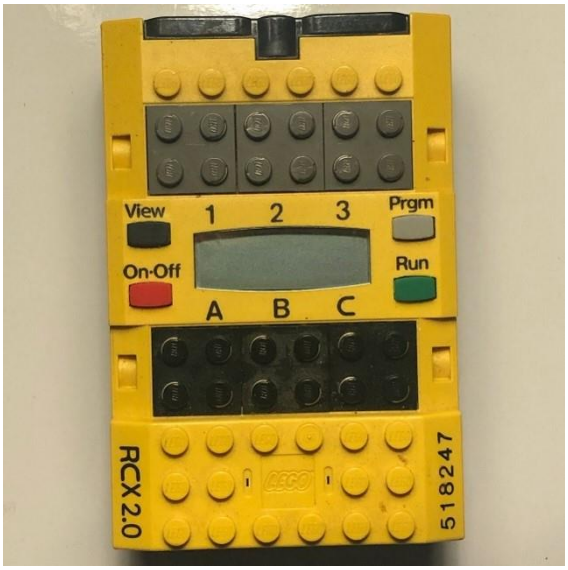
Chapter 1: History of Mindstorms.



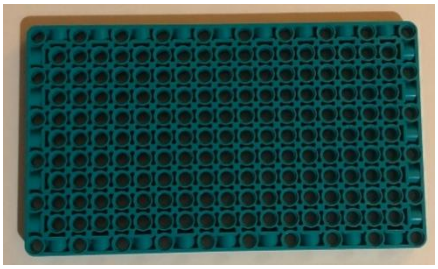
EV3
LEGO

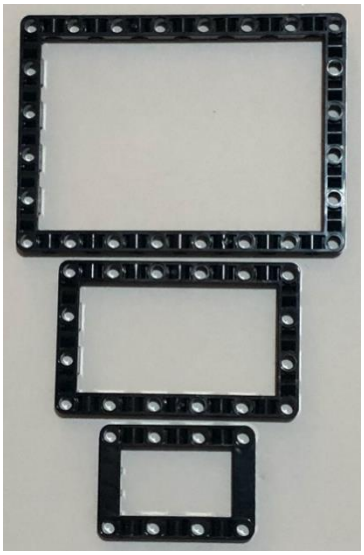
A
B
C
D
E
F

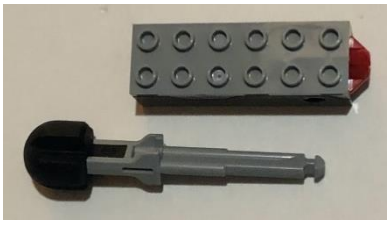
A
B
C
D
E
F

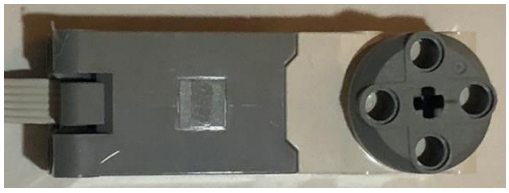
Chapter 2: Getting Started with the Robot Inventor Kit.

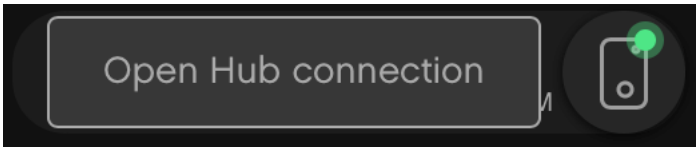
A
B
C
D
E
F

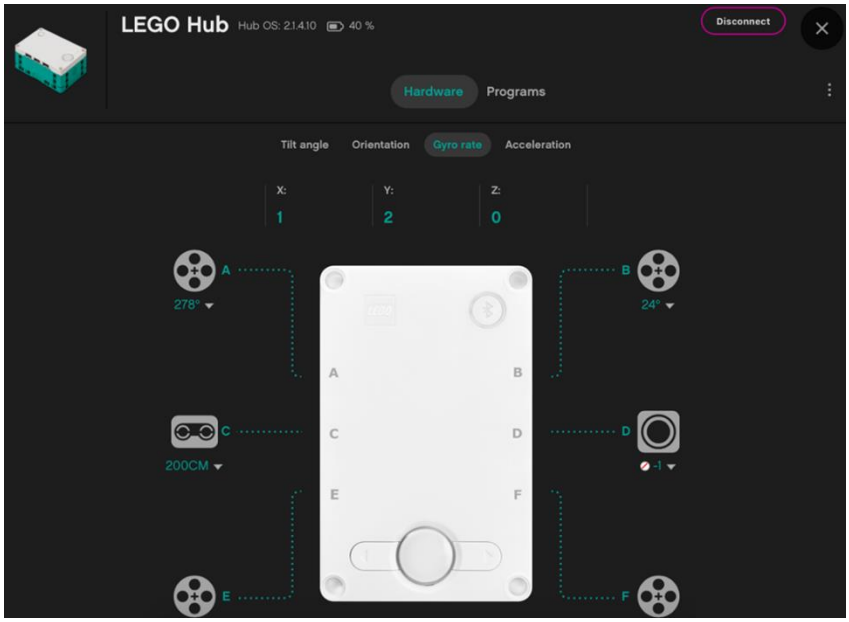


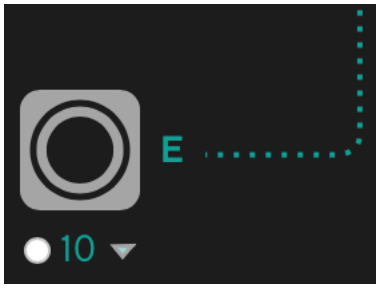


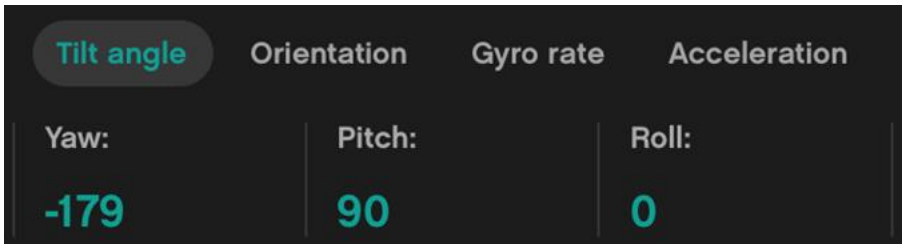


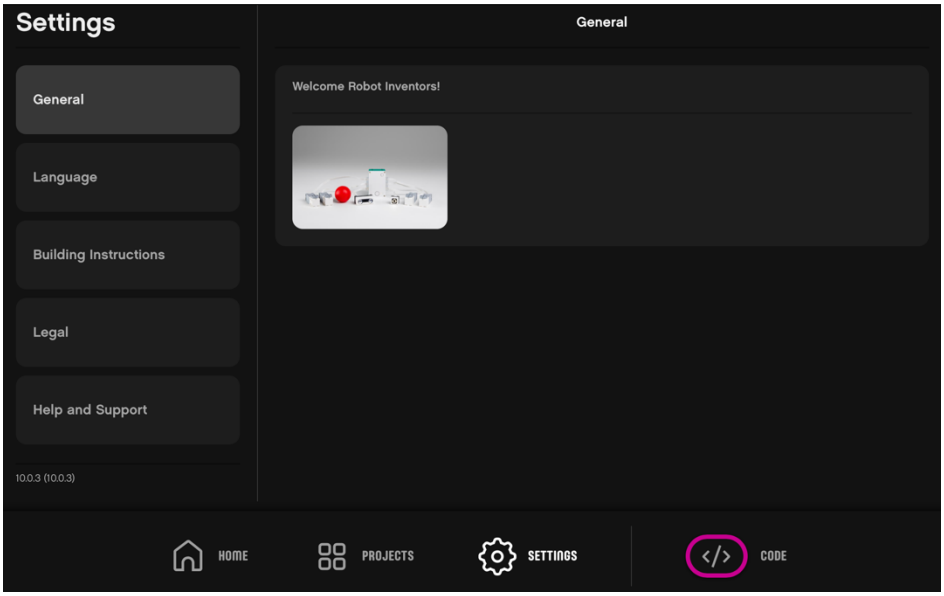



Open Hub connection

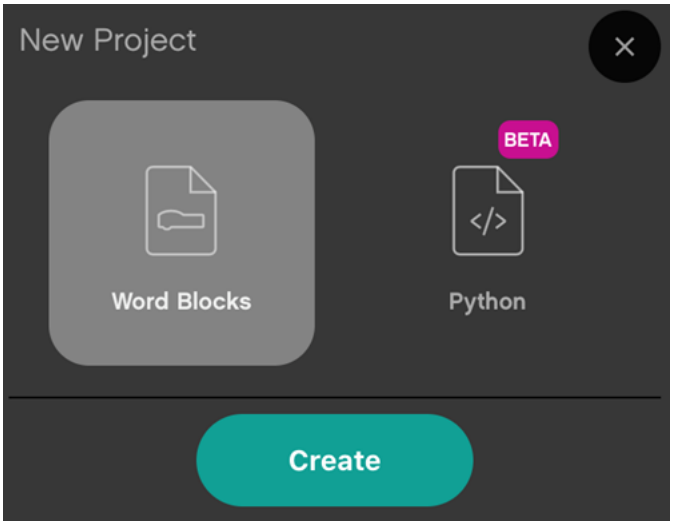

LEGO Hub
Hub OS: 2.1.4.10
40 %
Disconnect
Hardware
Programs
Tilt angle
Orientation
Gyro rate
Acceleration
X:
1
Y:
2
Z:
0
A
278°
B
24°
C
200CM
D
-1
E
F

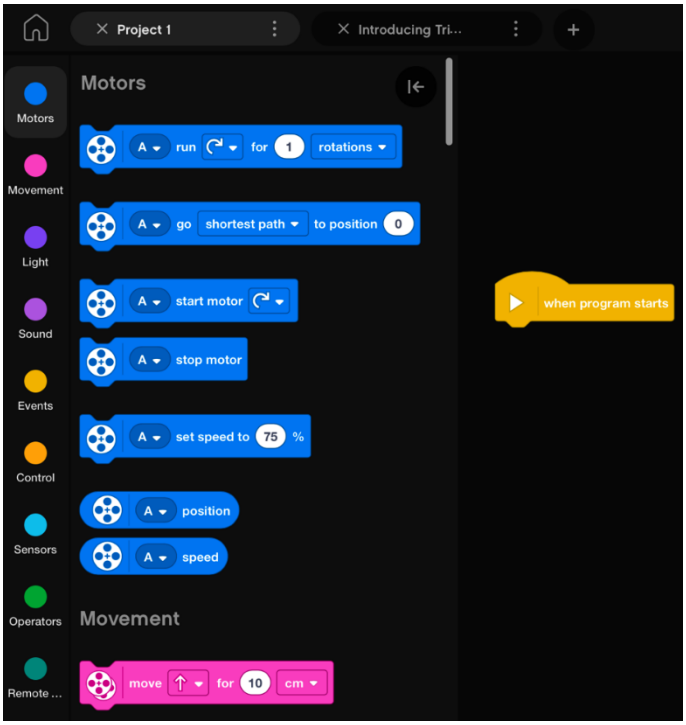

E
10


Tilt angle
Orientation
Gyro rate
Acceleration
Yaw:
-179
Pitch:
90
Roll:
0

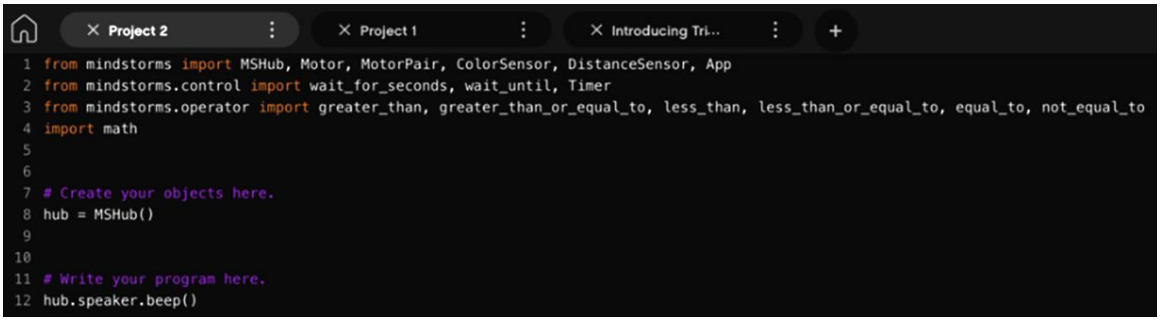

Settings
General
Language
Building Instructions
Legal
Help and Support
10.0.3 (10.0.3)
General
Welcome Robot Inventors!
HOME
PROJECTS
SETTINGS
CODE

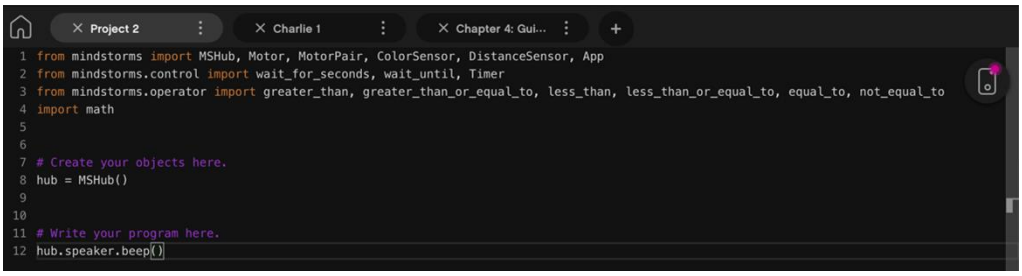
mindstorms
CHARLIE
TRICKY
BLAST
M.V.P.
GELO
HOME
PROJECTS
SETTINGS
CODE


New Project
BETA
Word Blocks
Python
Create


Project 1
Introducing Tri...
Motors
Movement
Light
Sound
Events
Control
Sensors
Operators
Remote ...
A run for 1 rotations
A go shortest path to position 0
A start motor
A stop motor
A set speed to 75 %
A position
A speed
Movement
move for 10 cm
when program starts

Remote ...


Project 2
Project 1
Introducing Tri...
from mindstorms import MSHub, Motor, MotorPair, ColorSensor, DistanceSensor, App
from mindstorms.control import wait_for_seconds, wait_until, Timer
from mindstorms.operator import greater_than, greater_than_or_equal_to, less_than, less_than_or_equal_to, equal_to, not_equal_to
import math
# Create your objects here.
hub = MSHub()
# Write your program here.
hub.speaker.beep()


Project 2
Charlie 1
Chapter 4: Gui...
from mindstorms import MSHub, Motor, MotorPair, ColorSensor, DistanceSensor, App
from mindstorms.control import wait_for_seconds, wait_until, Timer
from mindstorms.operator import greater_than, greater_than_or_equal_to, less_than, less_than_or_equal_to, equal_to, not_equal_to
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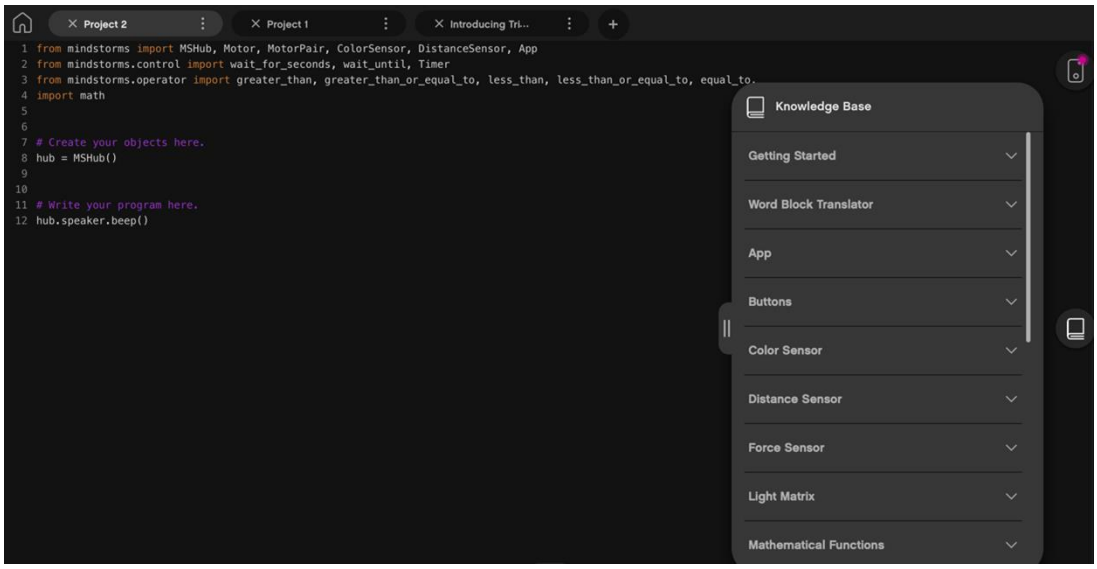
Project 2
Project 1
Introducing Tri...
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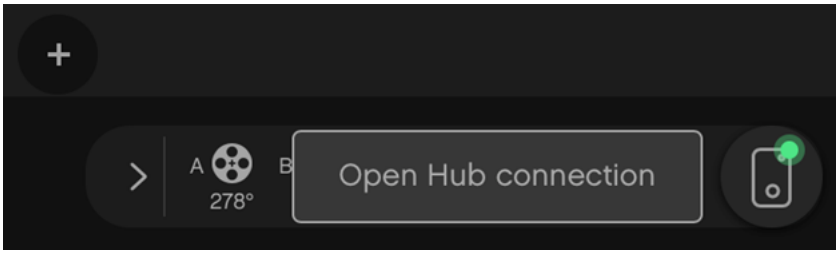
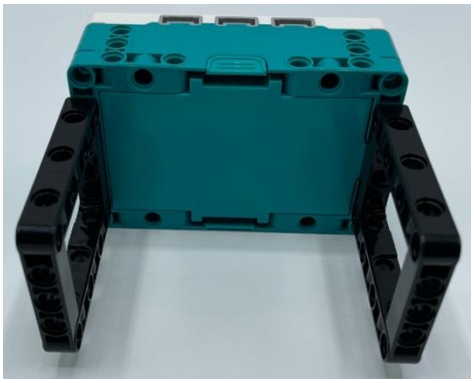
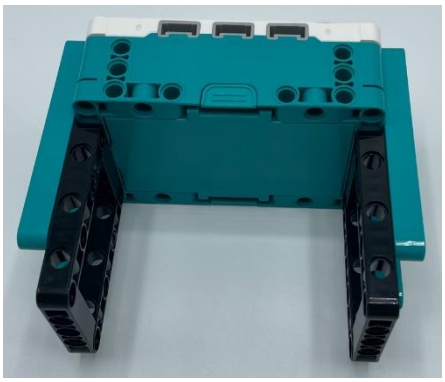
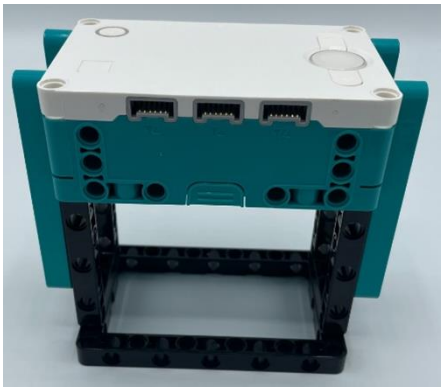
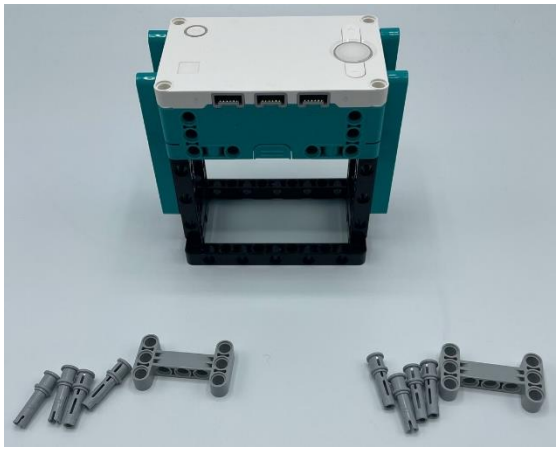
from mindstorms.operator import greater_than, greater_than_or_equal_to, less_than, less_than_or_equal_to, equal_to,
import math
# Create your objects here.
hub = MSHub()
# Write your program here.
hub.speaker.beep()
Knowledge Base
Getting Started
Word Block Translator
App
Buttons
Color Sensor
Distance Sensor
Force Sensor
Light Matrix
Mathematical Functions

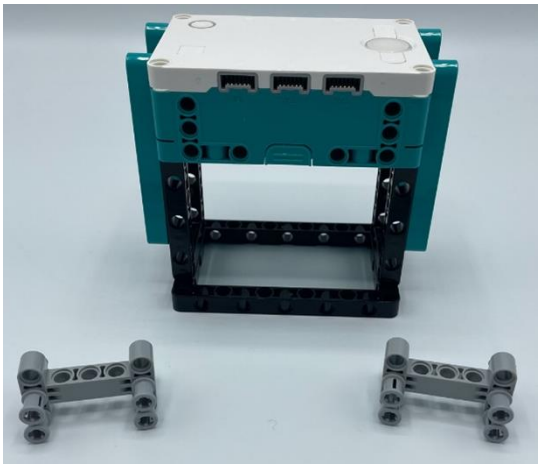

A
278°
B
Open Hub connection



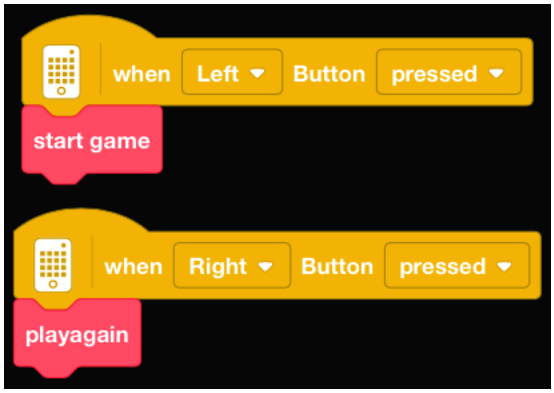


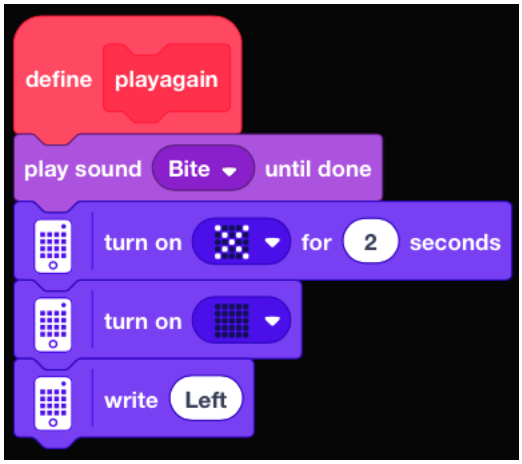




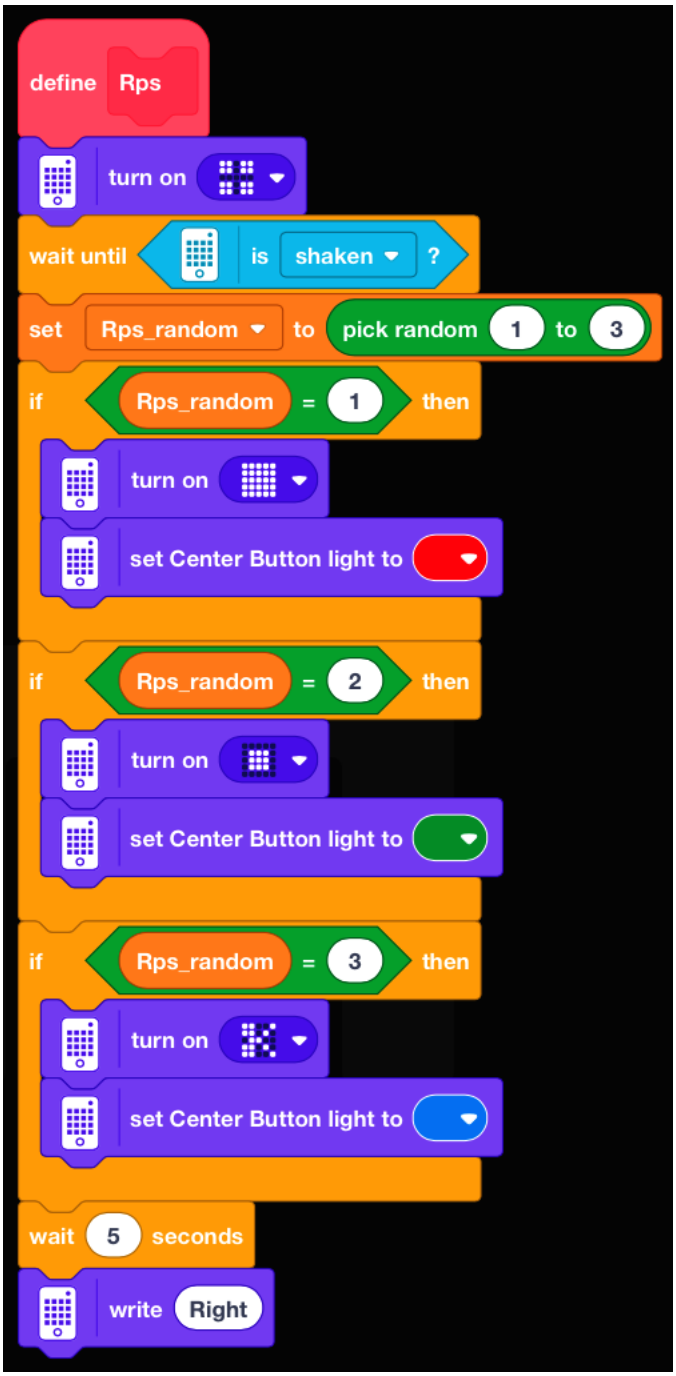


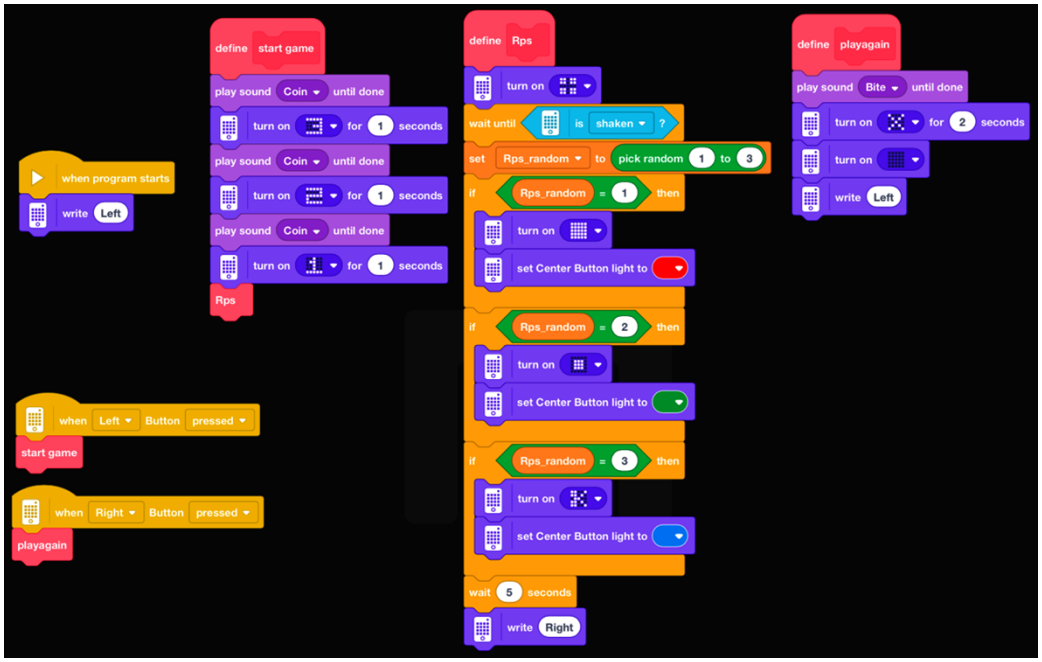
when program starts
write
Left


when
Left
Button
pressed
start game
when
Right
Button
pressed
playagain

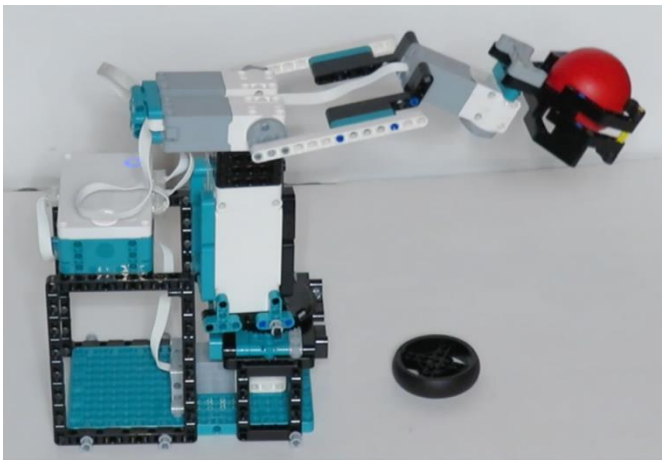

define playagain
play sound Bite until done
turn on for 2 seconds
turn on
write Left

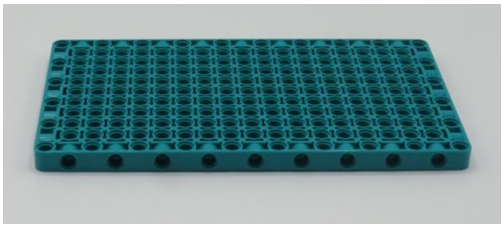
define start game
play sound Coin until done
turn on for 1 seconds
play sound Coin until done
turn on for 1 seconds
play sound Coin until done
turn on for 1 seconds
Rps

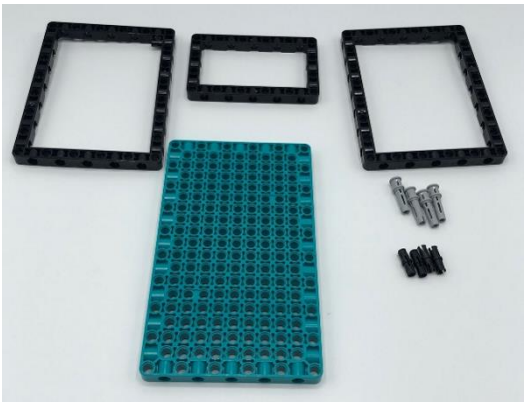

define Rps
turn on
wait until is shaken ?
set Rps_random to pick random 1 to 3
if Rps_random = 1 then
turn on
set Center Button light to
if Rps_random = 2 then
turn on
set Center Button light to
if Rps_random = 3 then
turn on
set Center Button light to
wait 5 seconds
write Right

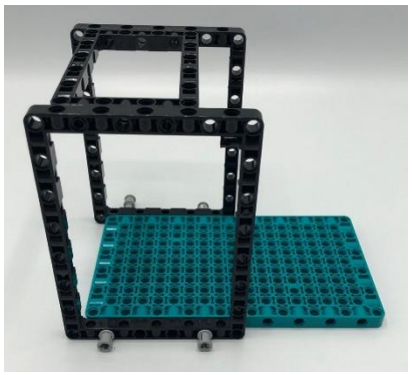

when program starts
write Left
define start game
play sound Coin until done
turn on for 1 seconds
play sound Coin until done
turn on for 1 seconds
play sound Coin until done
turn on for 1 seconds
Rps
when Left Button pressed
start game
when Right Button pressed
playagain
define Rps
turn on
wait until is shaken ?
set Rps_random to pick random 1 to 3
if Rps_random = 1 then
turn on
set Center Button light to
if Rps_random = 2 then
turn on
set Center Button light to
if Rps_random = 3 then
turn on
set Center Button light to
wait 5 seconds
write Right
define playagain
play sound Bite until done
turn on for 2 seconds
turn on
write Left

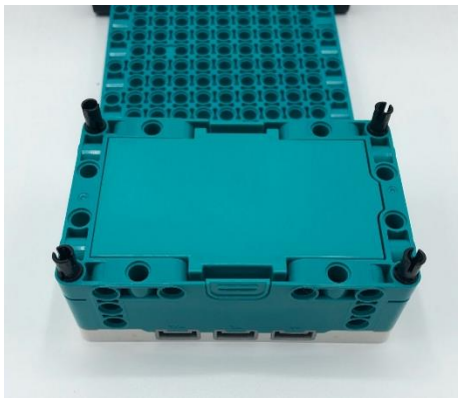
Chapter 3: Building an Industrial Robot Claw.

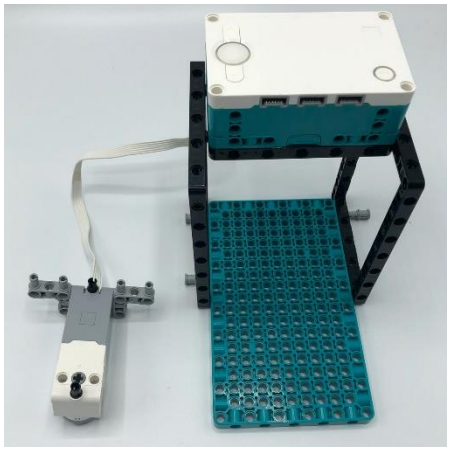


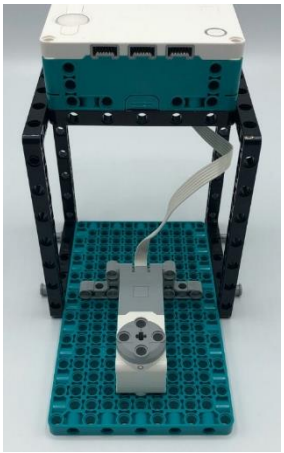


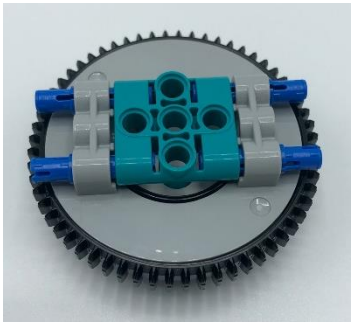


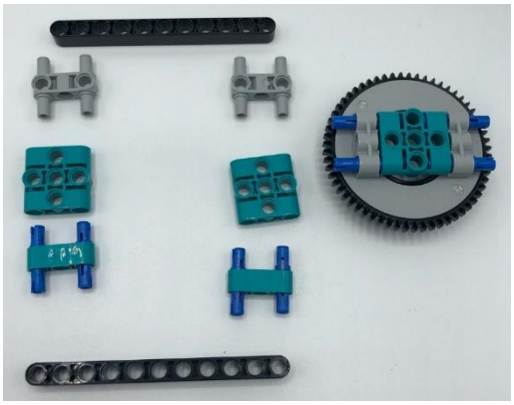


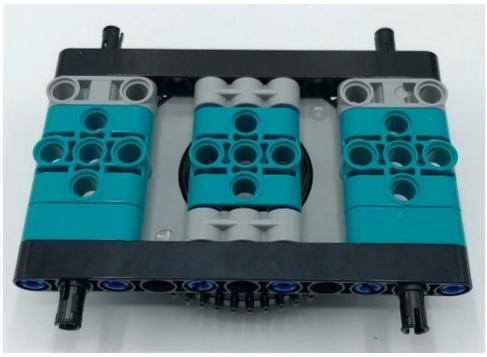


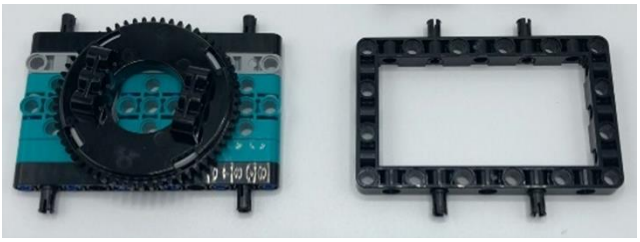


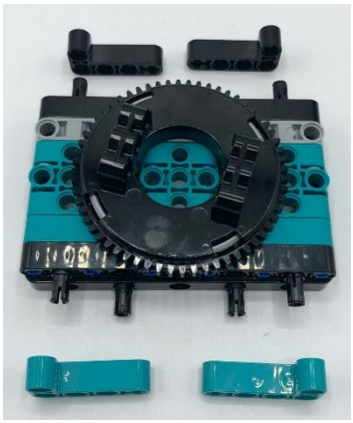


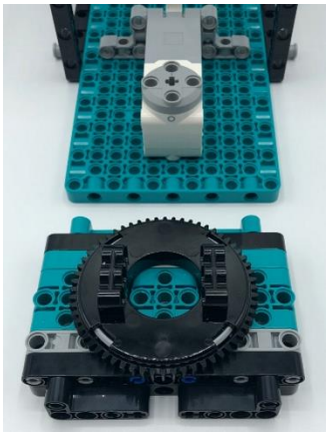


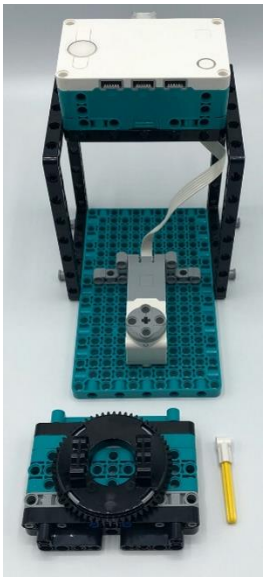


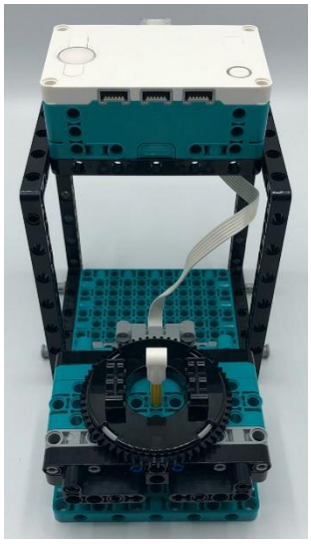


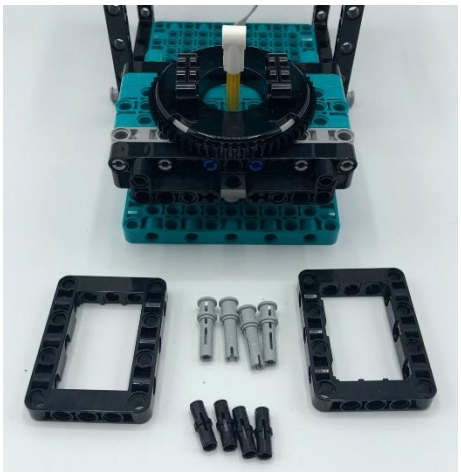


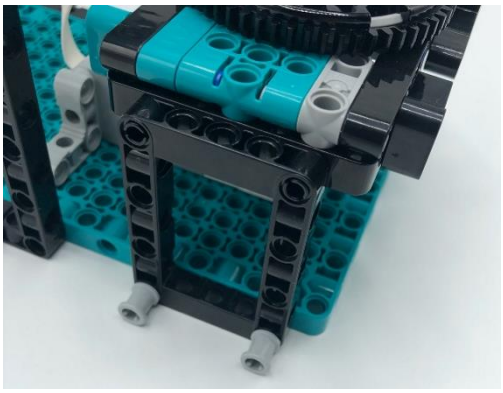


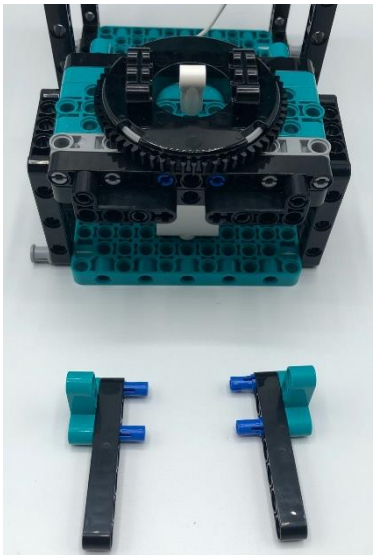


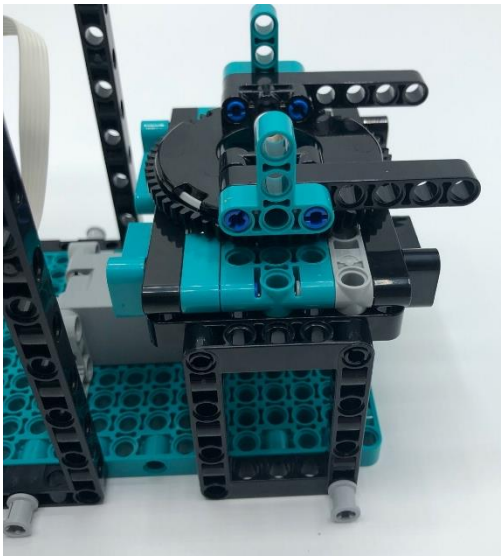


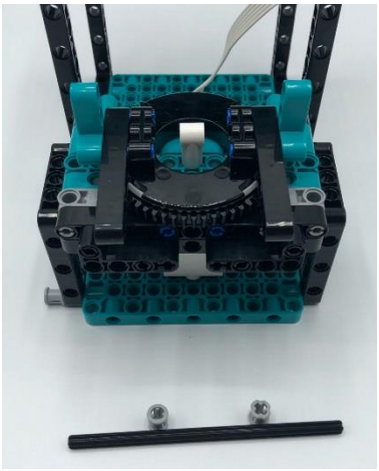


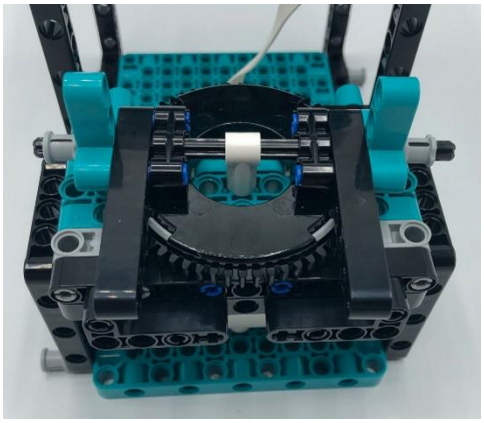


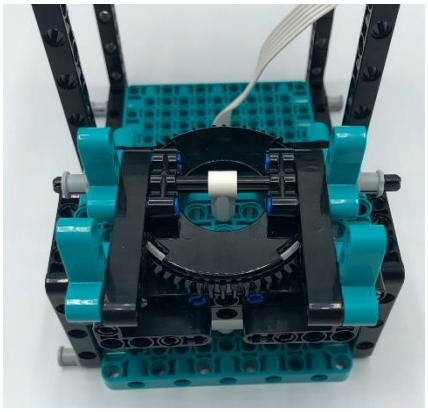


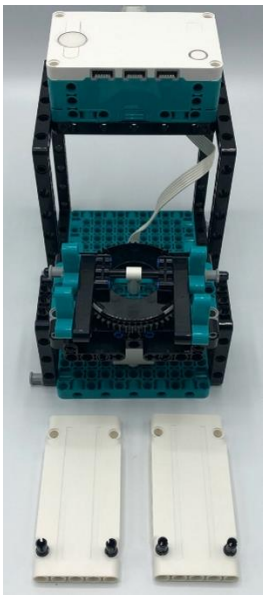


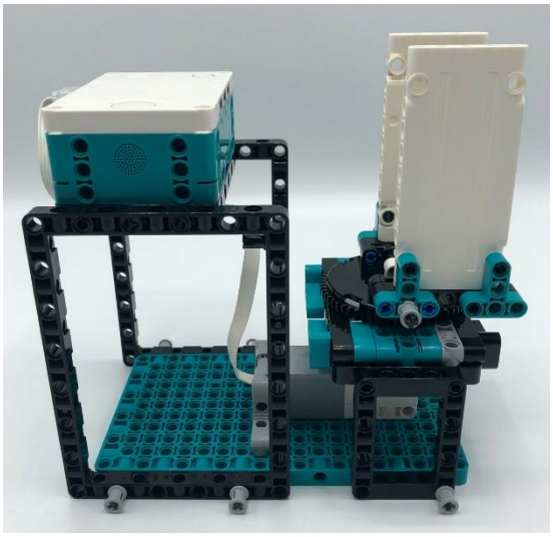


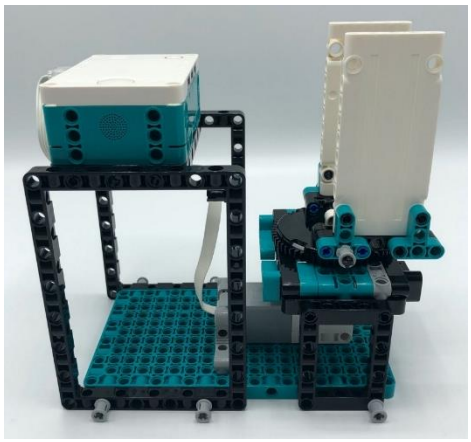


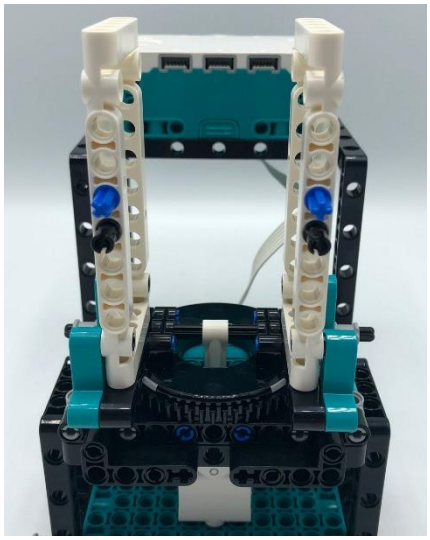


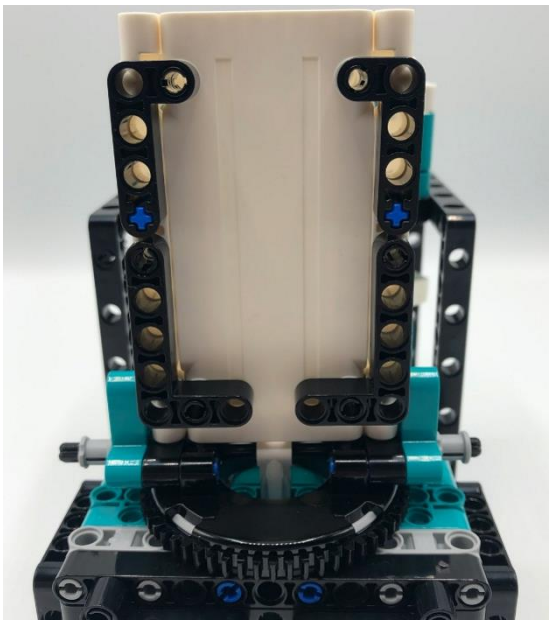


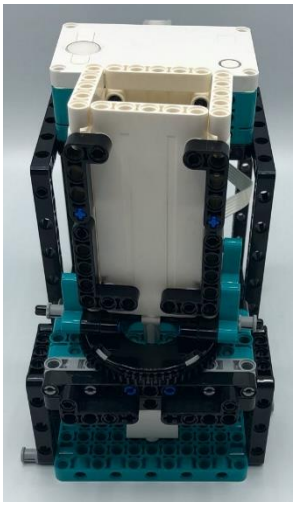


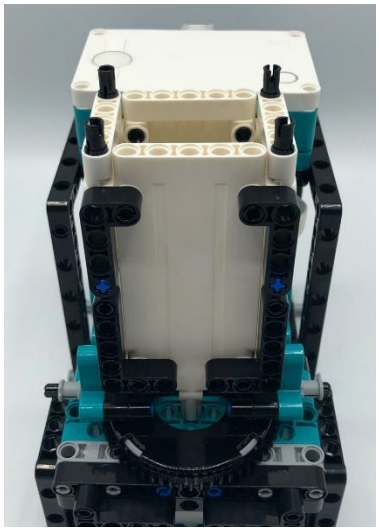


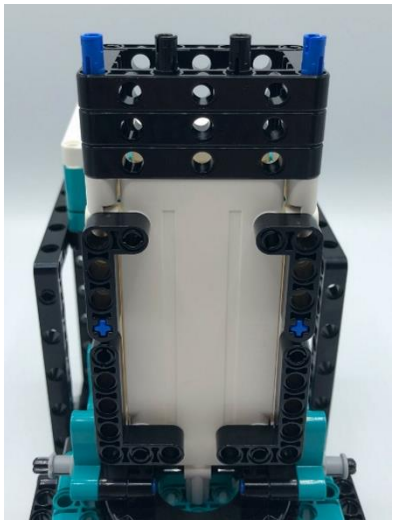


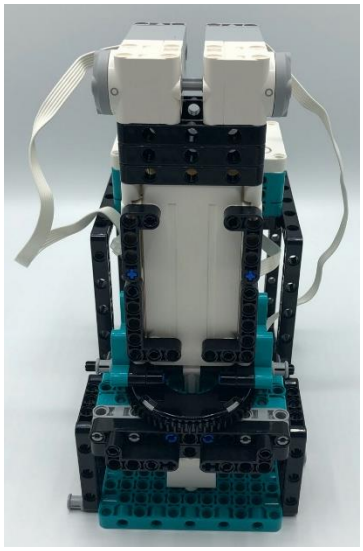


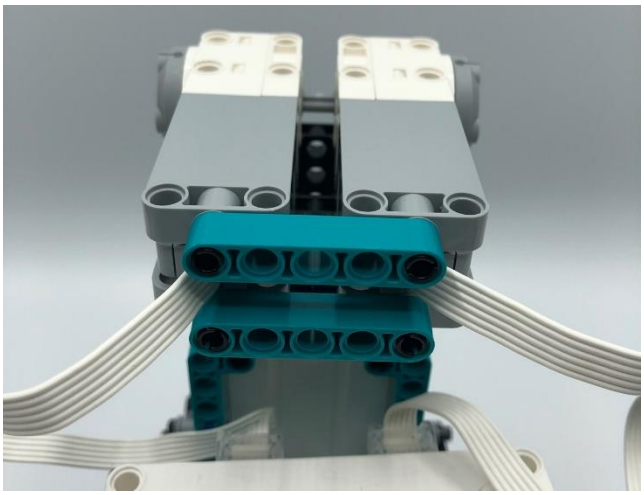


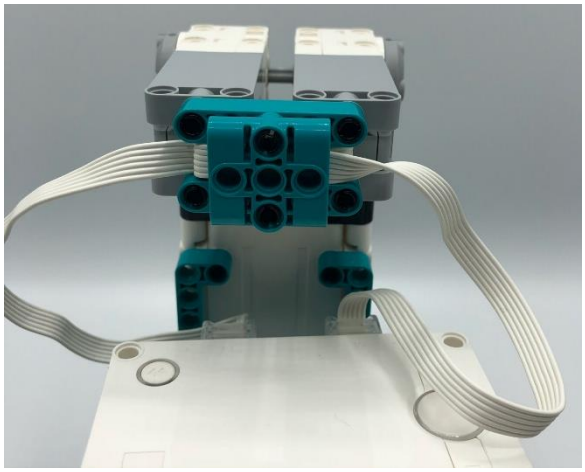


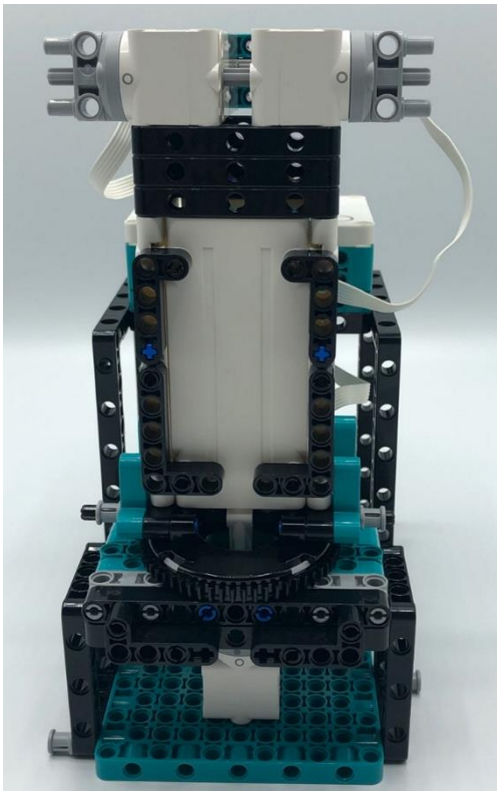


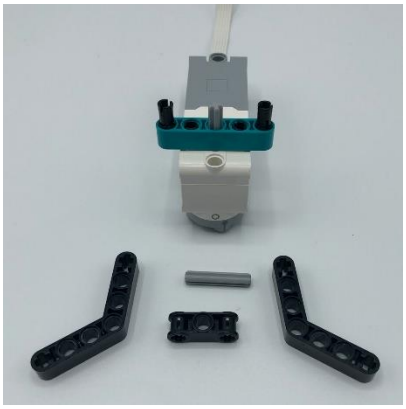


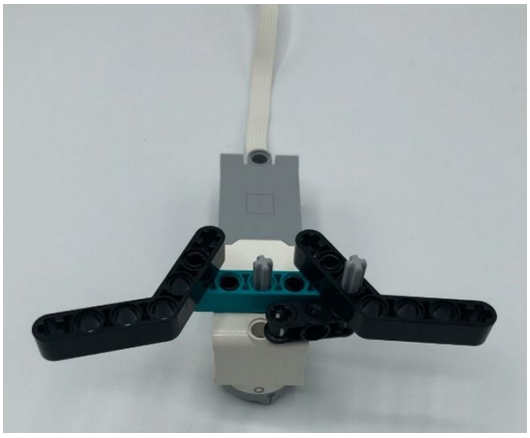


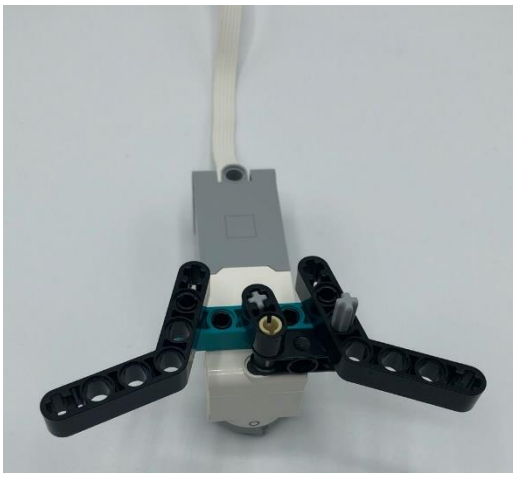


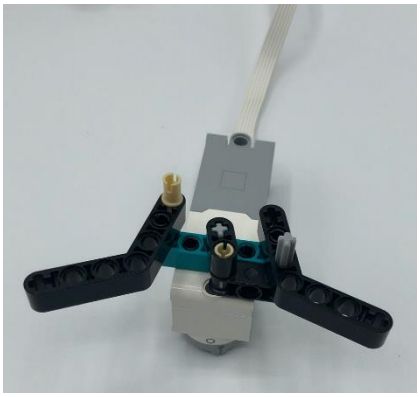


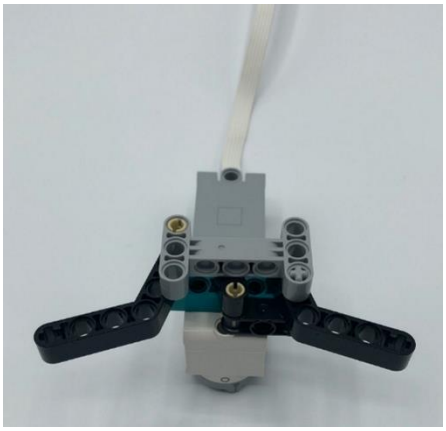


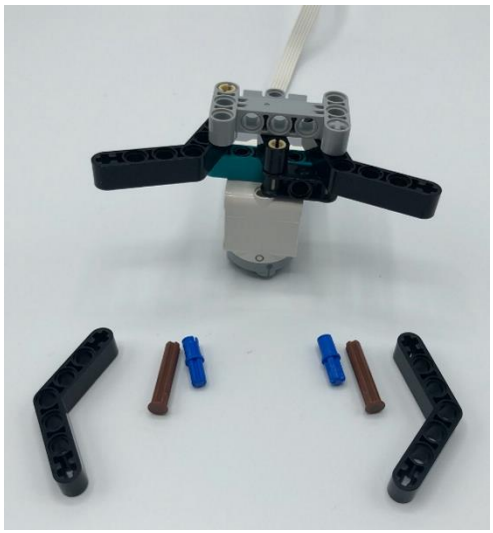


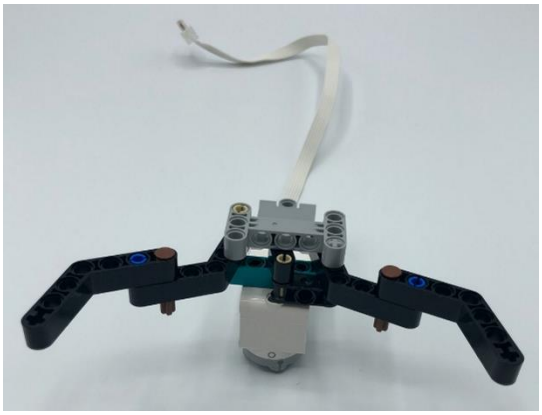


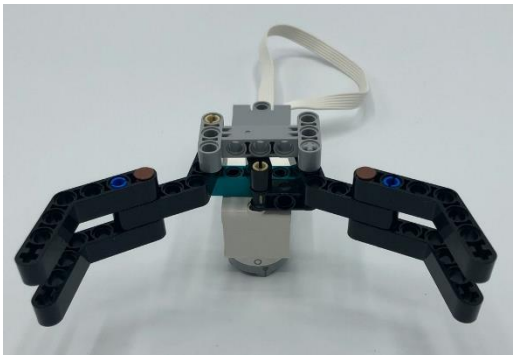


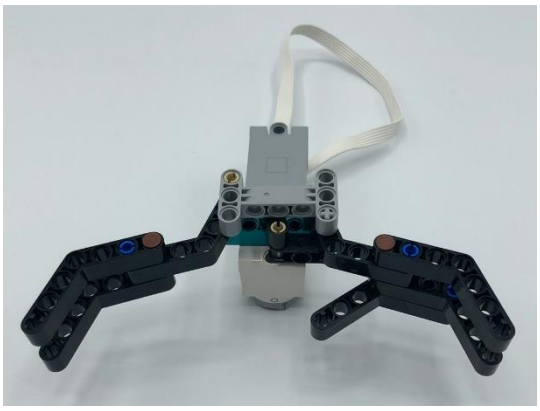


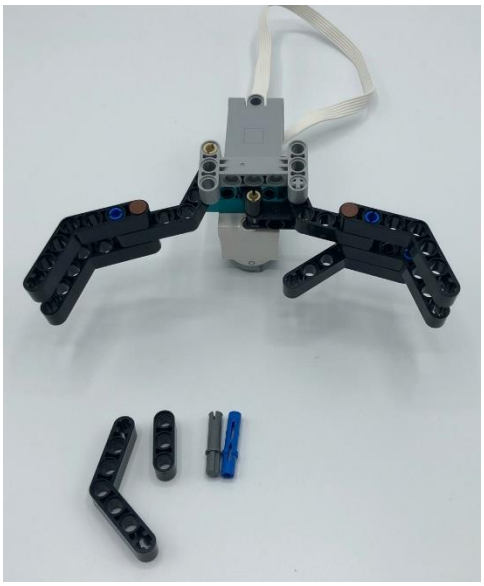


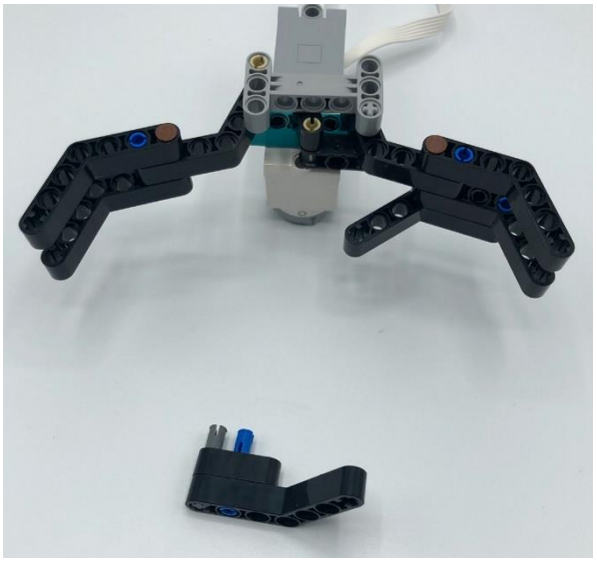


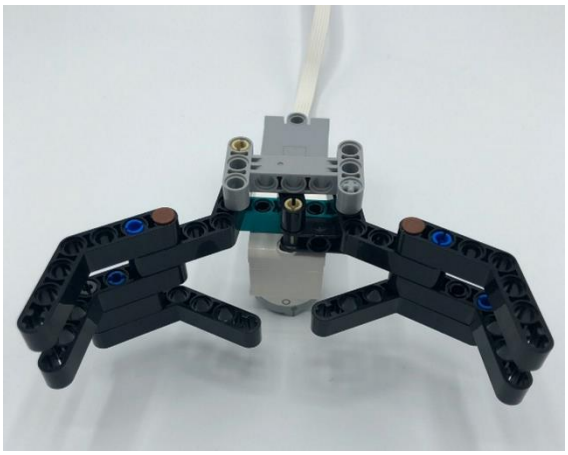


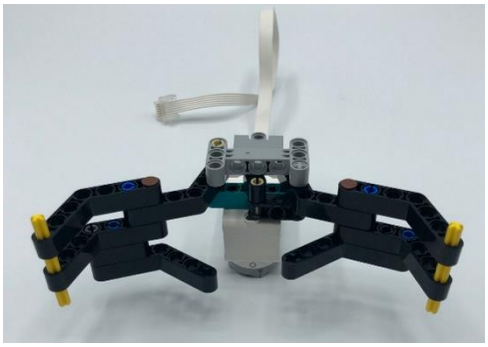


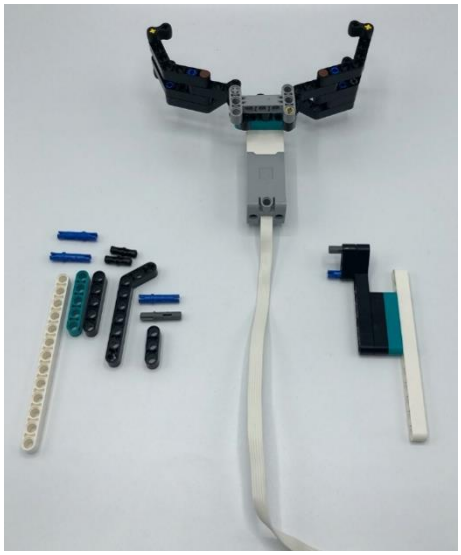


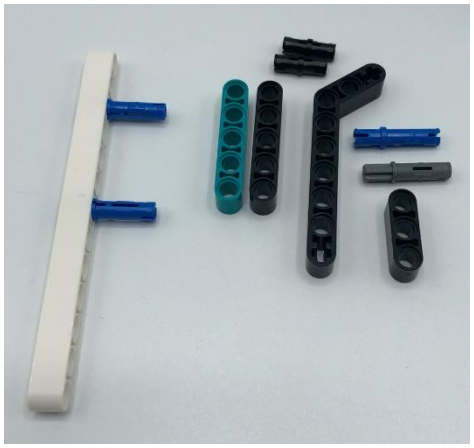


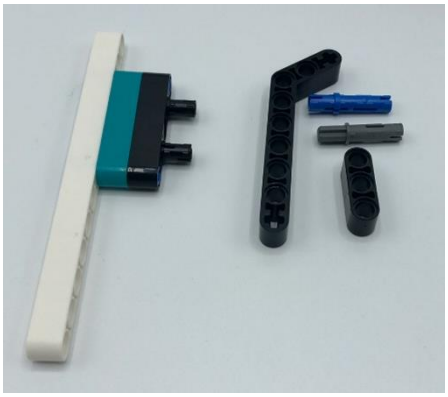


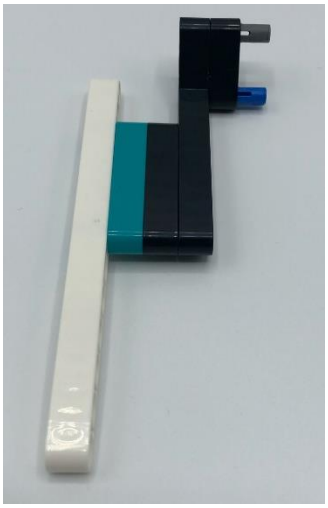


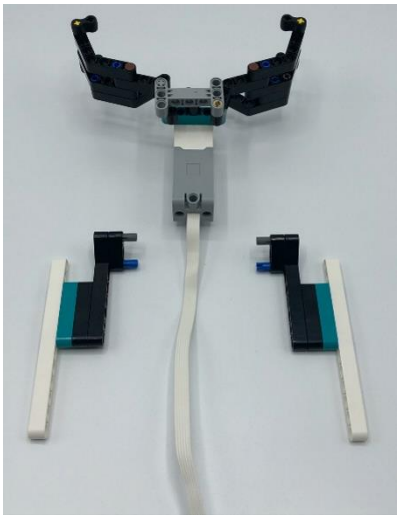


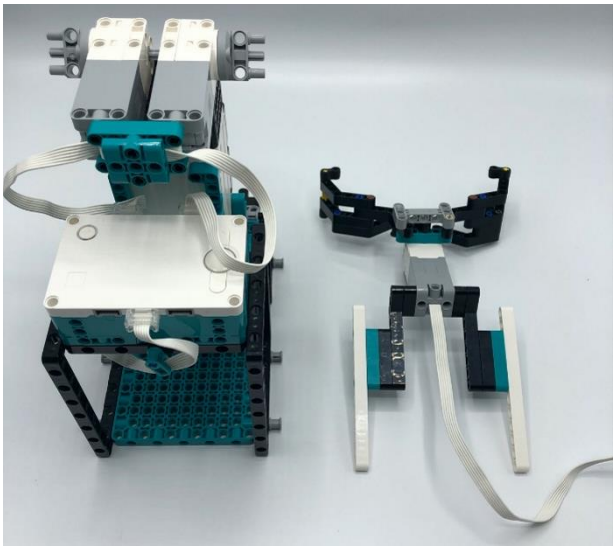


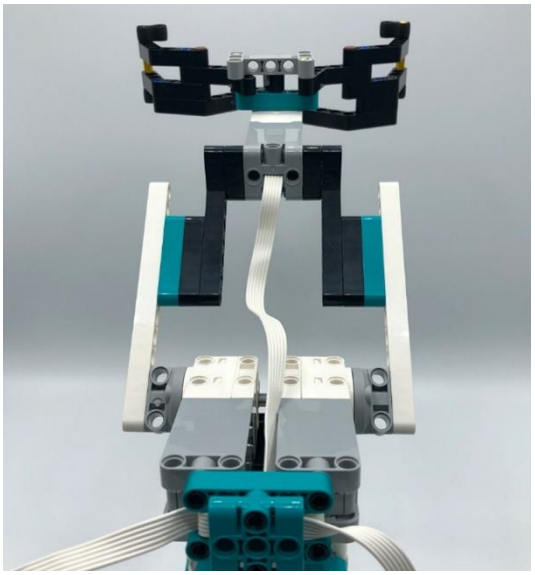


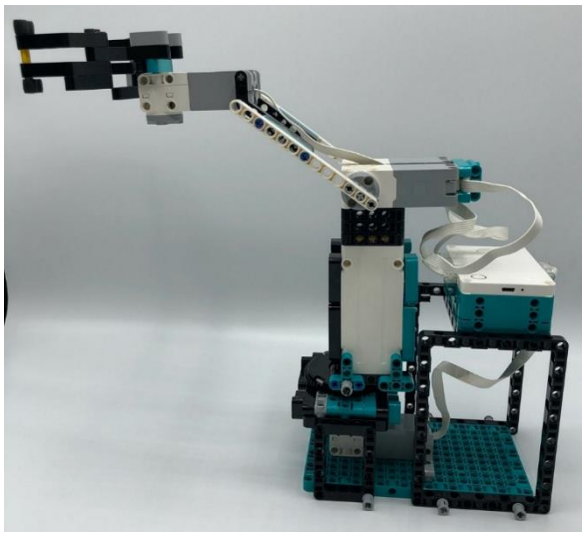


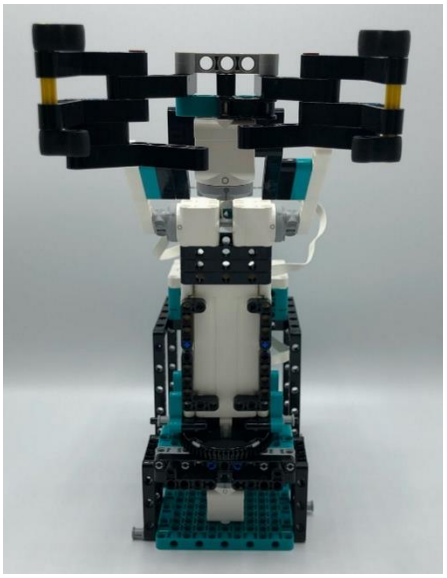


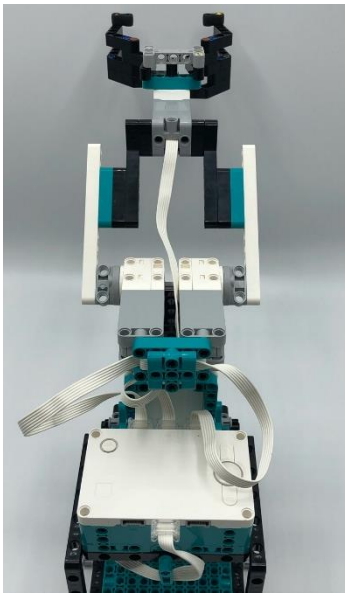


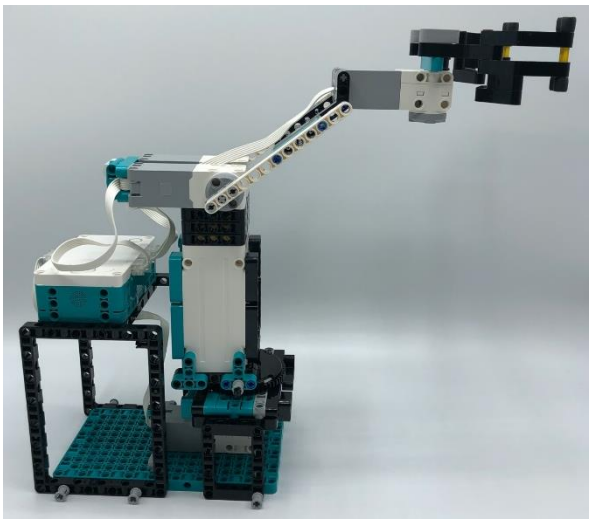


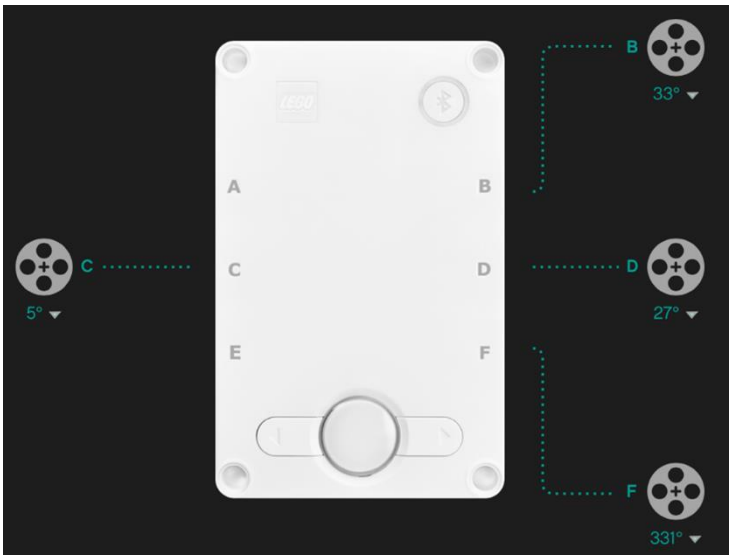


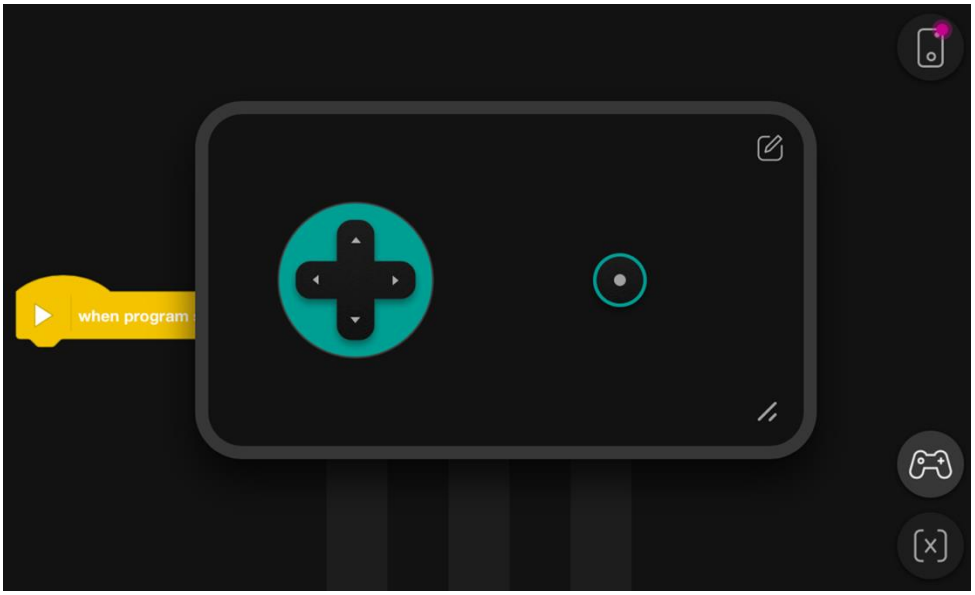


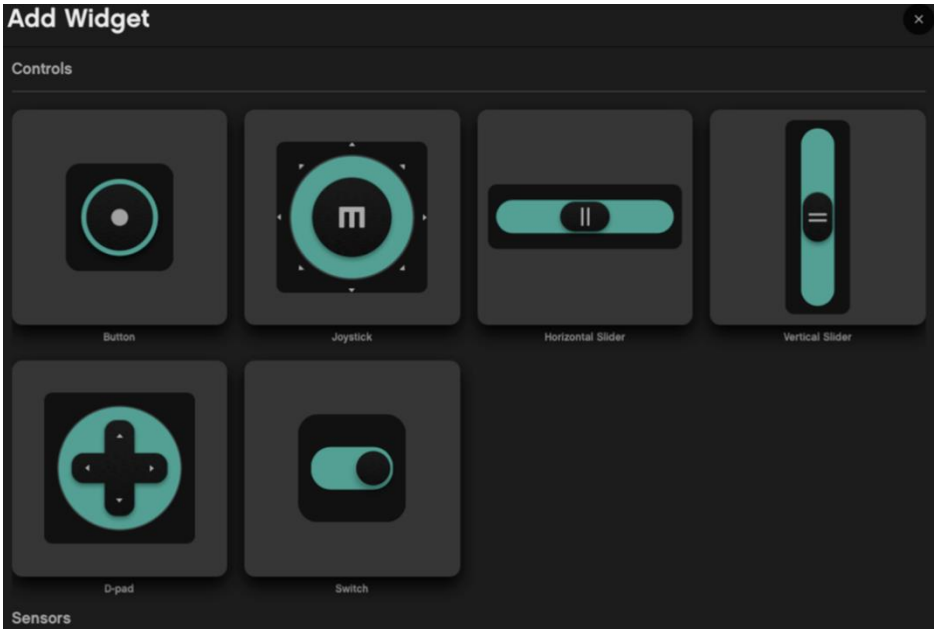


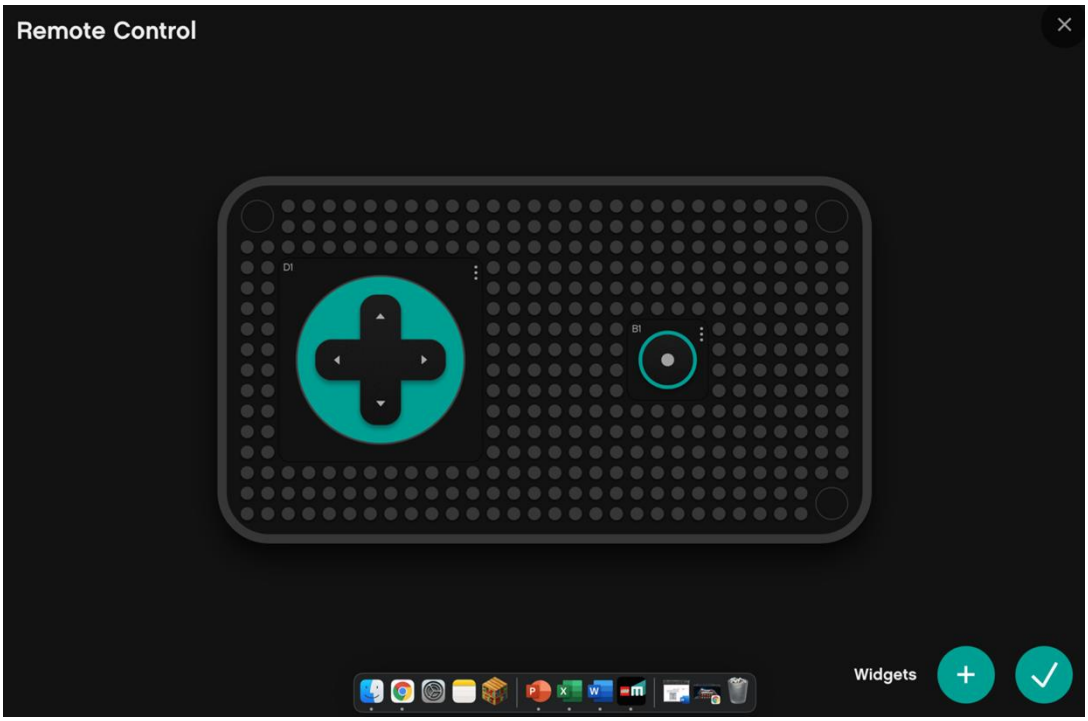


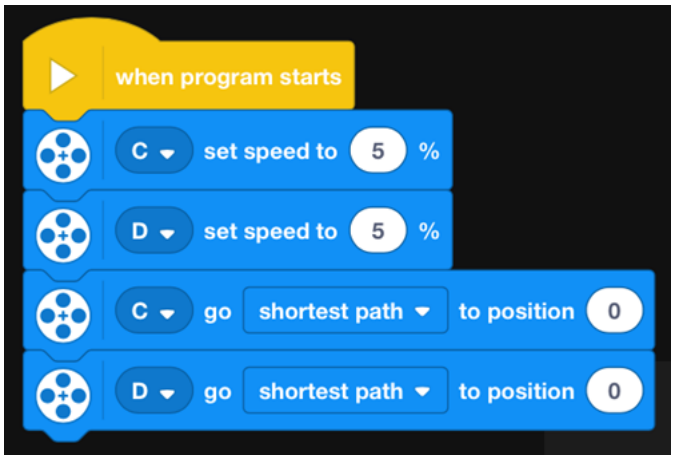


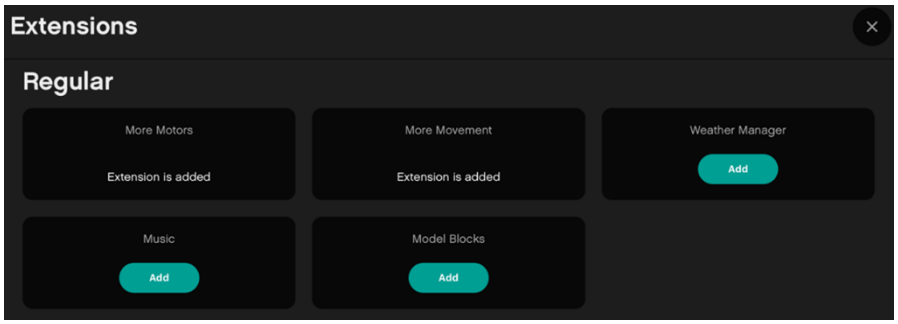

B
33°
A
B
C
C
D
D
27°
E
F
F
331°

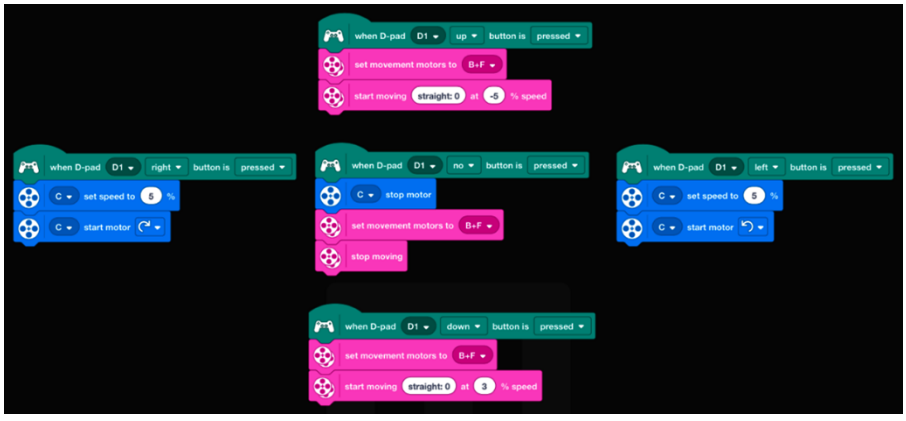

when program

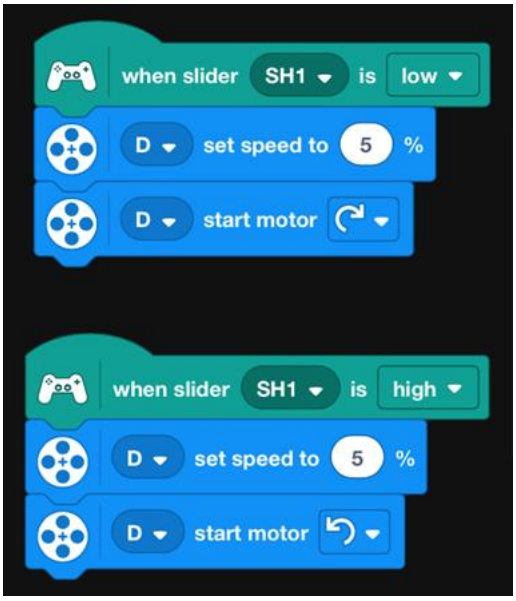

Add Widget
Controls
Button
Joystick
Horizontal Slider
Vertical Slider
D-pad
Switch
Sensors

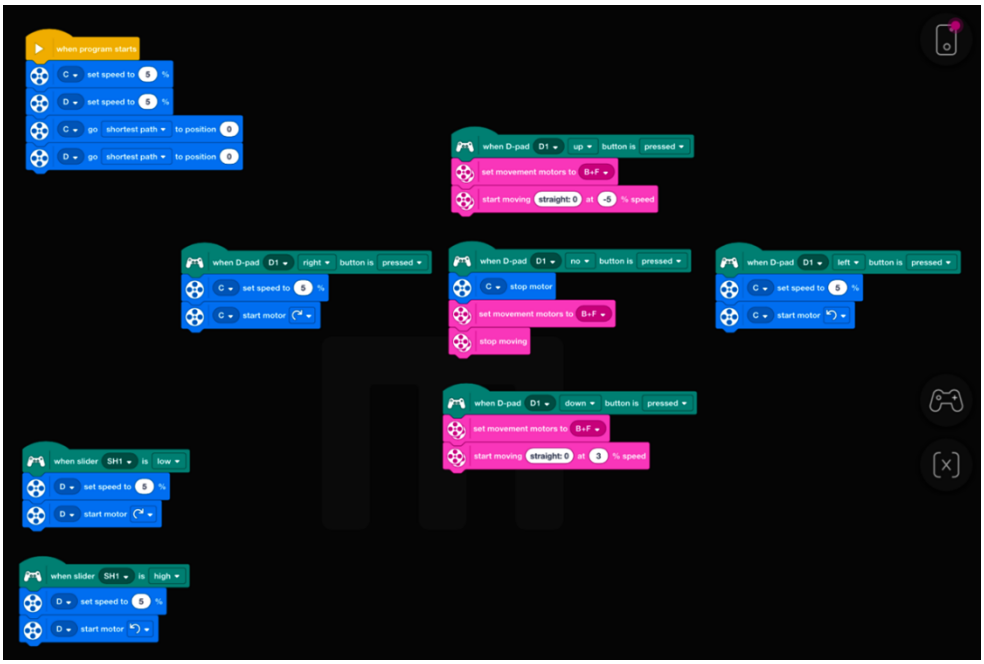

Remote Control
D1
B1
Widgets


when program starts
C set speed to 5 %
D set speed to 5 %
C go shortest path to position 0
D go shortest path to position 0

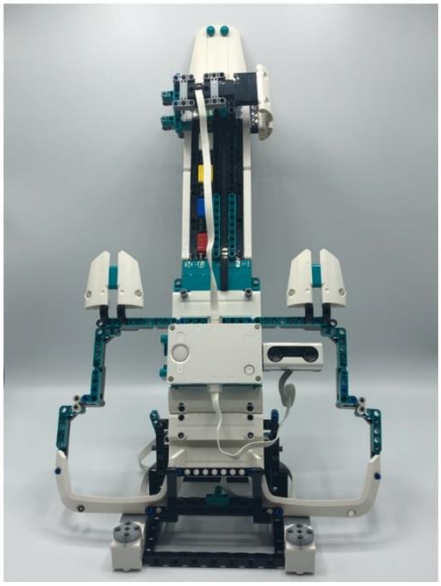

Extensions
Regular
More Motors
Extension is added
More Movement
Extension is added
Weather Manager
Add
Music
Add
Model Blocks
Add

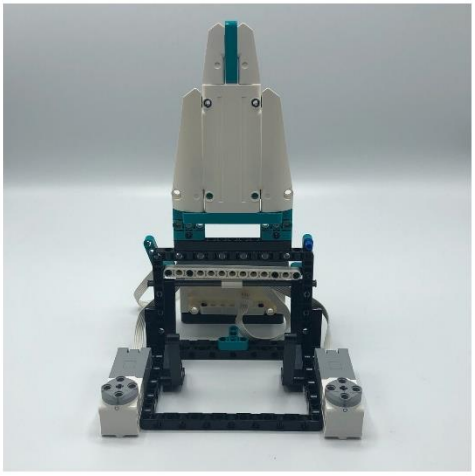

when D-pad D1 up button is pressed
set movement motors to B+F
start moving straight: 0 at -5 % speed
when D-pad D1 right button is pressed
C set speed to 5 %
C start motor
when D-pad D1 no button is pressed
C stop motor
set movement motors to B+F
stop moving
when D-pad D1 left button is pressed
C set speed to 5 %
C start motor
when D-pad D1 down button is pressed
set movement motors to B+F
start moving straight: 0 at 3 % speed

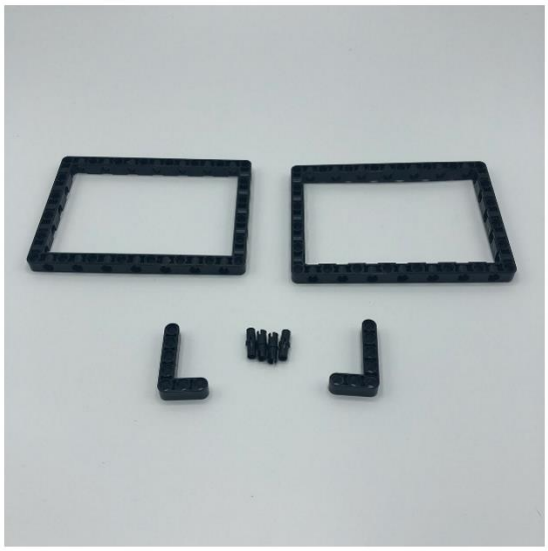

when slider SH1 is low
D set speed to 5 %
D start motor
when slider SH1 is high
D set speed to 5 %
D start motor

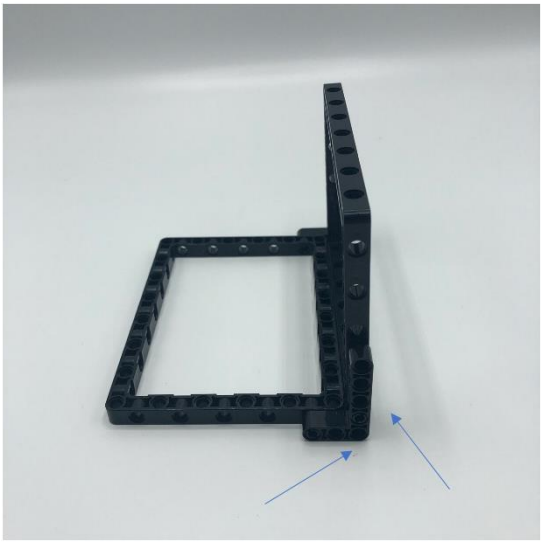

when program starts
C set speed to 5 %
D set speed to 5 %
C go shortest path to position 0
D go shortest path to position 0
when D-pad D1 up button is pressed
set movement motors to B+F
start moving straight: 0 at -5 % speed
when D-pad D1 right button is pressed
C set speed to 5 %
C start motor
when D-pad D1 no button is pressed
C stop motor
set movement motors to B+F
stop moving
when D-pad D1 left button is pressed
C set speed to 5 %
C start motor
when D-pad D1 down button is pressed
set movement motors to B+F
start moving straight: 0 at 3 % speed
when slider SH1 is low
D set speed to 5 %
D start motor
when slider SH1 is high
D set speed to 5 %
D start motor

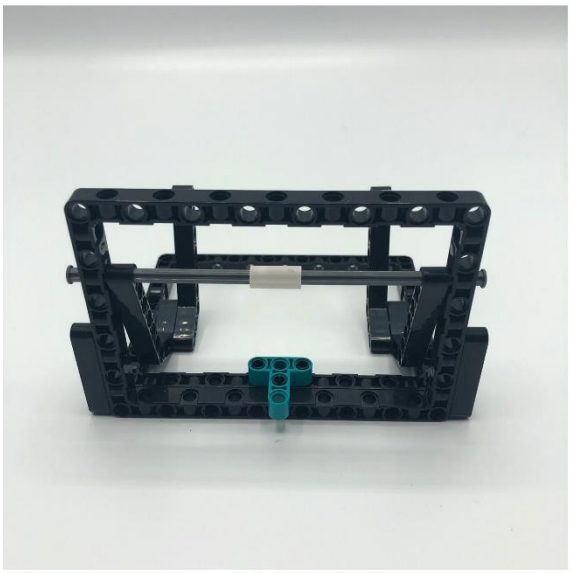
Chapter 4: Building a LEGO Guitar.

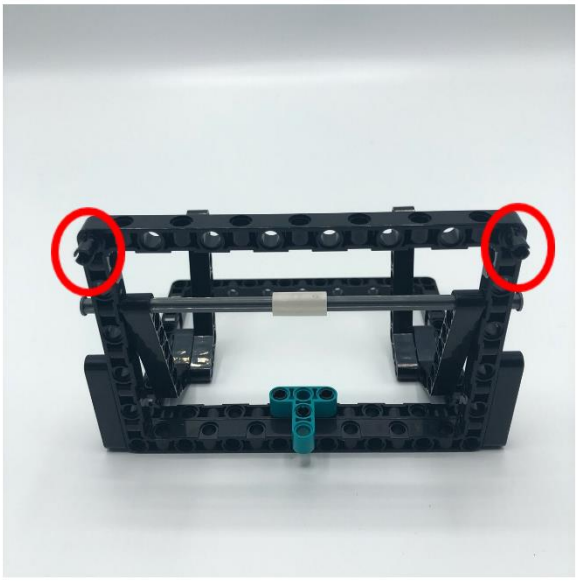


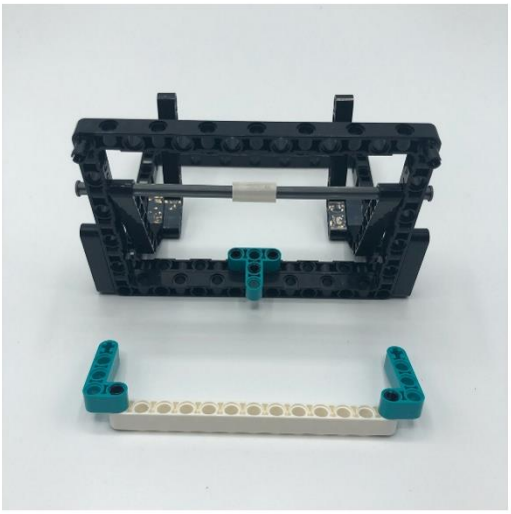


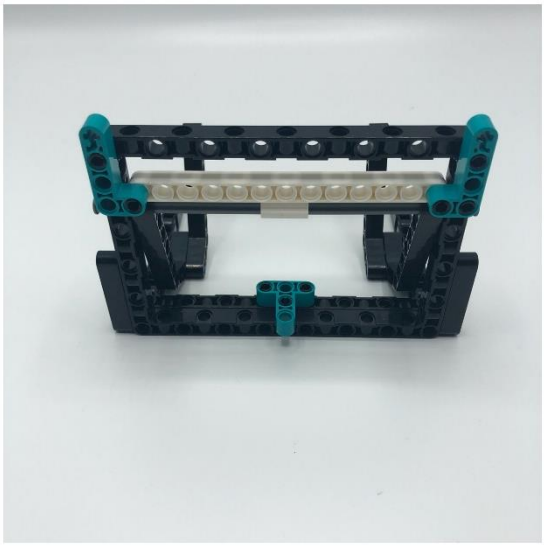


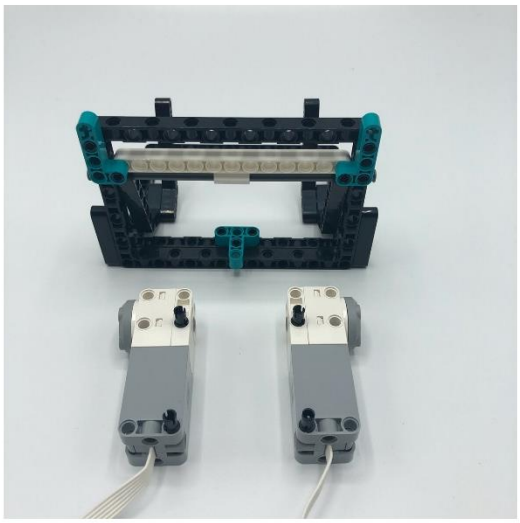


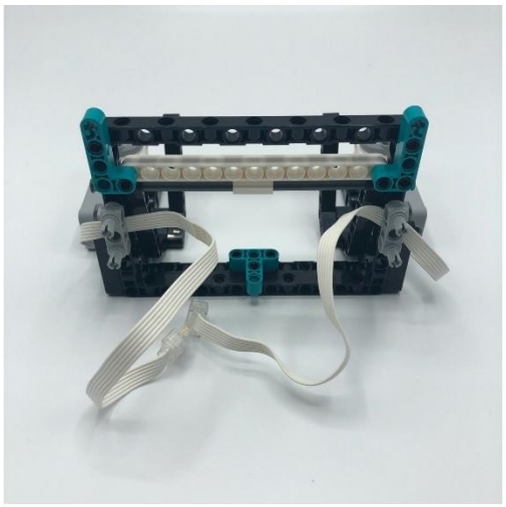


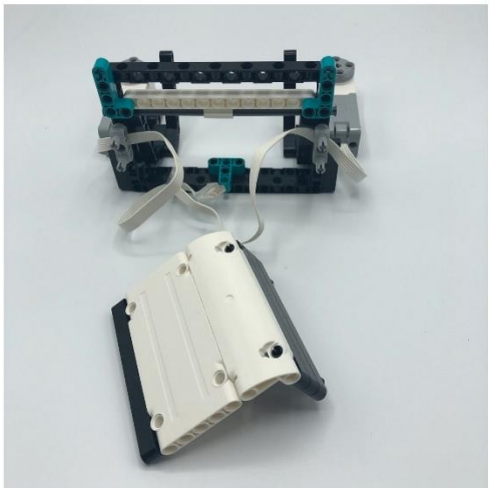


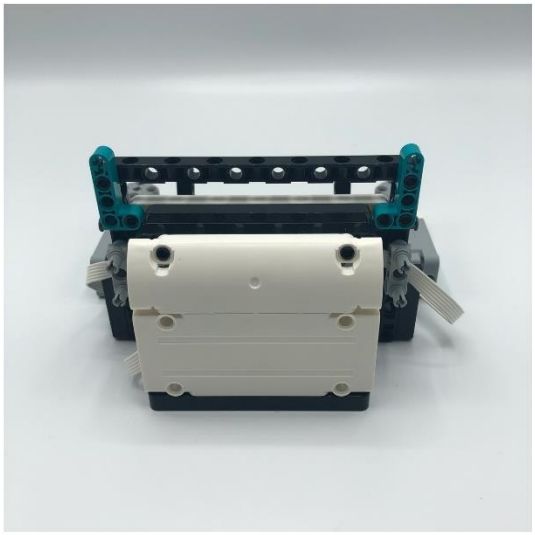


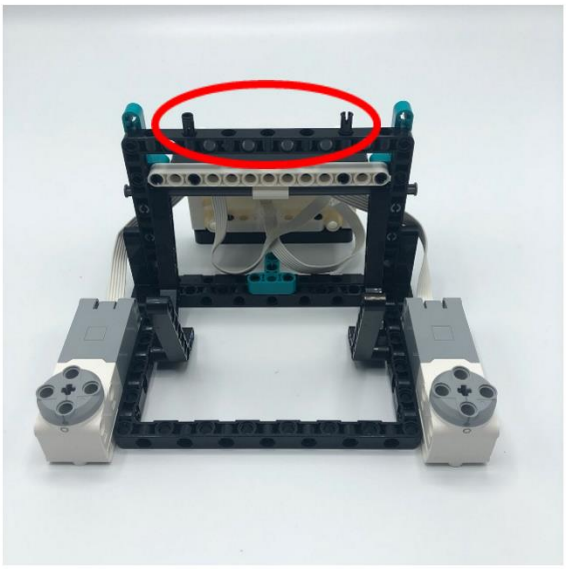


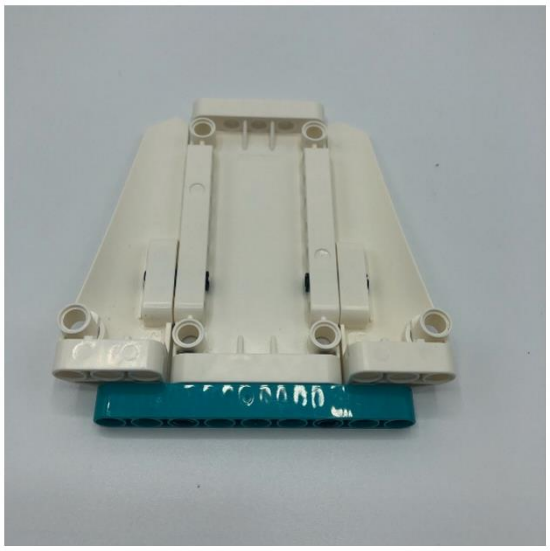


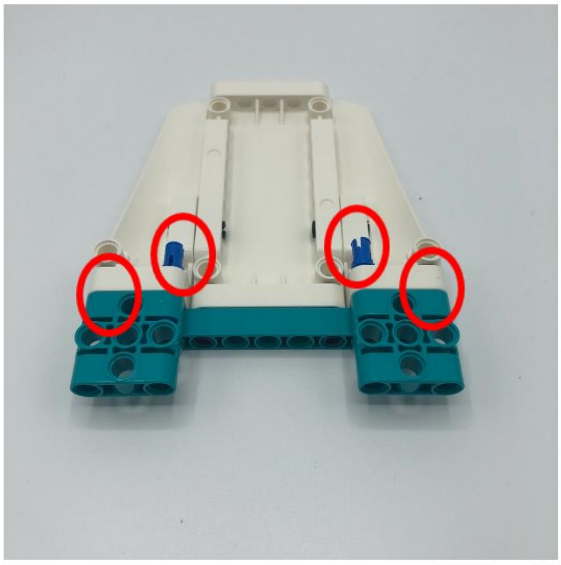


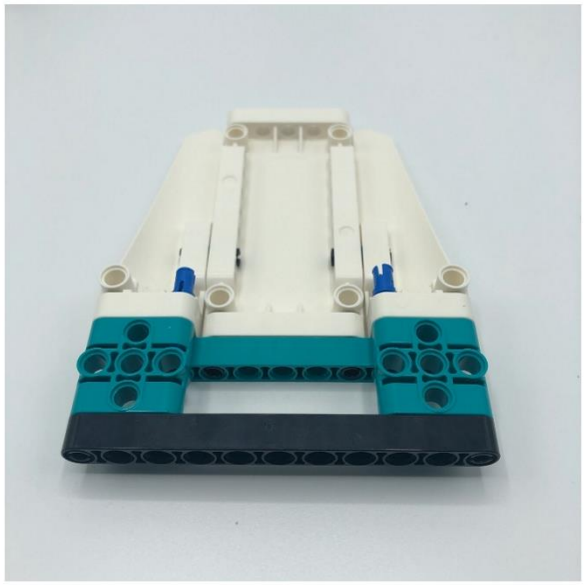


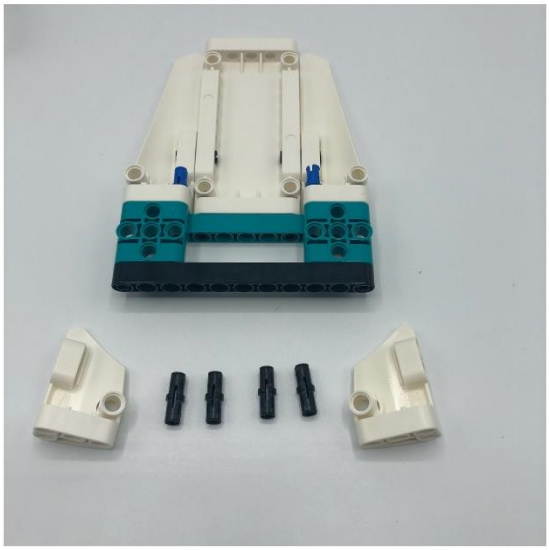


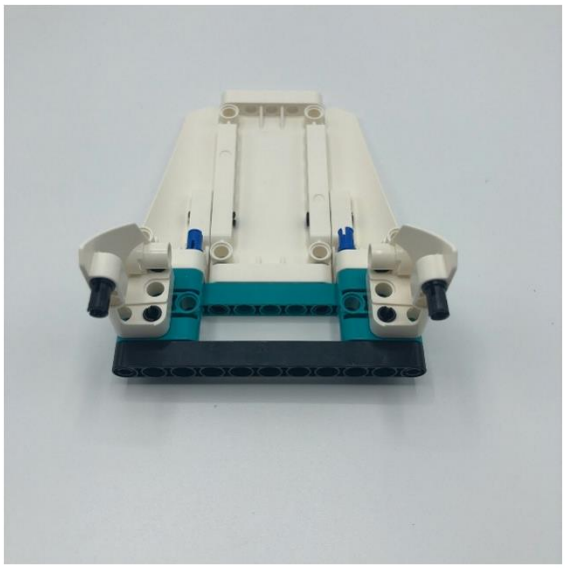


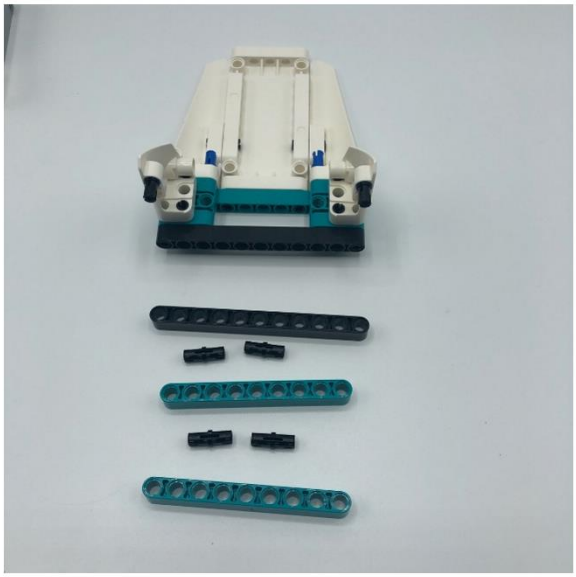


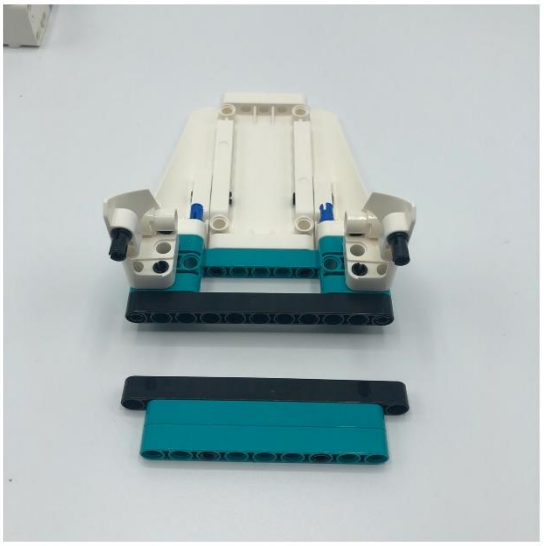


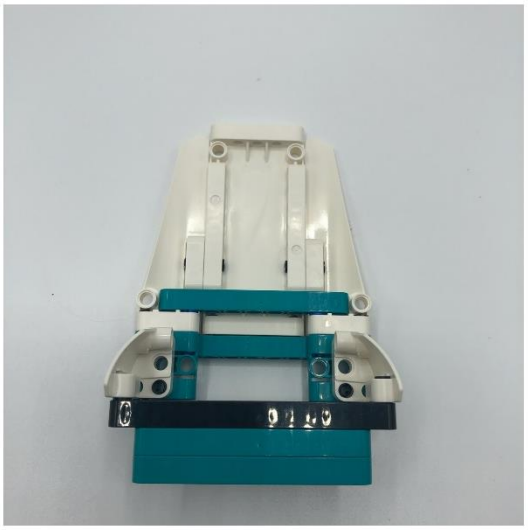


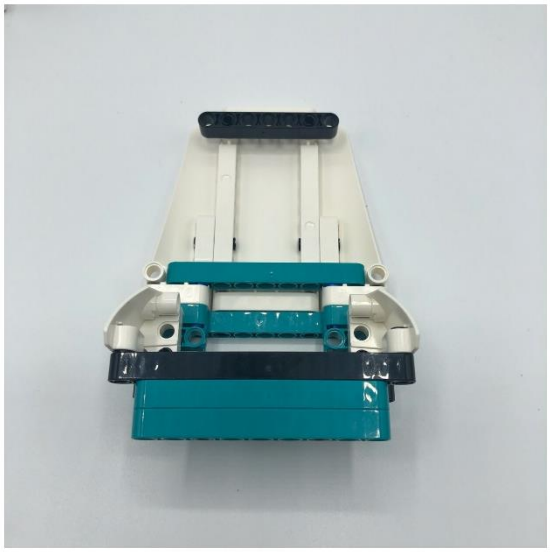


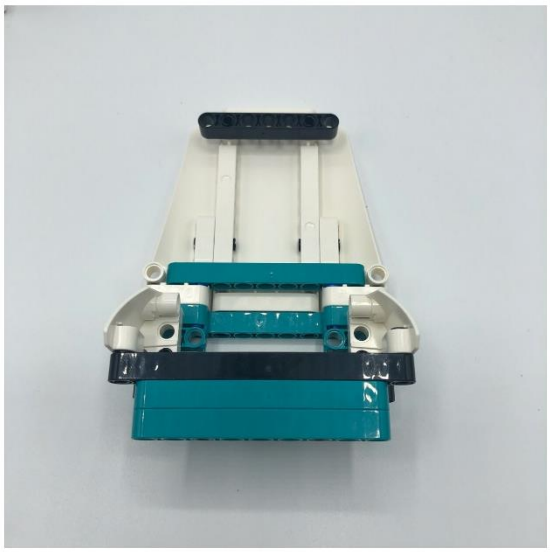


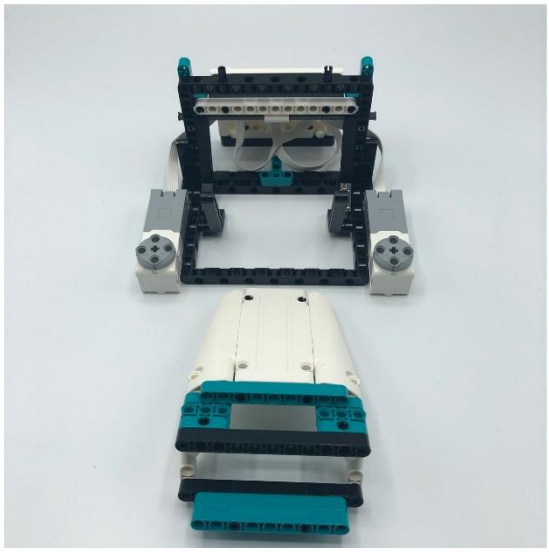


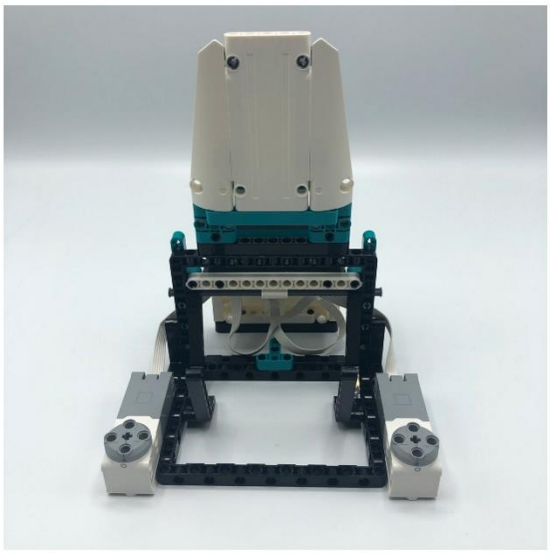


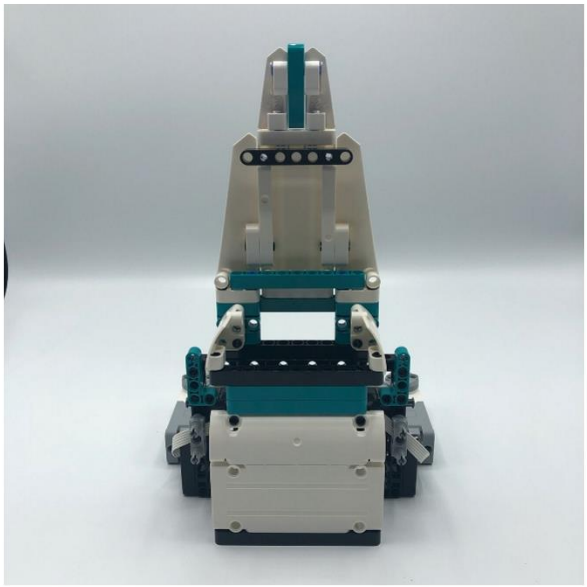


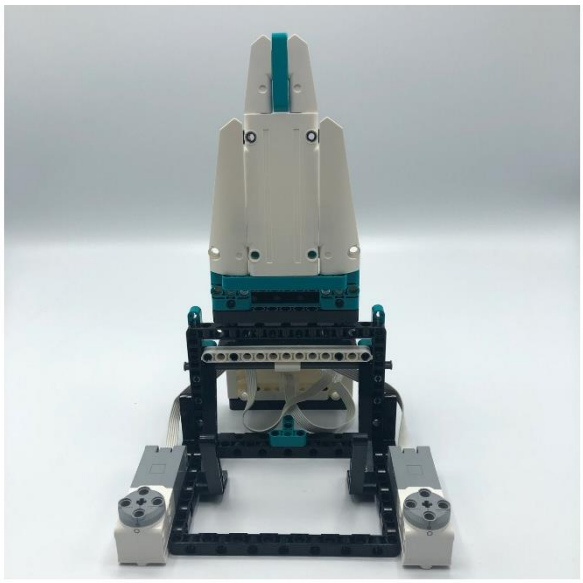


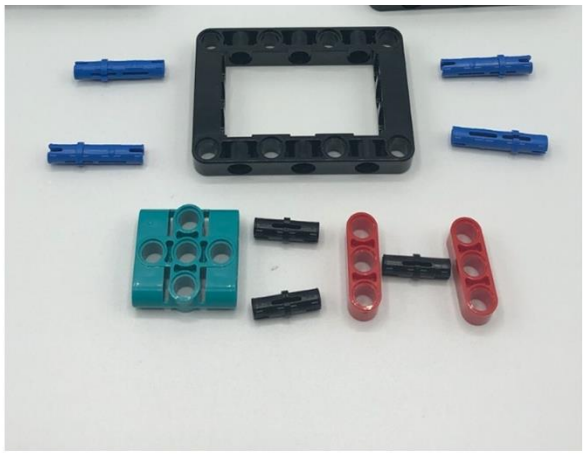


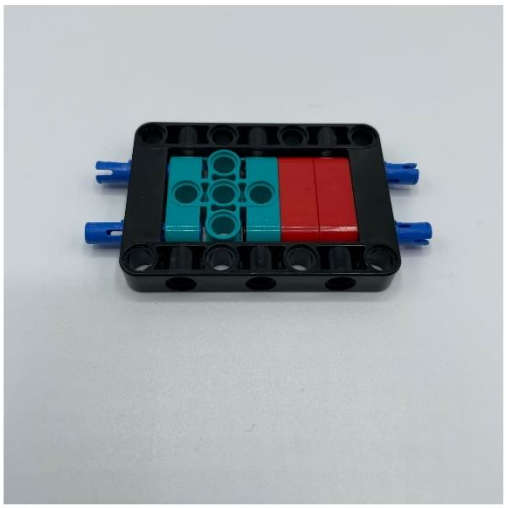


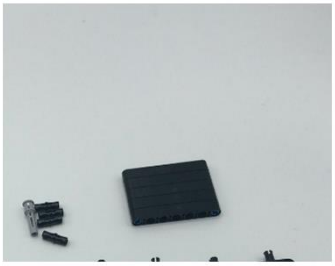


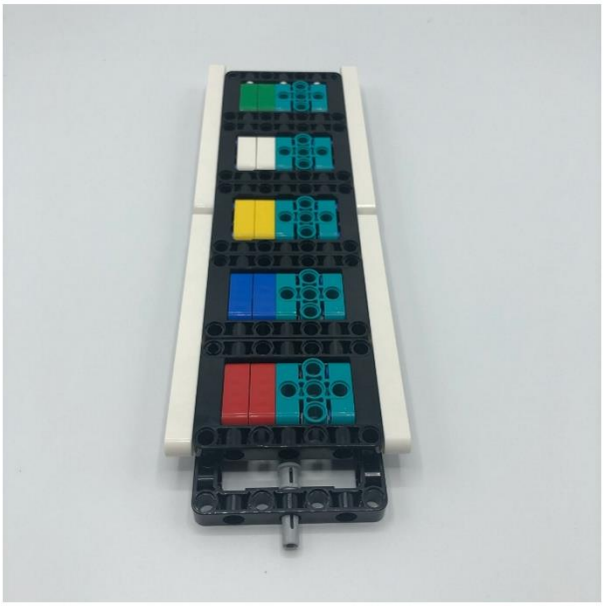


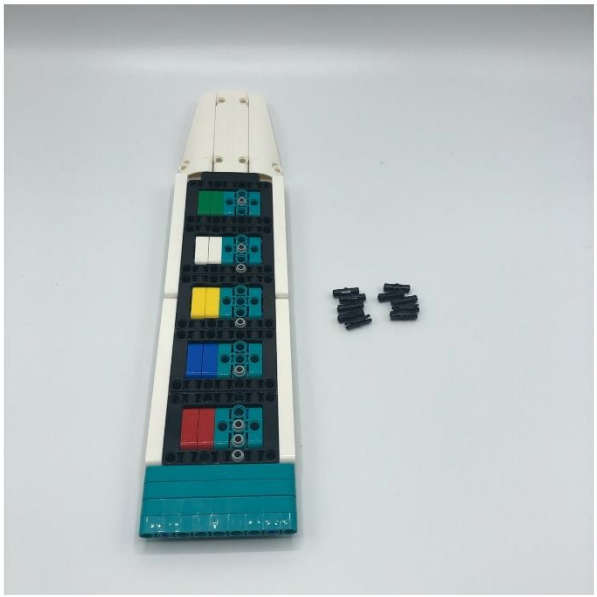


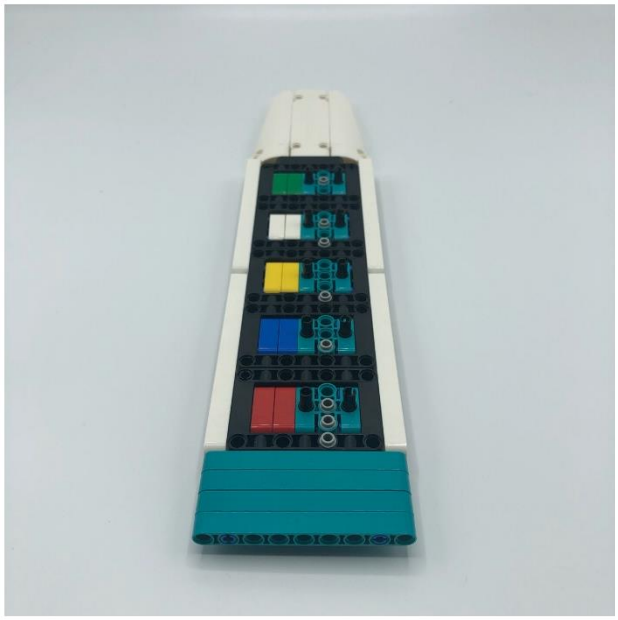


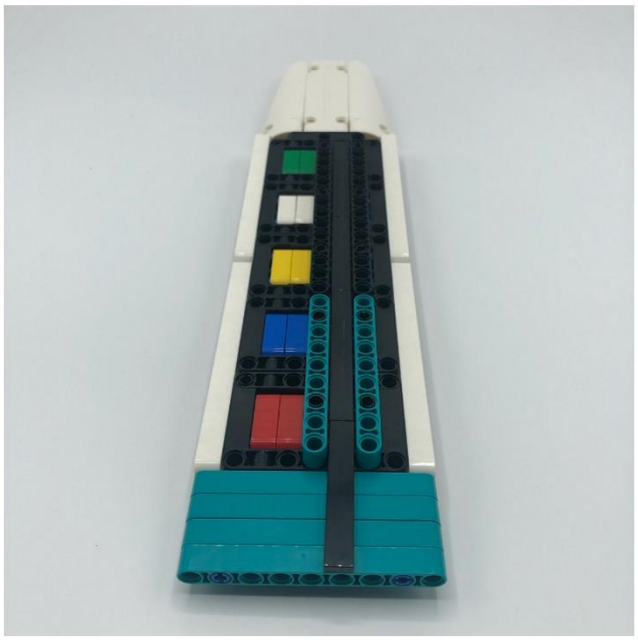


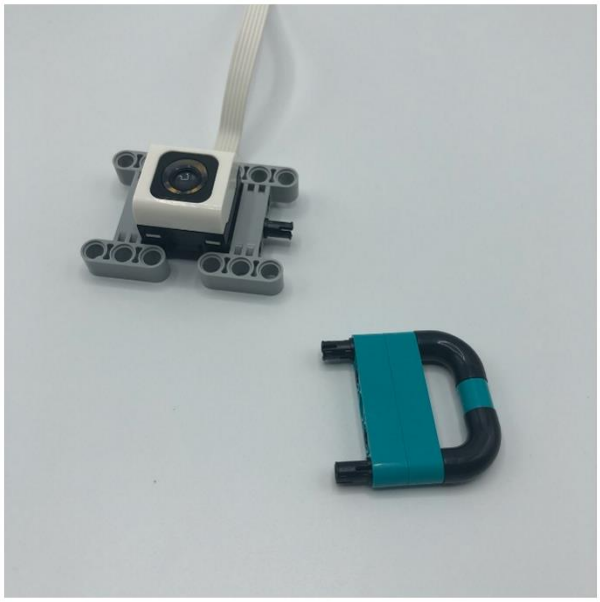


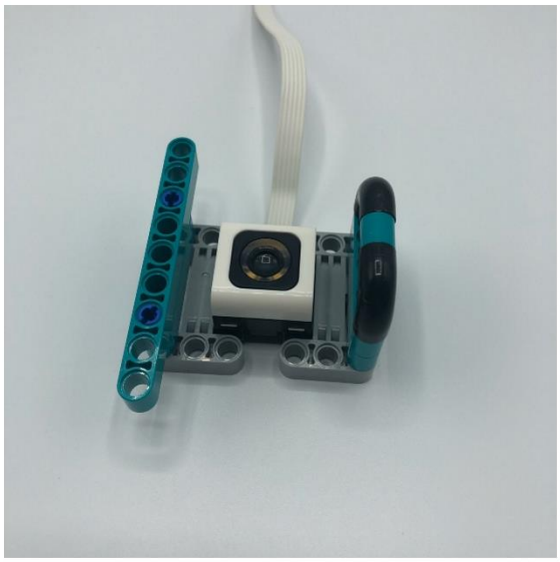


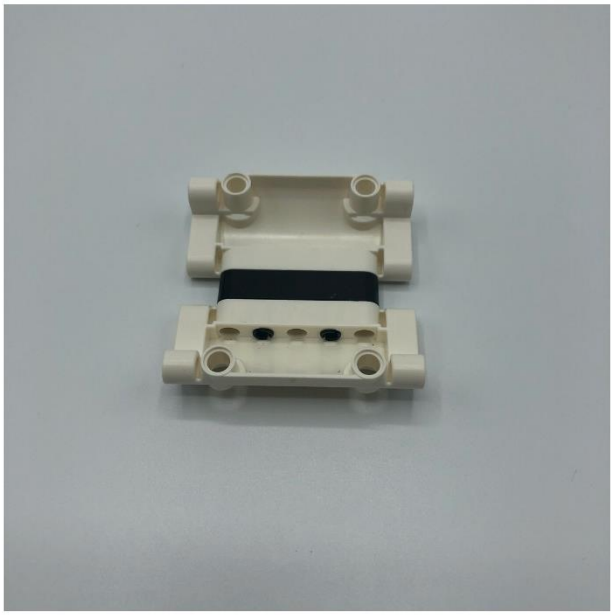


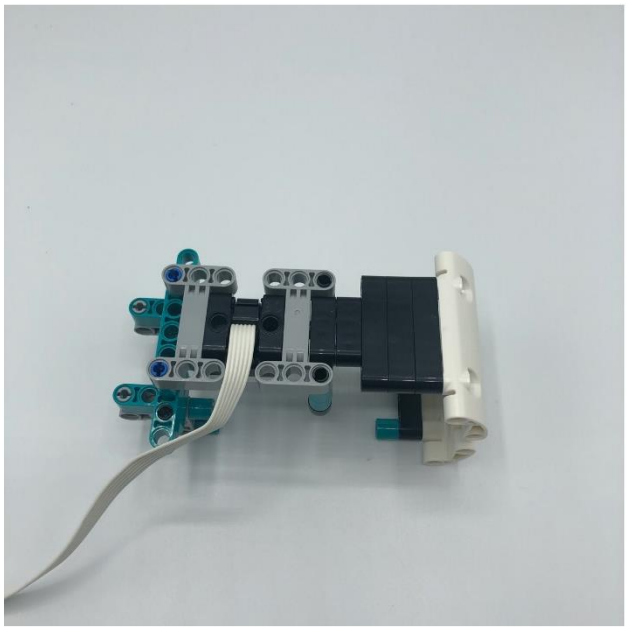


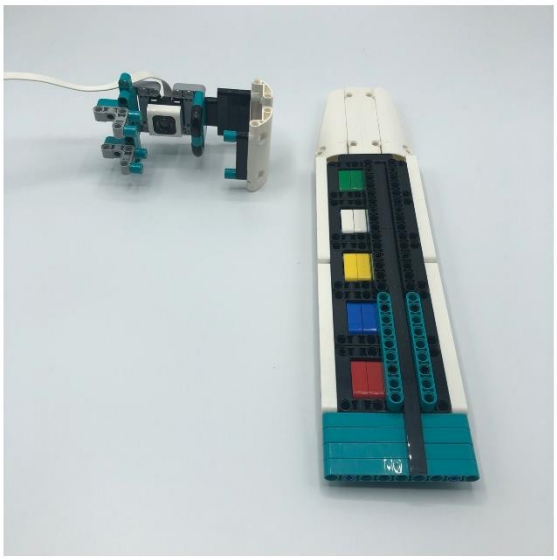


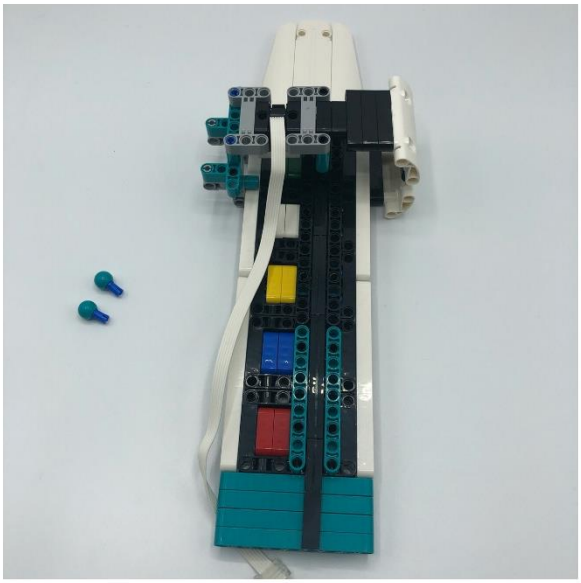


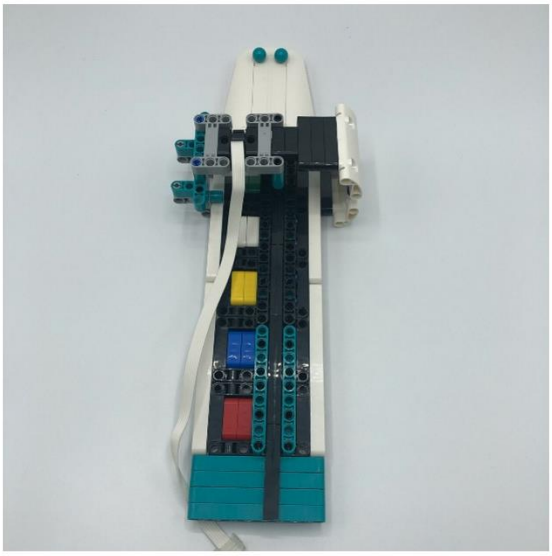


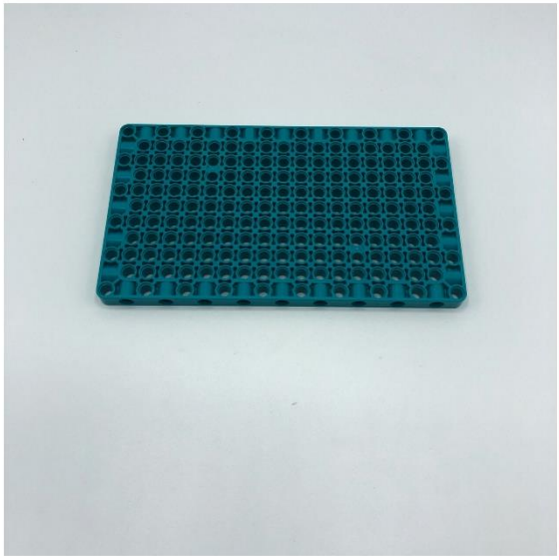


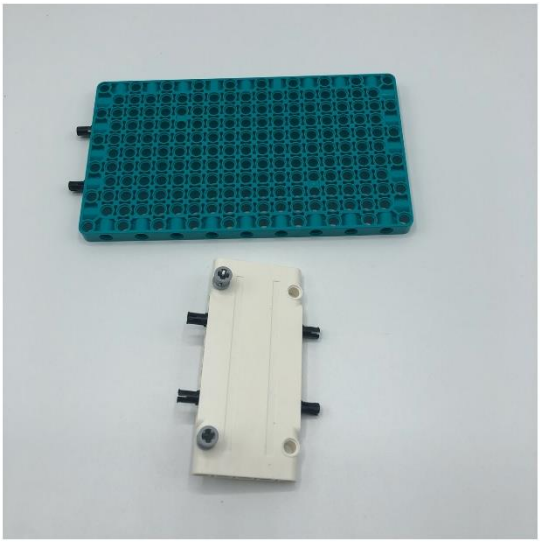


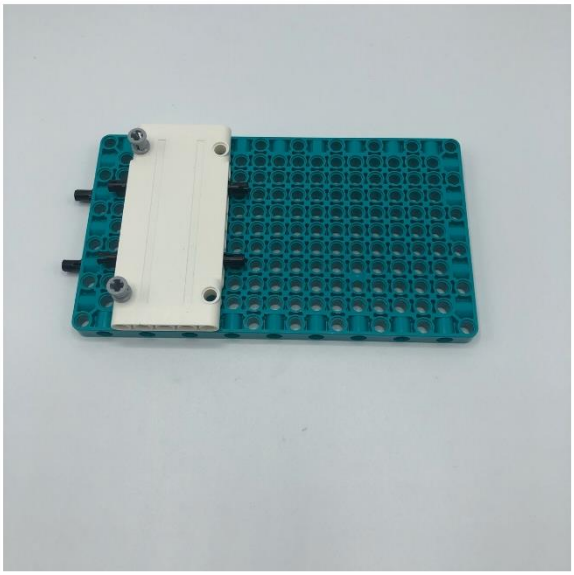


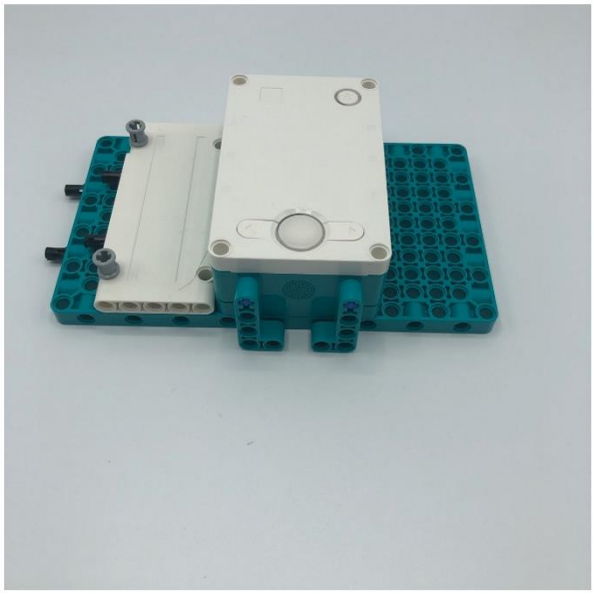


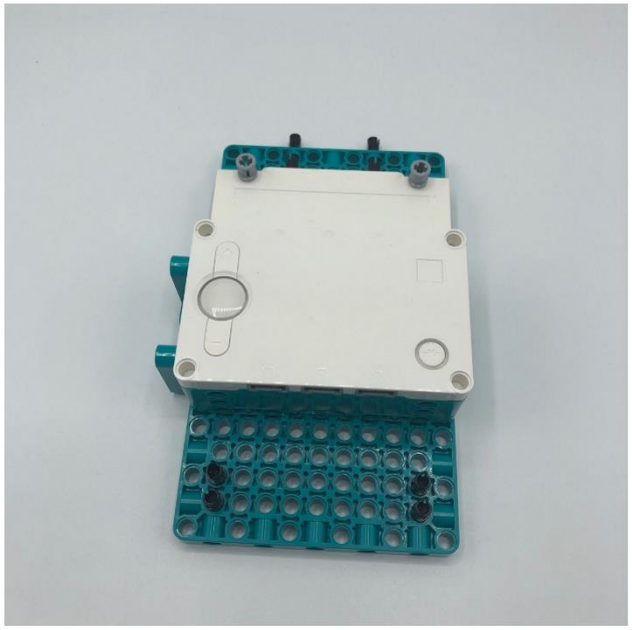


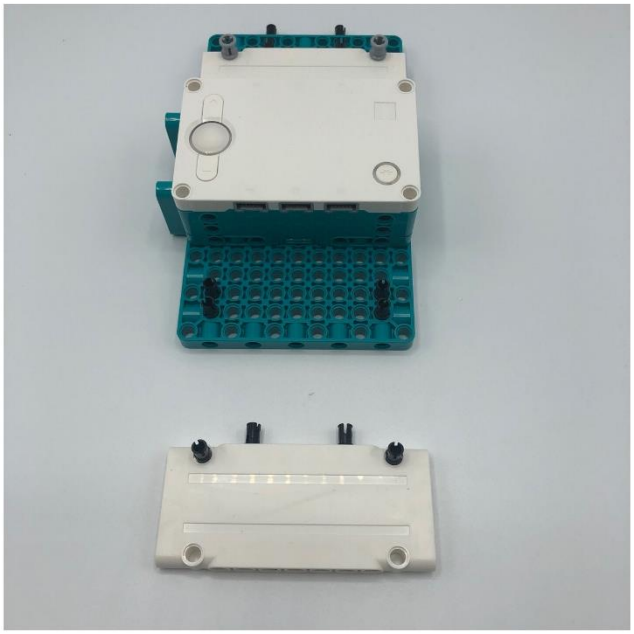


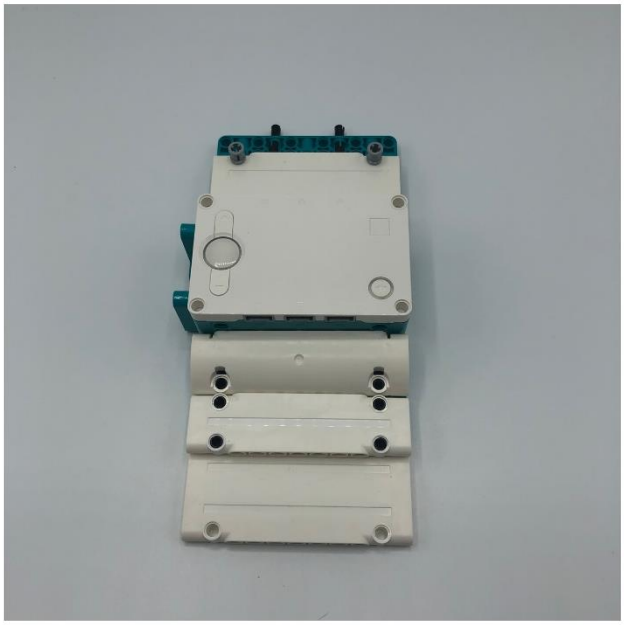


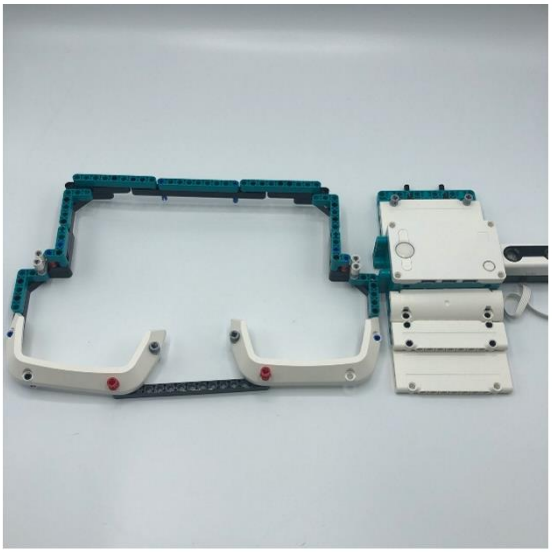


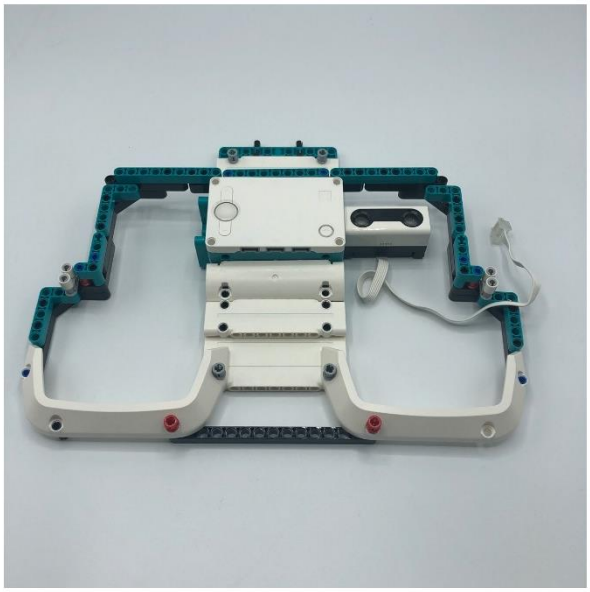


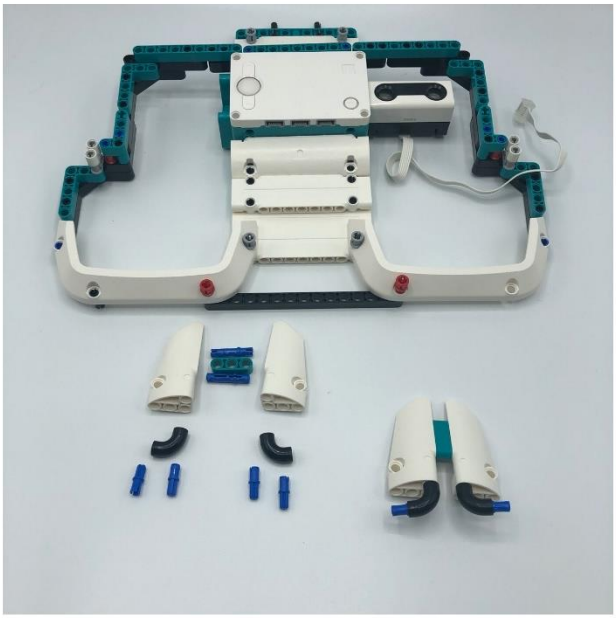


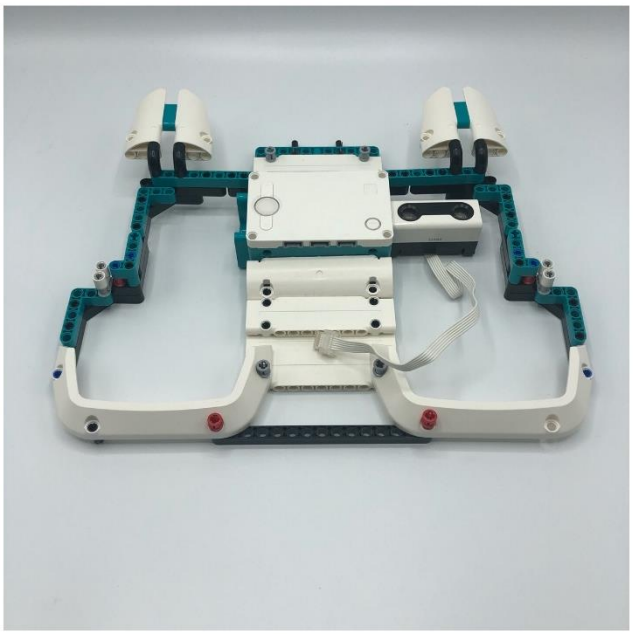


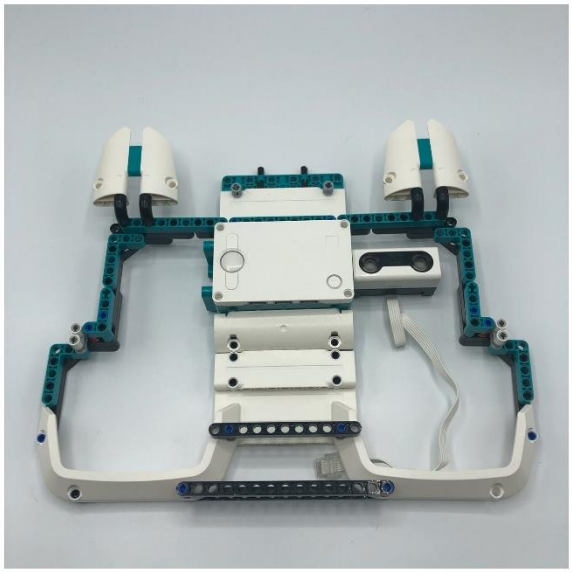


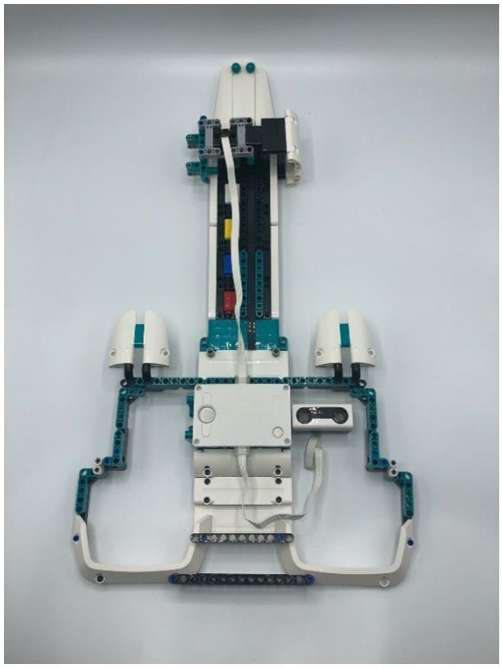


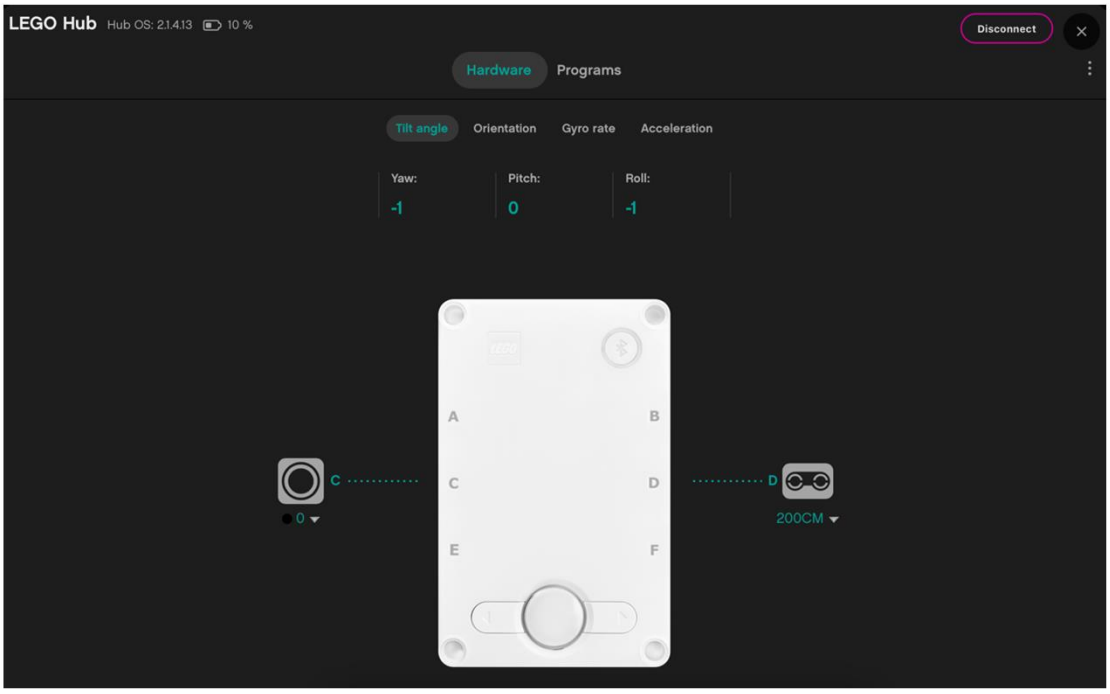











LEGO Hub
Hub OS: 2.1.4.13
10 %
Disconnect
Hardware
Programs
Tilt angle
Orientation
Gyro rate
Acceleration
Yaw:
-1
Pitch:
0
Roll:
-1
A
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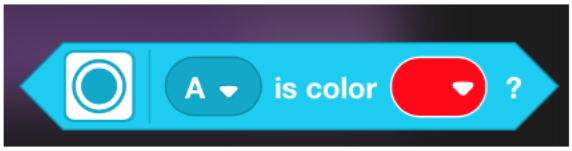
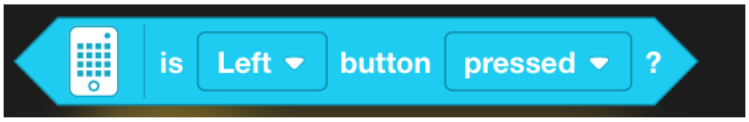
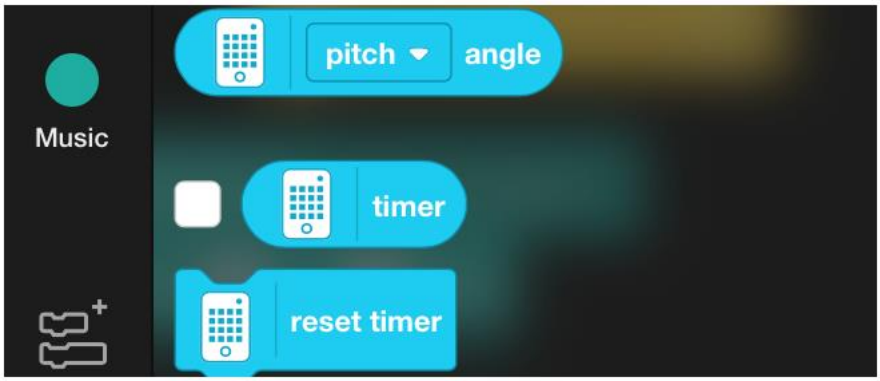
200CM

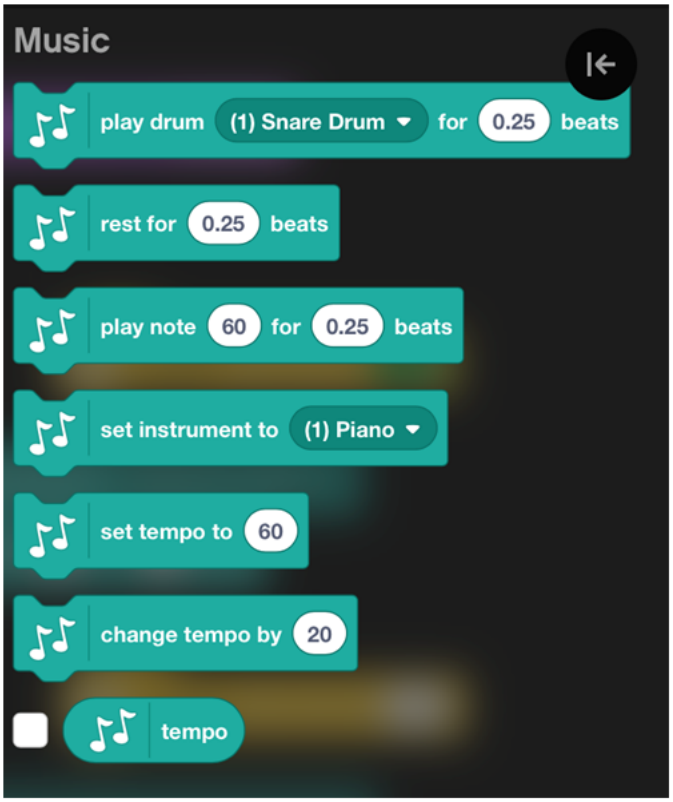
when

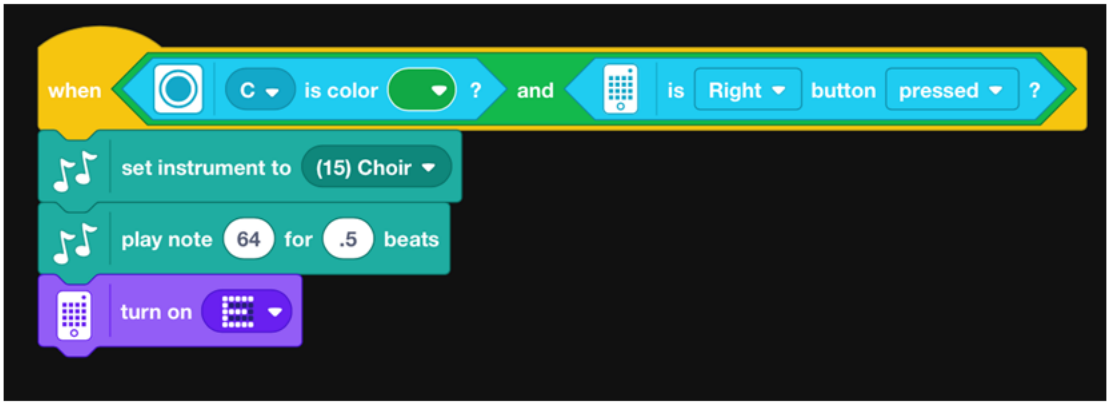
and

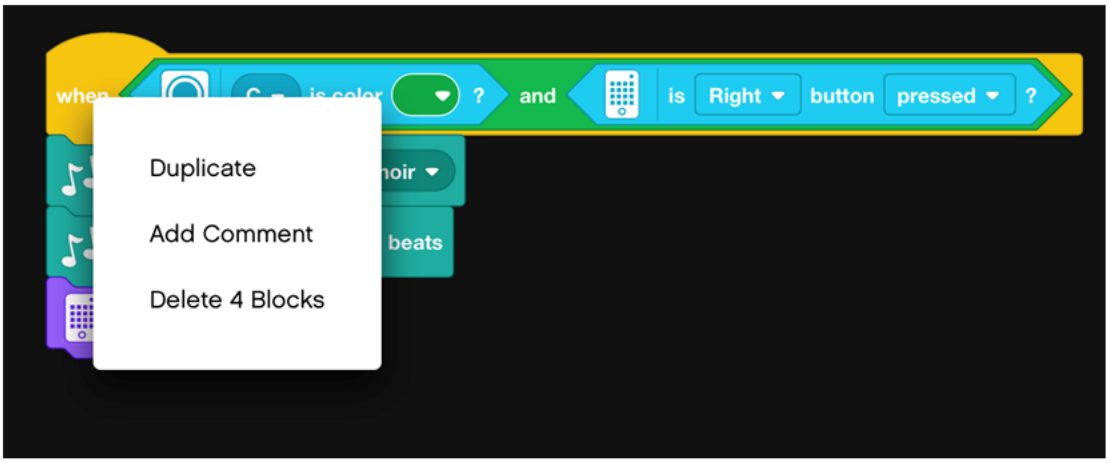

A
is color
?

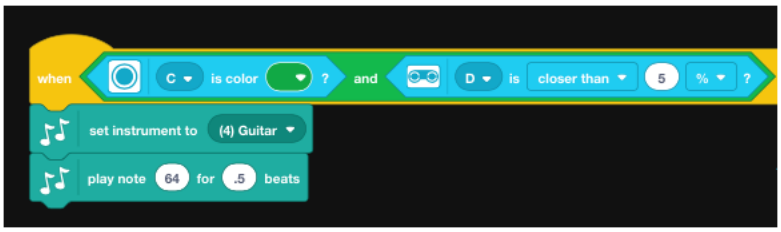

is
Left
button
pressed
?

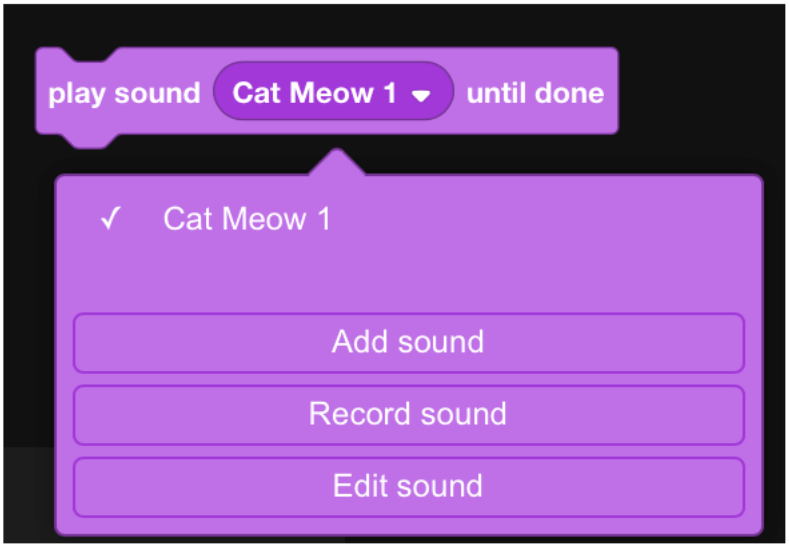

Music
pitch
angle
timer
reset timer

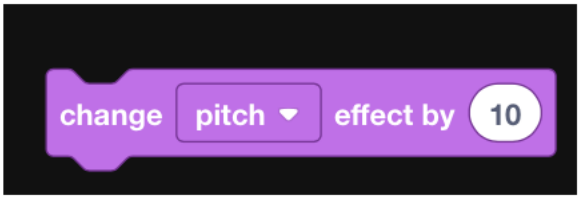

Music
play drum (1) Snare Drum for 0.25 beats
rest for 0.25 beats
play note 60 for 0.25 beats
set instrument to (1) Piano
set tempo to 60
change tempo by 20
tempo


when C is color ? and is Right button pressed ?
set instrument to (15) Choir
play note 64 for .5 beats
turn on

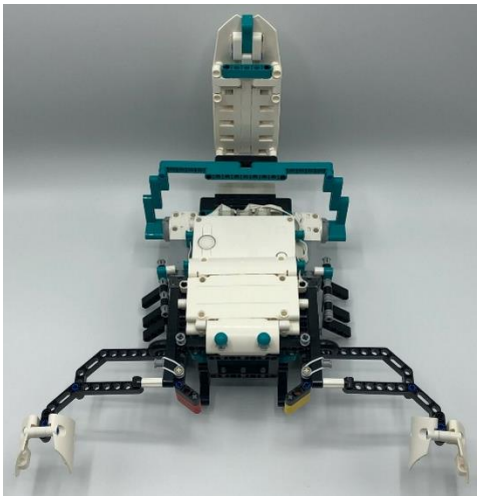

when
and
is
Right
button
pressed
?
Duplicate
Add Comment
Delete 4 Blocks
beats

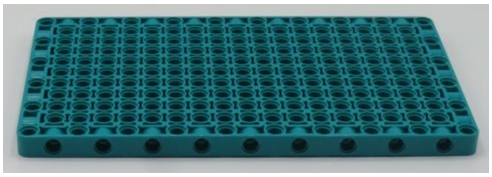

when
C
is color
?
and
D
is
closer than
5
%
?
set instrument to
(4) Guitar
play note
64
for
.5
beats

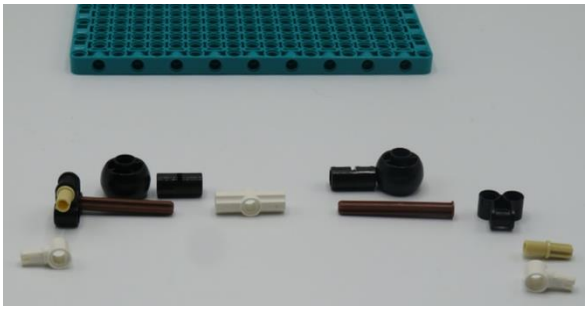

play sound
Cat Meow 1
until done
✓ Cat Meow 1
Add sound
Record sound
Edit sound

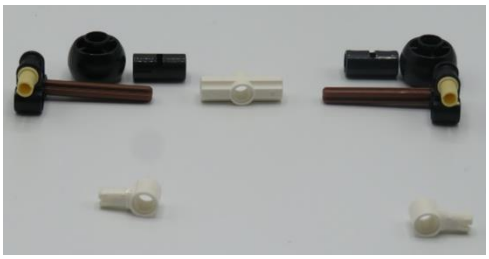

change
pitch
effect by
10

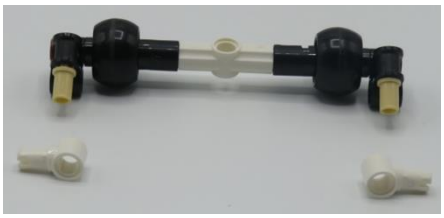
Chapter 5: Building a Scorpion.

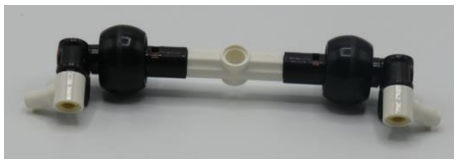


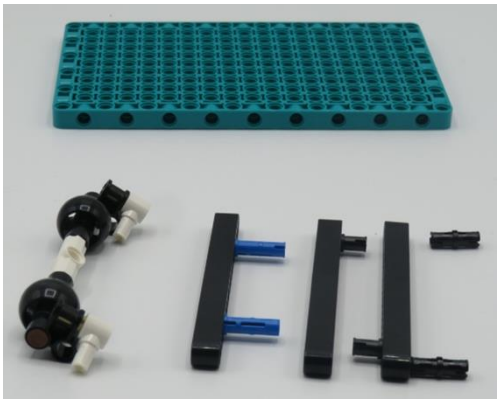


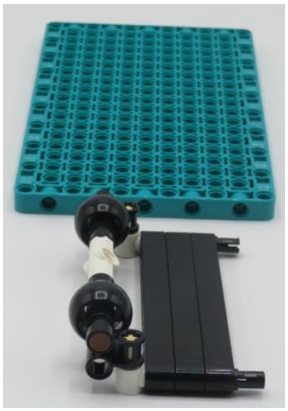


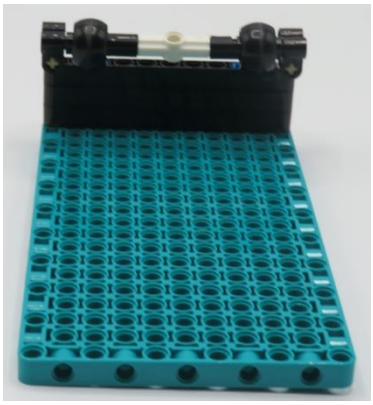


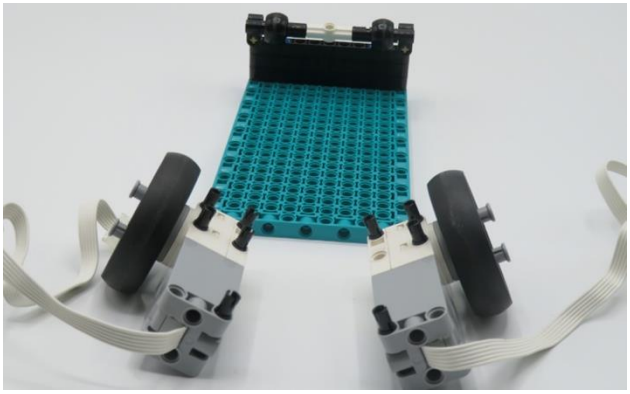


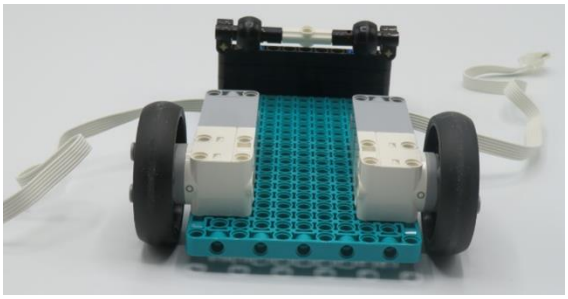


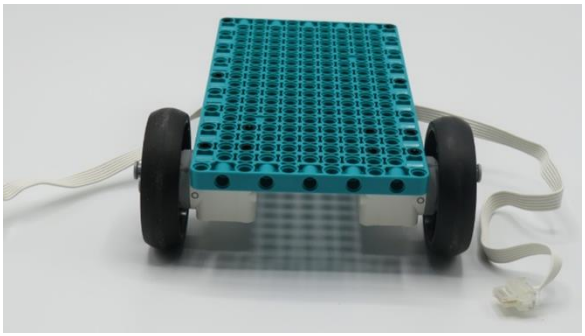


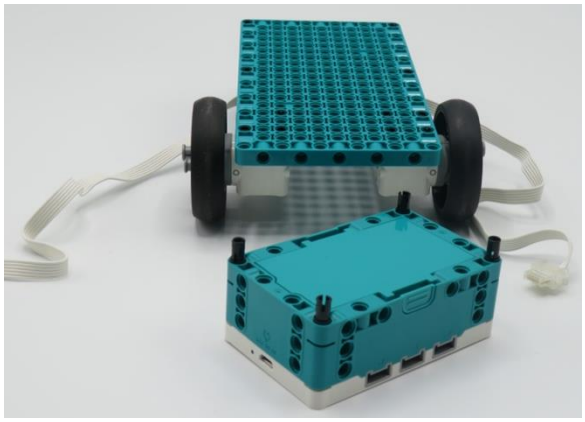


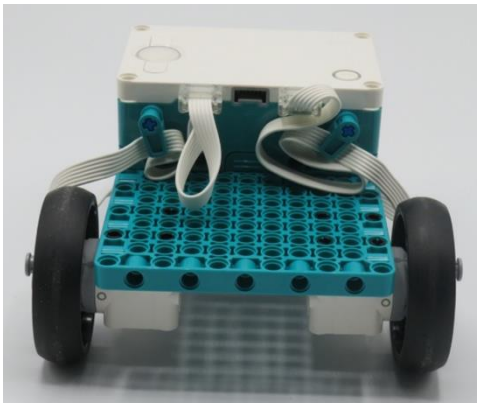


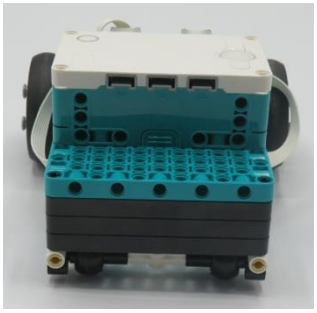


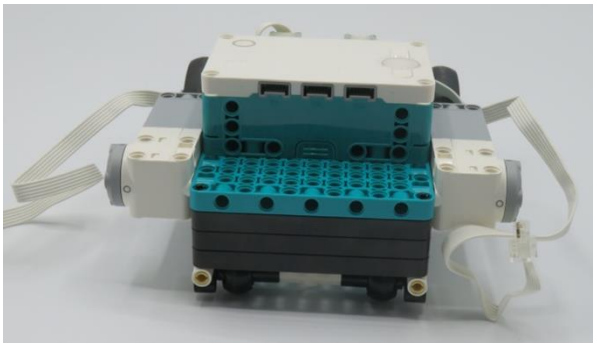


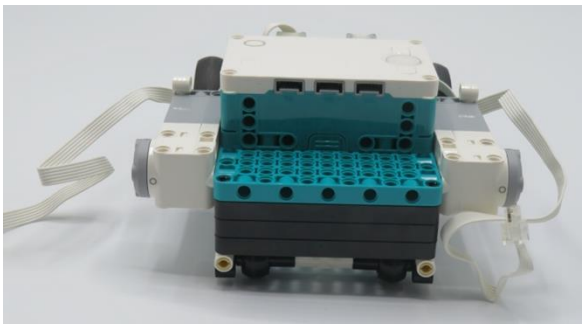


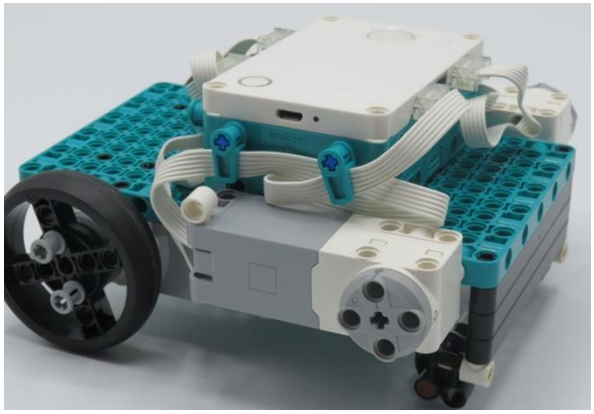


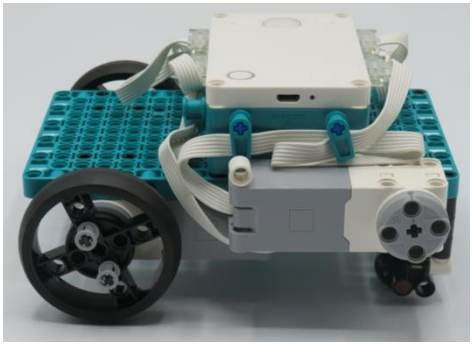


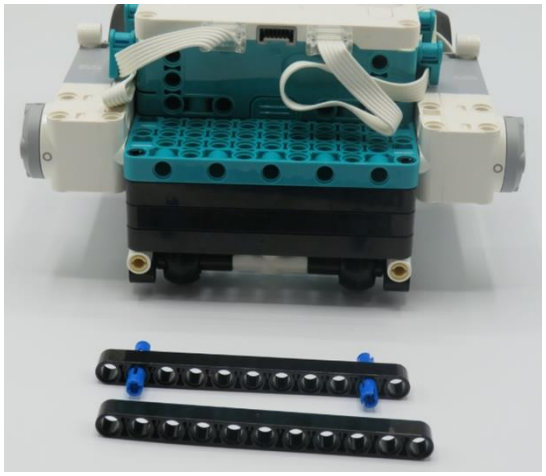


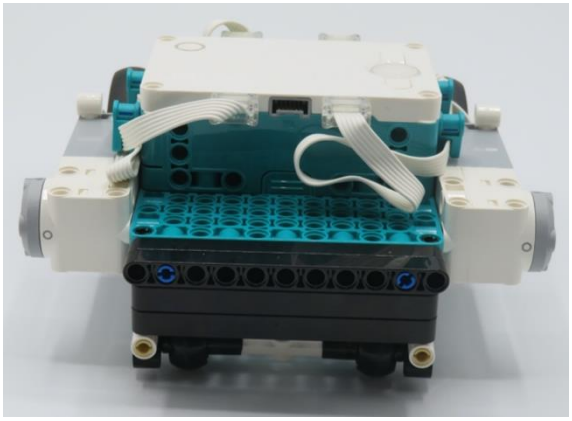


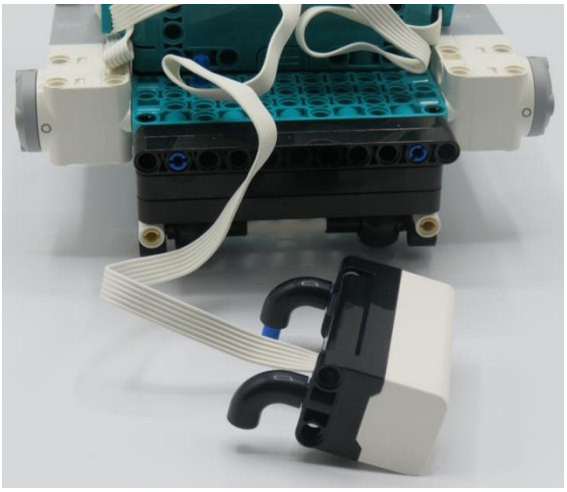


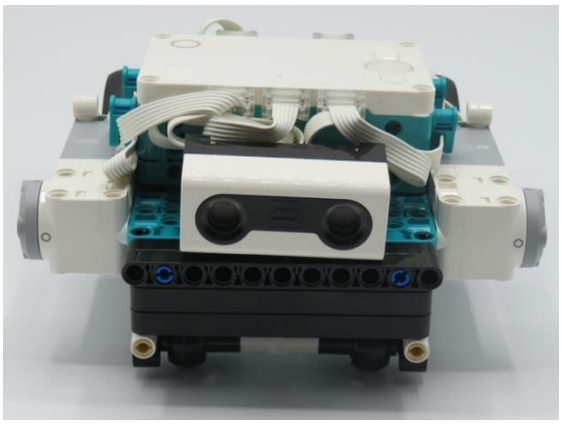


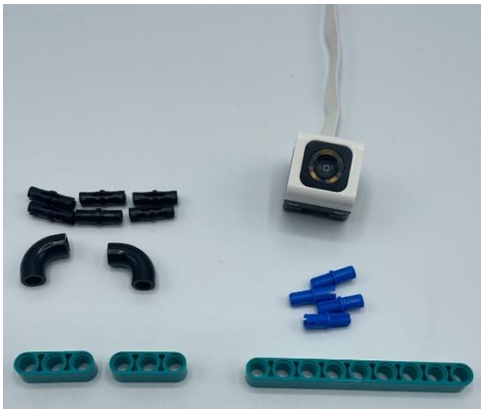


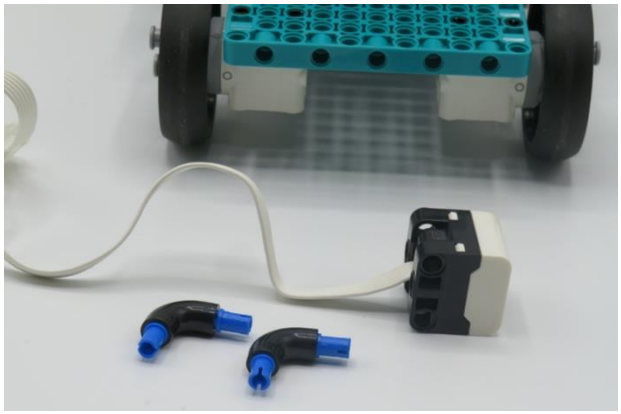


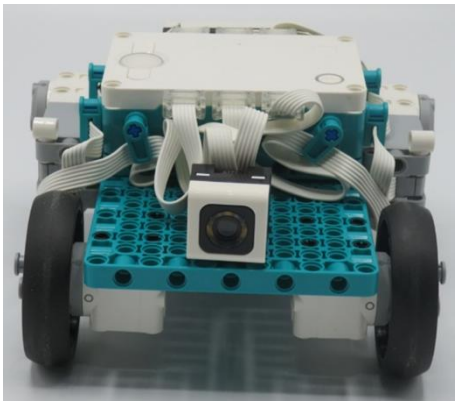


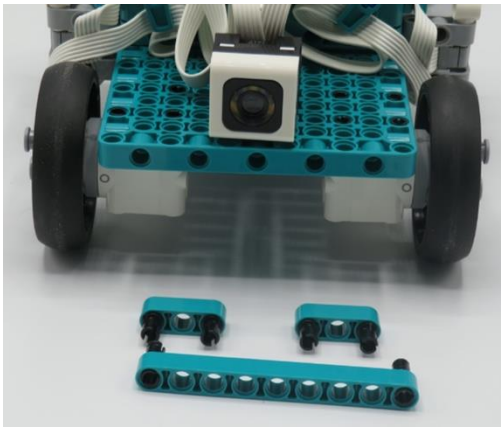


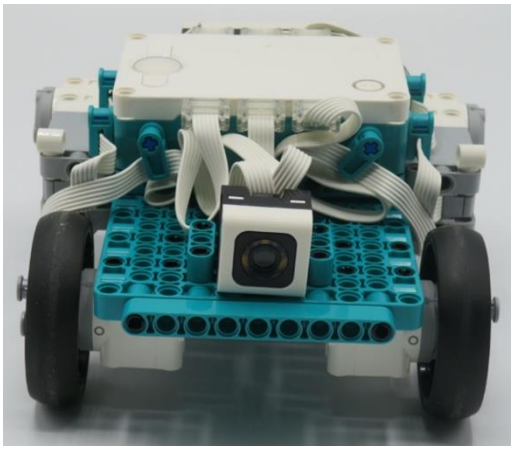


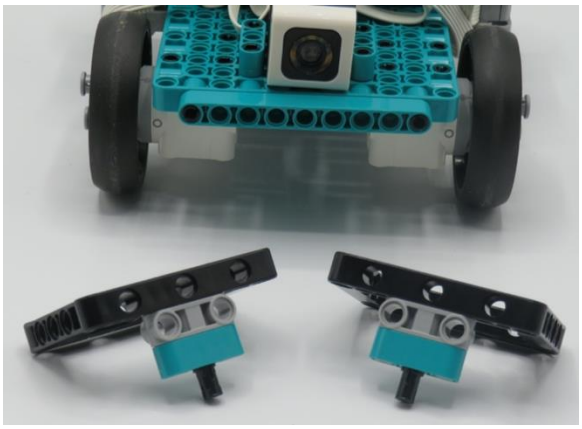


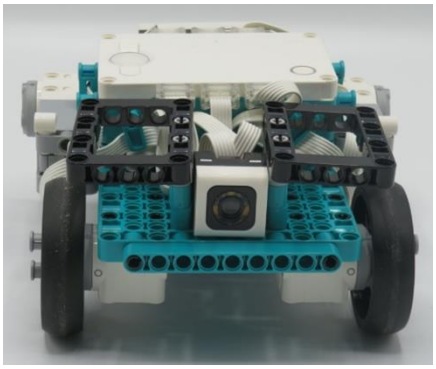


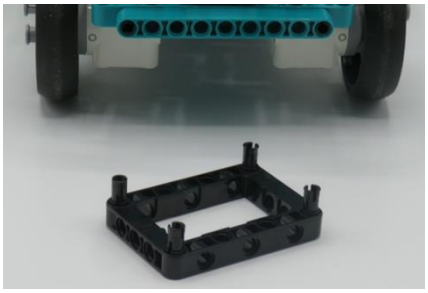


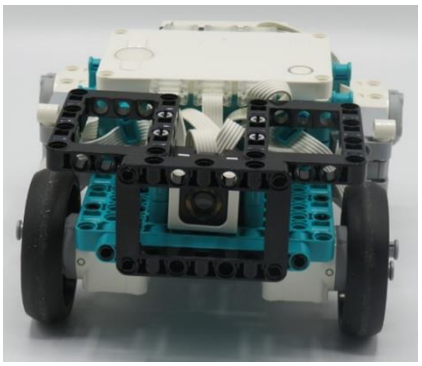


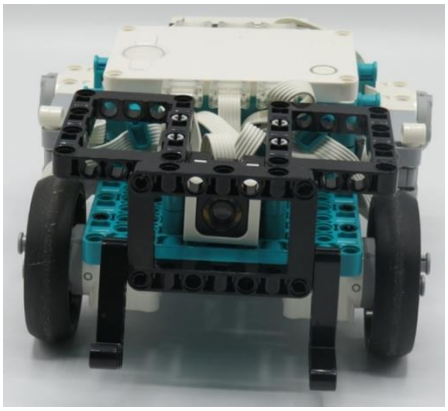


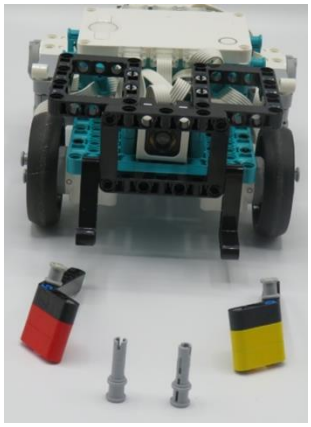


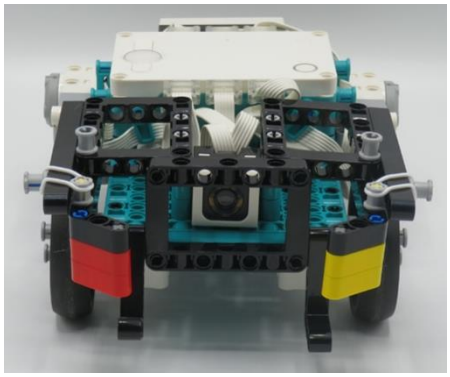


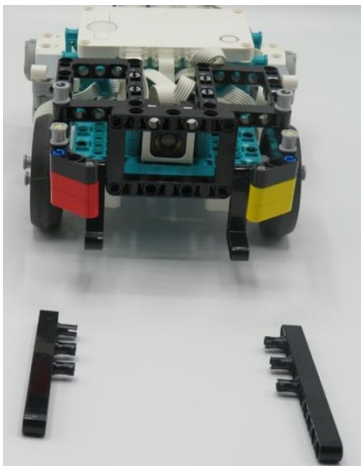


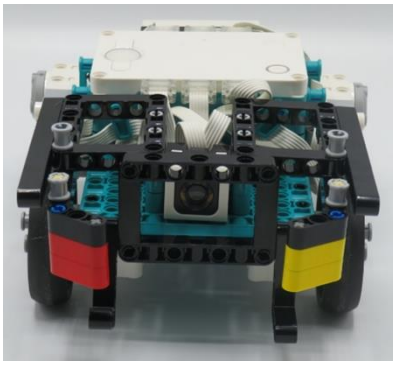


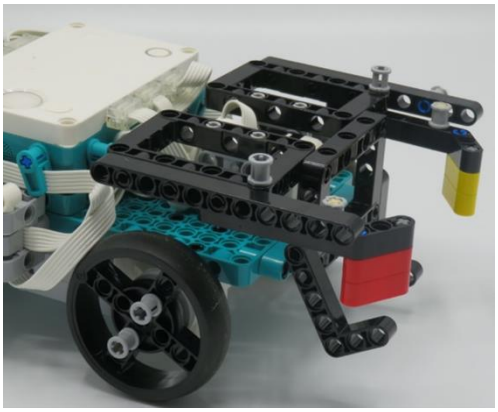


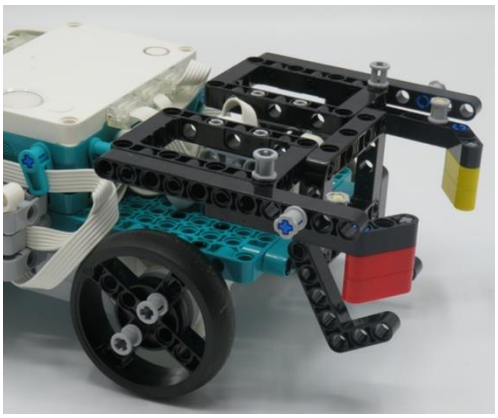


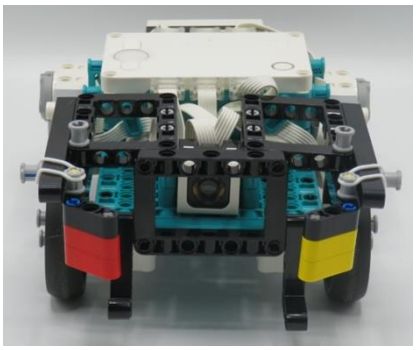


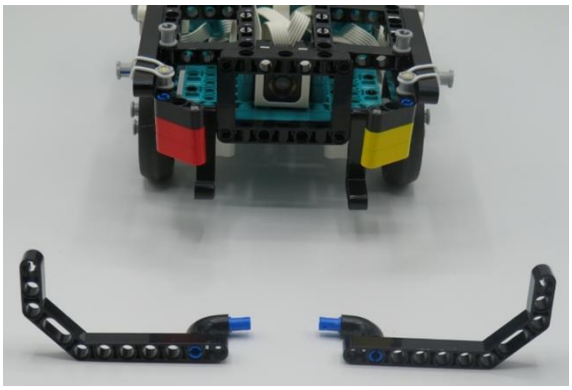


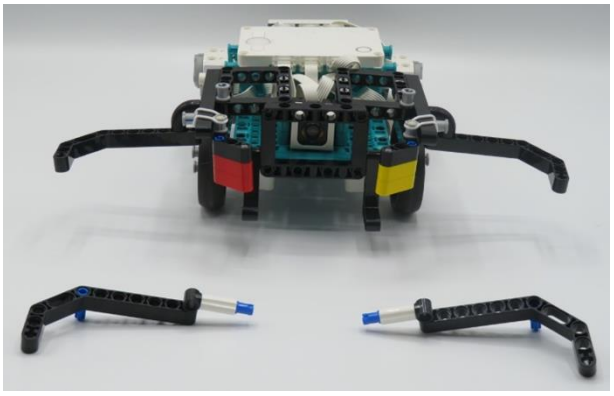


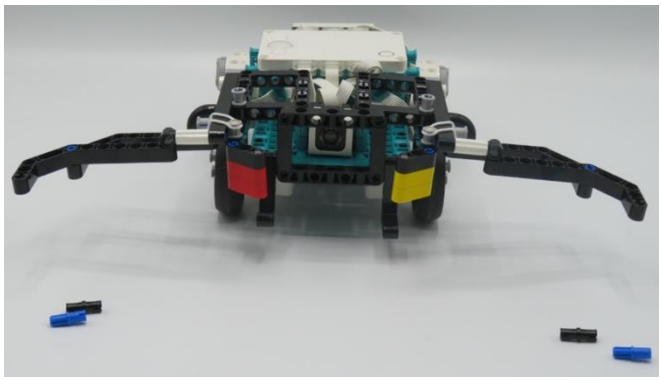


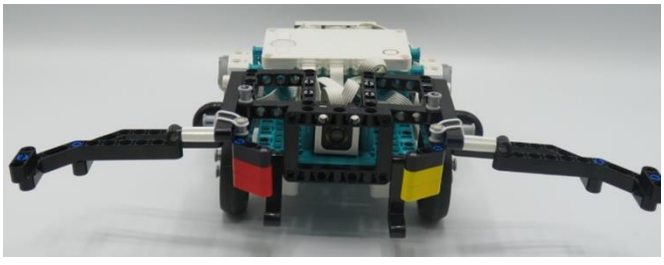


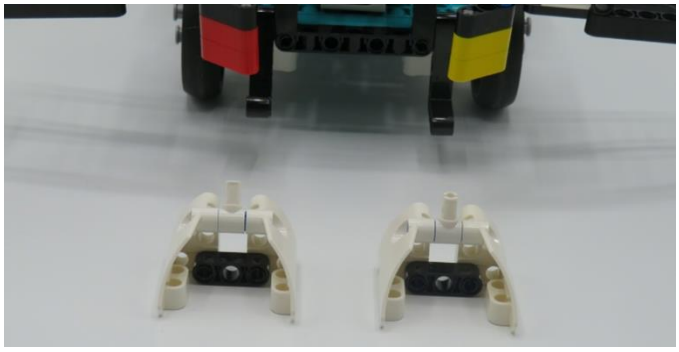


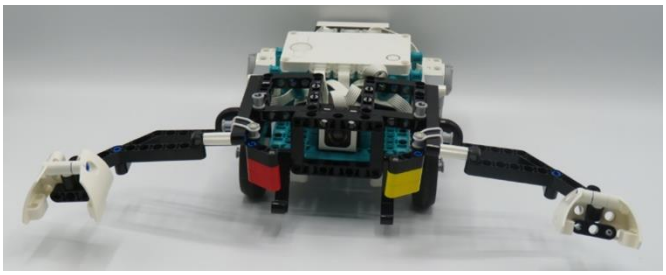


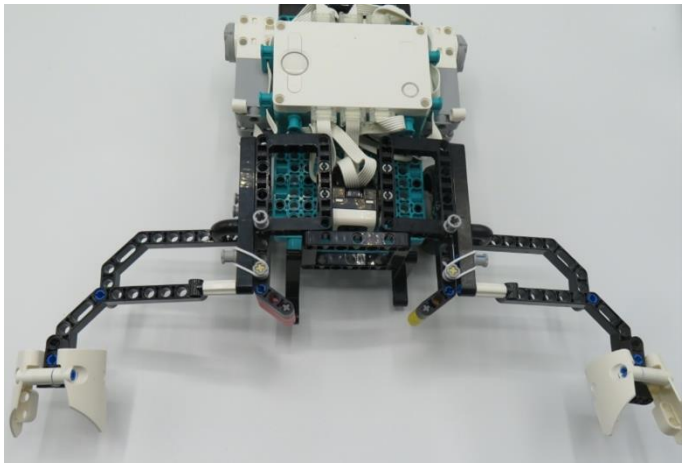


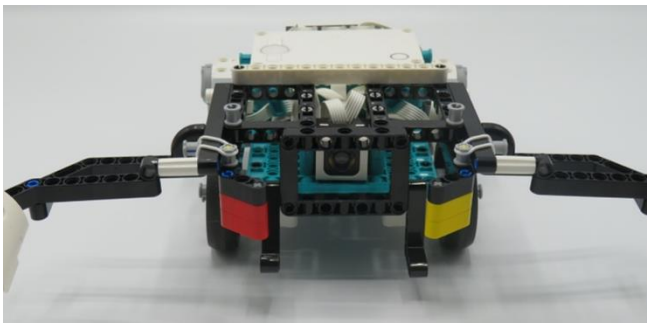


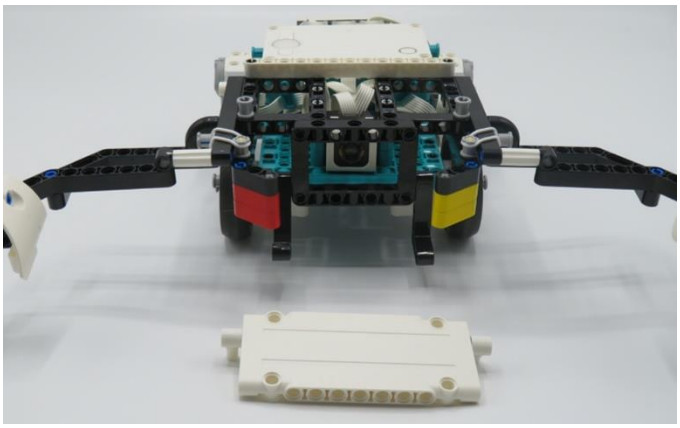


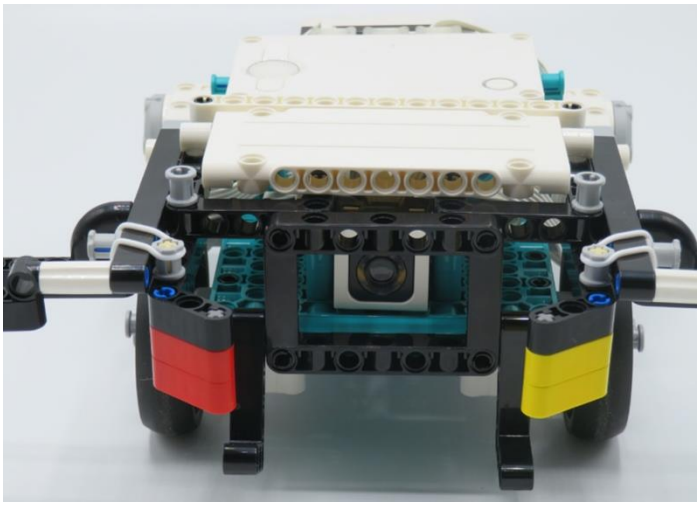


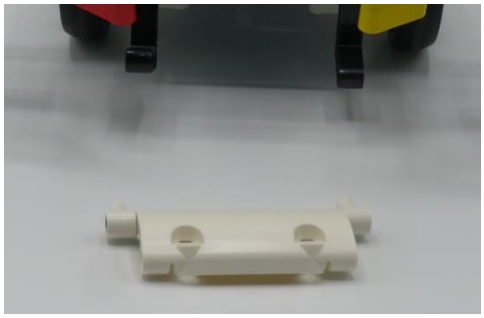


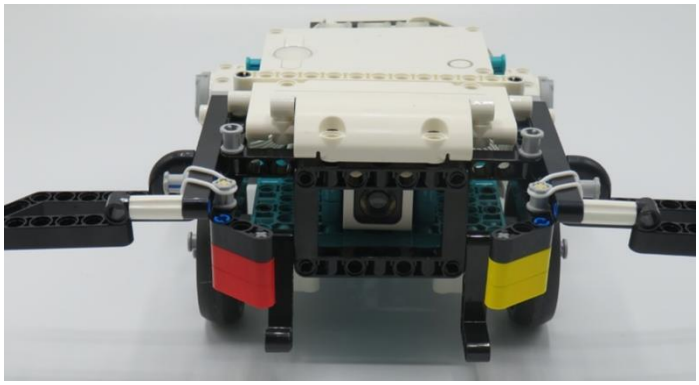


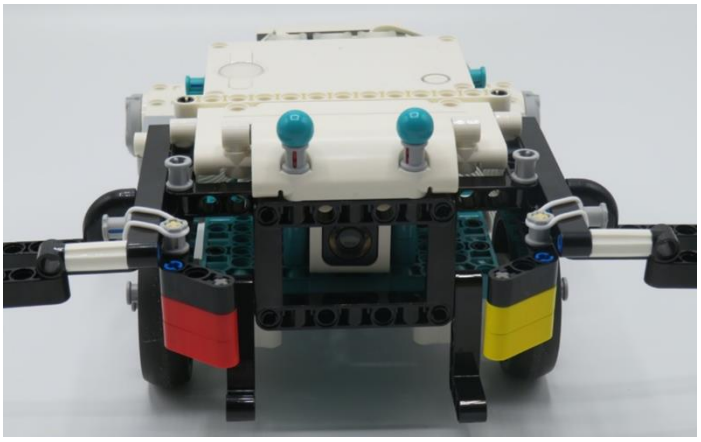


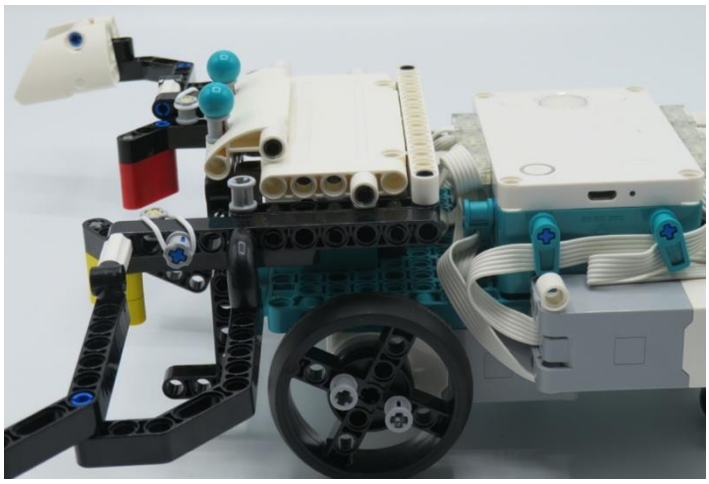


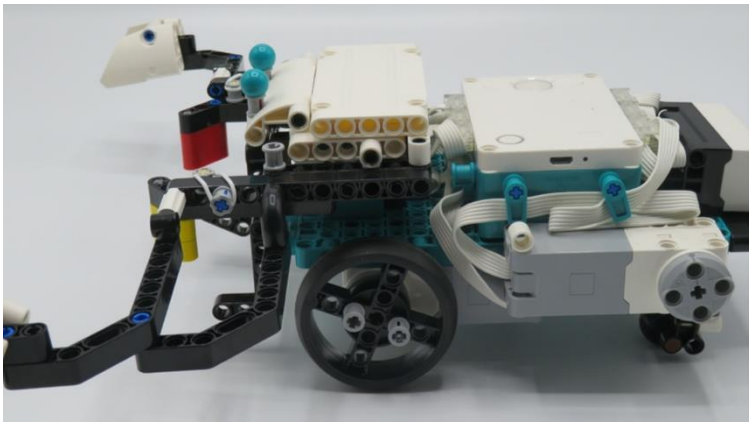


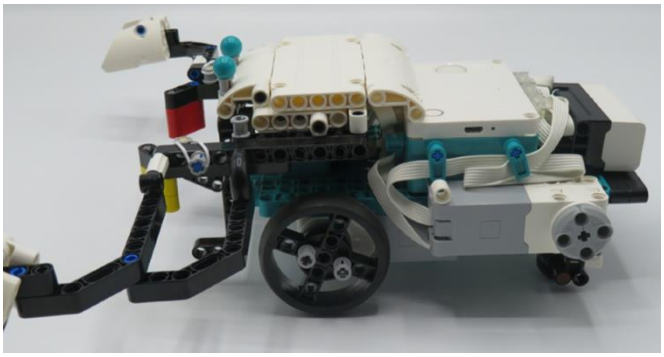


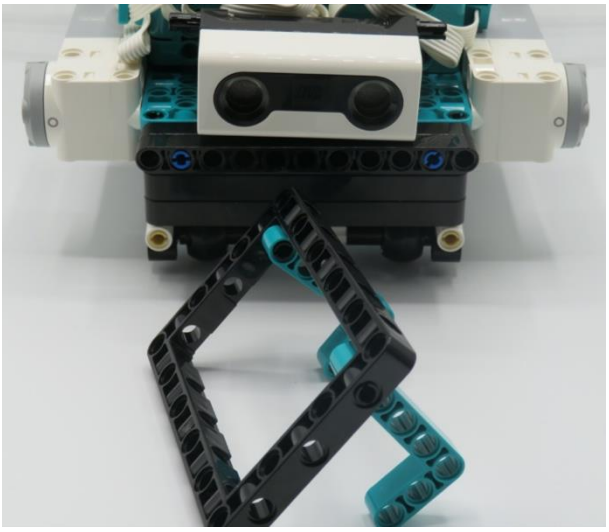


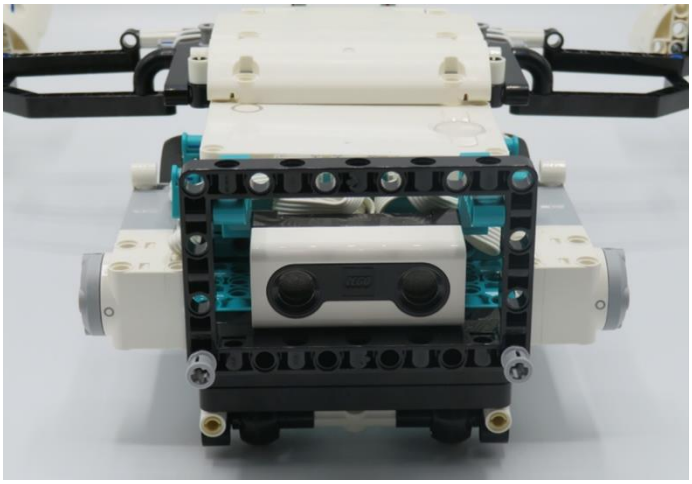


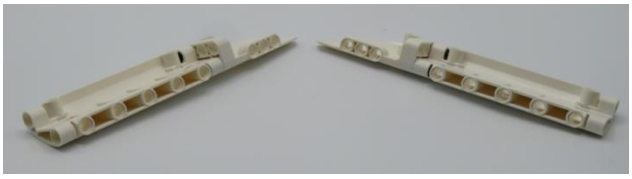


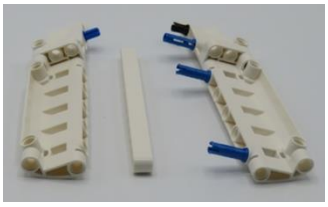


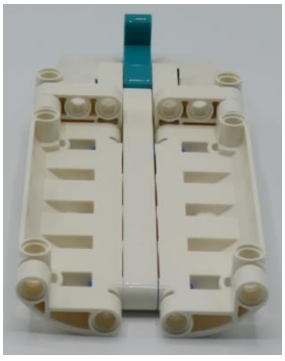


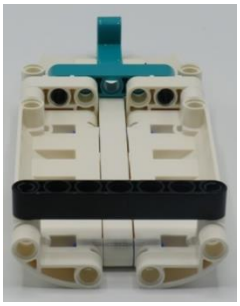


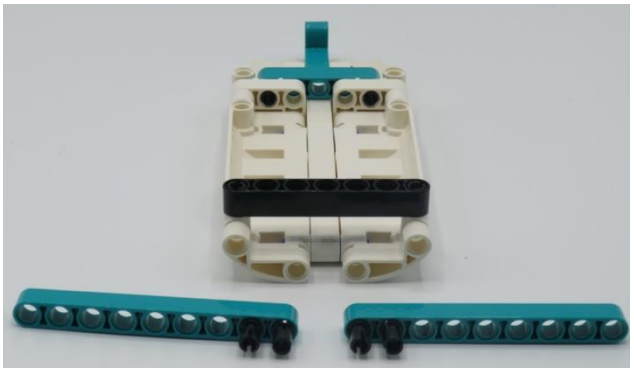


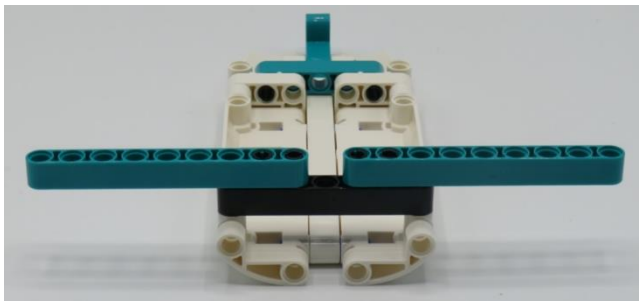


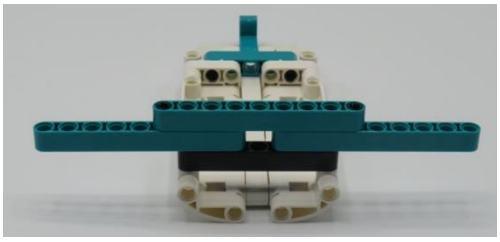


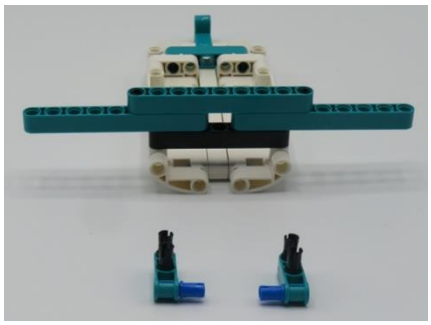


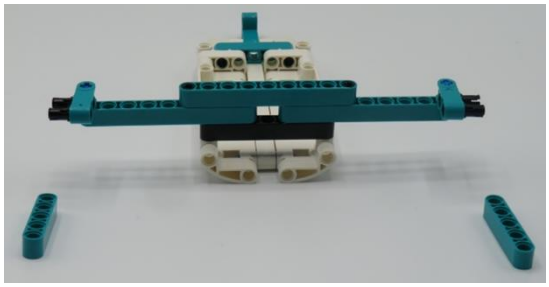


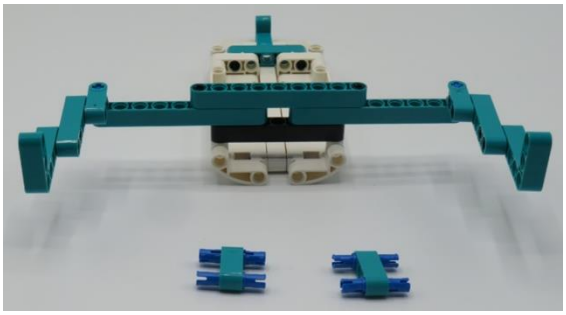


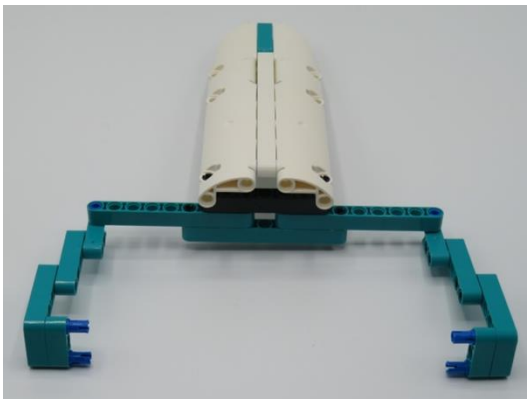


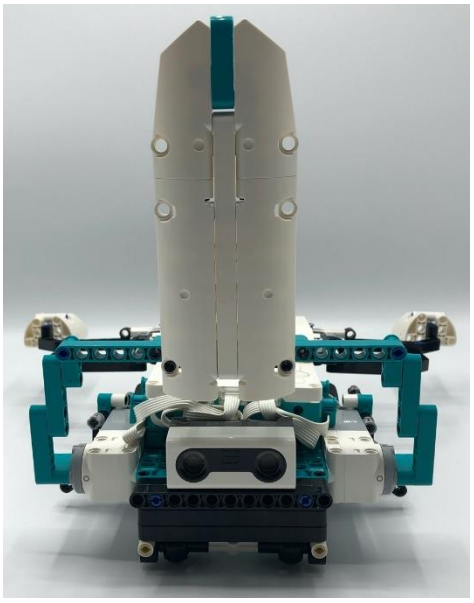


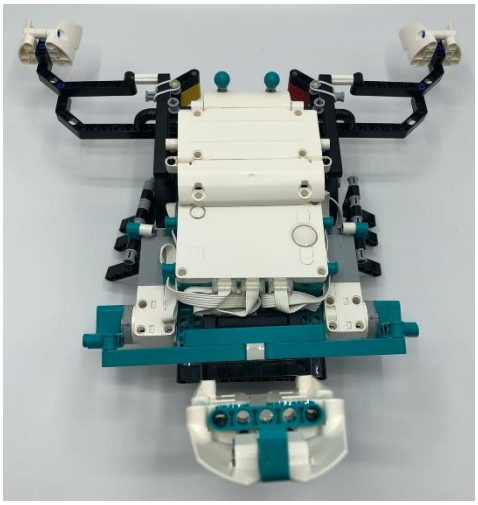


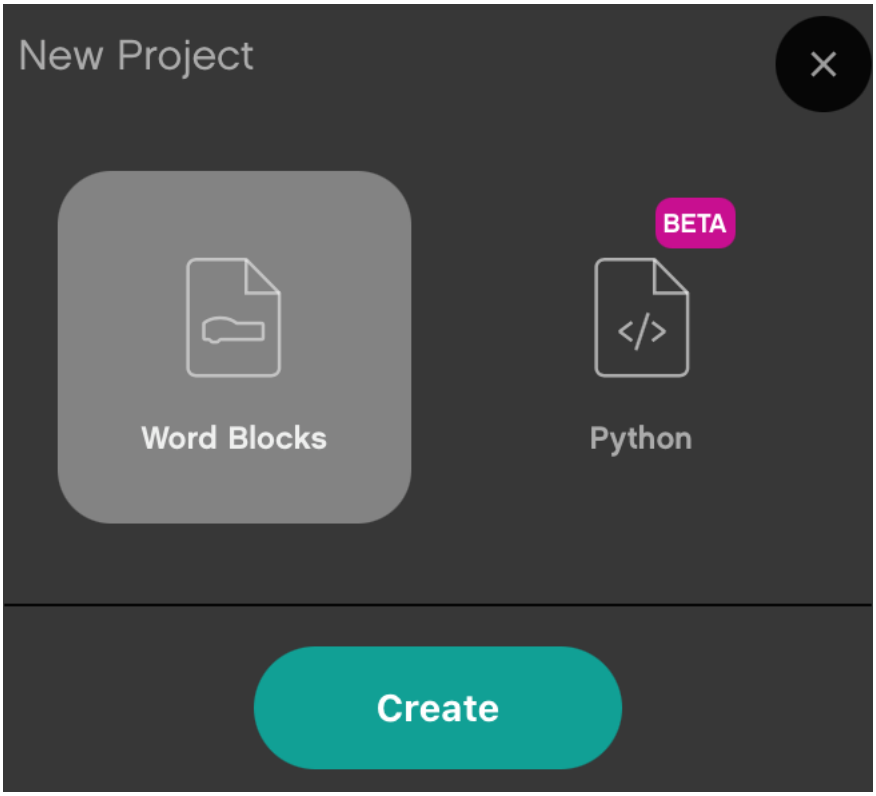


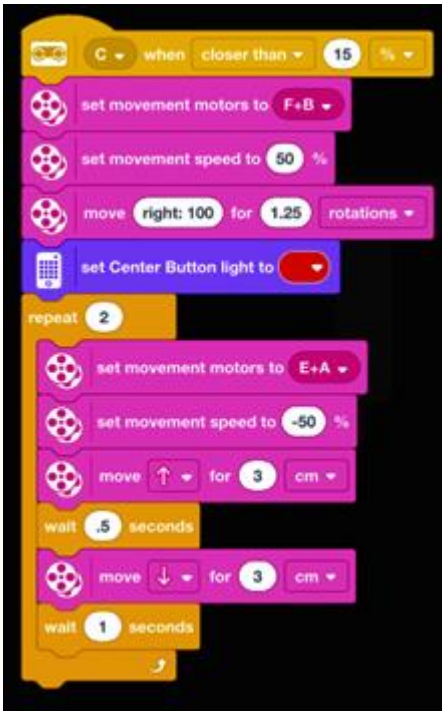


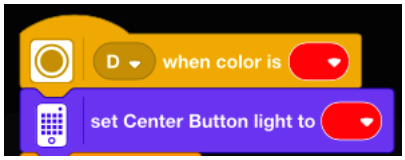


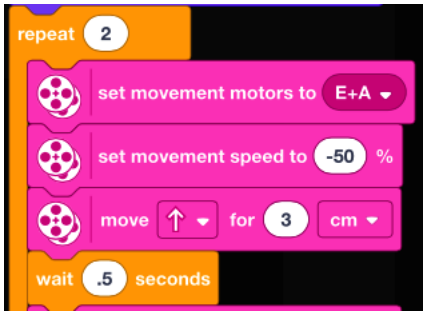


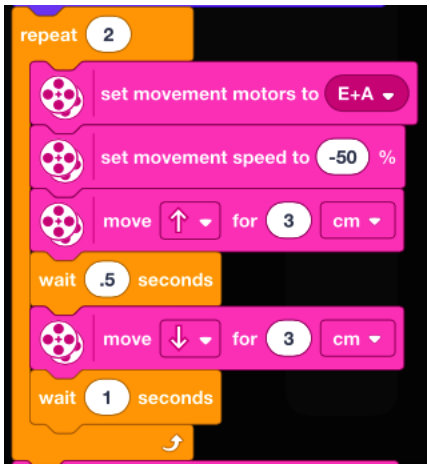


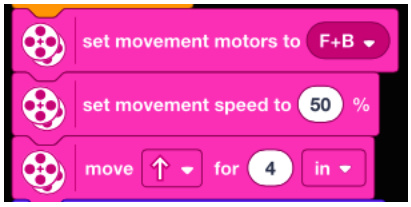

New Project
BETA
Word Blocks
Python
Create

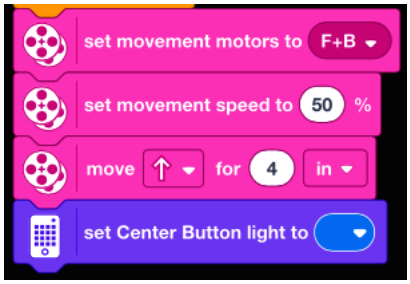

C when closer than 15 %
set movement motors to F+B
set movement speed to 50 %
move right: 100 for 1.25 rotations
set Center Button light to
repeat 2
set movement motors to E+A
set movement speed to -50 %
move for 3 cm
wait .5 seconds
move for 3 cm
wait 1 seconds

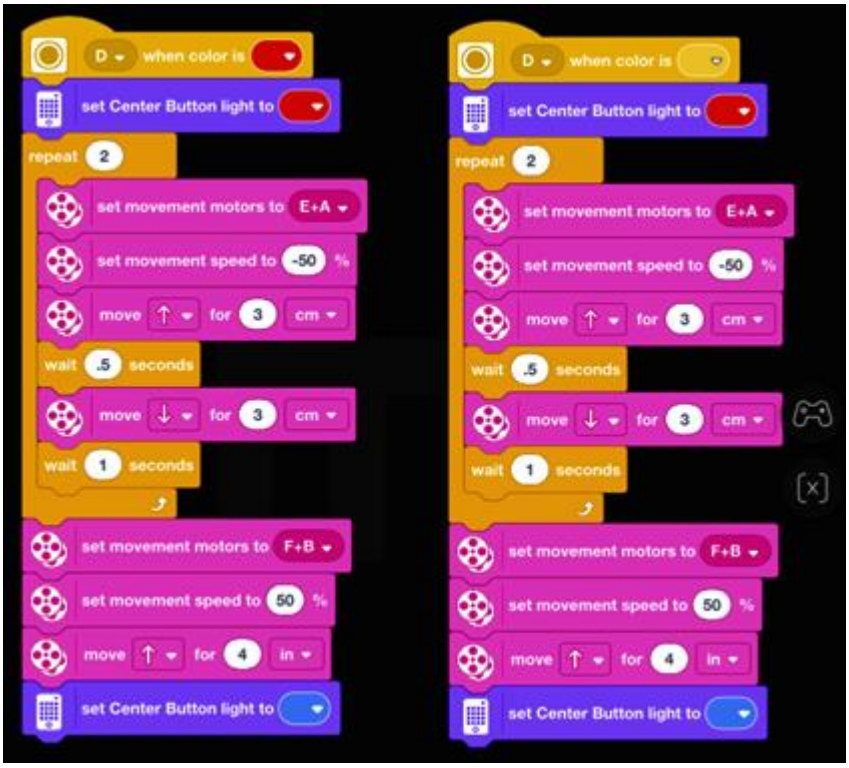

D
when color is
set Center Button light to

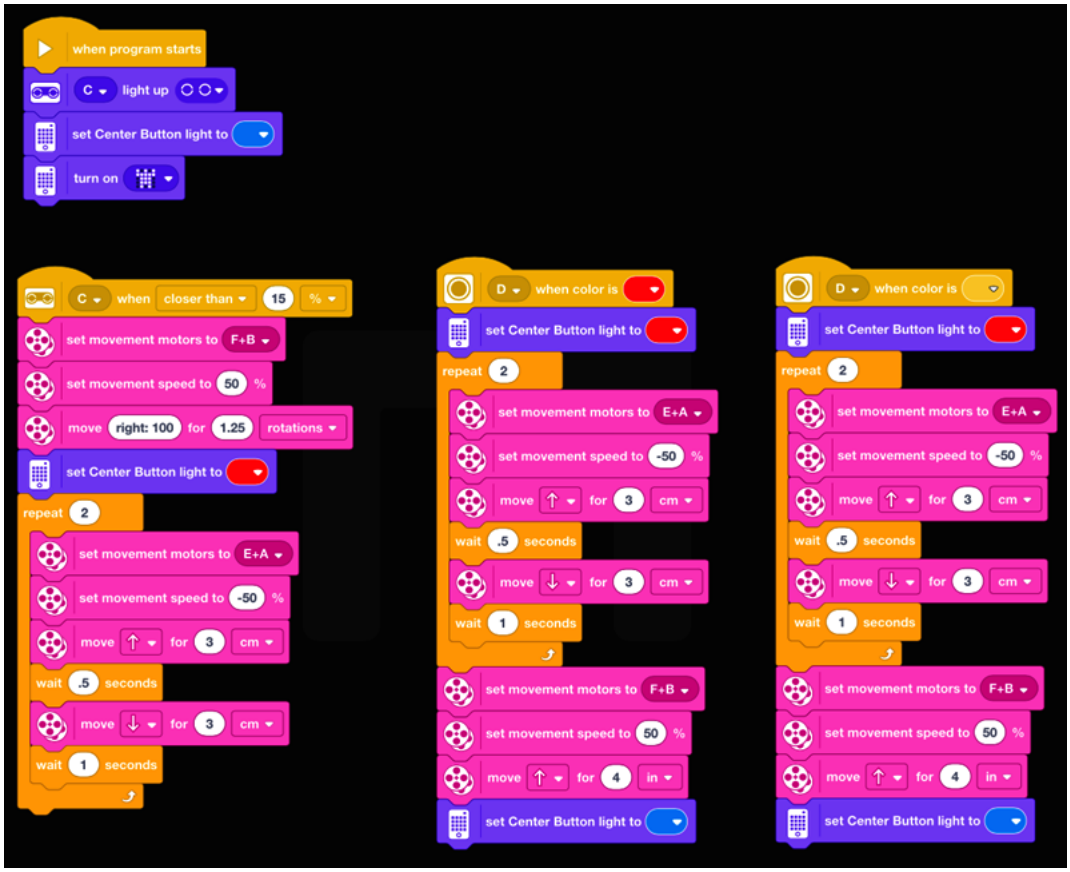

repeat
2
set movement motors to
E+A
set movement speed to
-50
%
move
for
3
cm
wait
.5
seconds

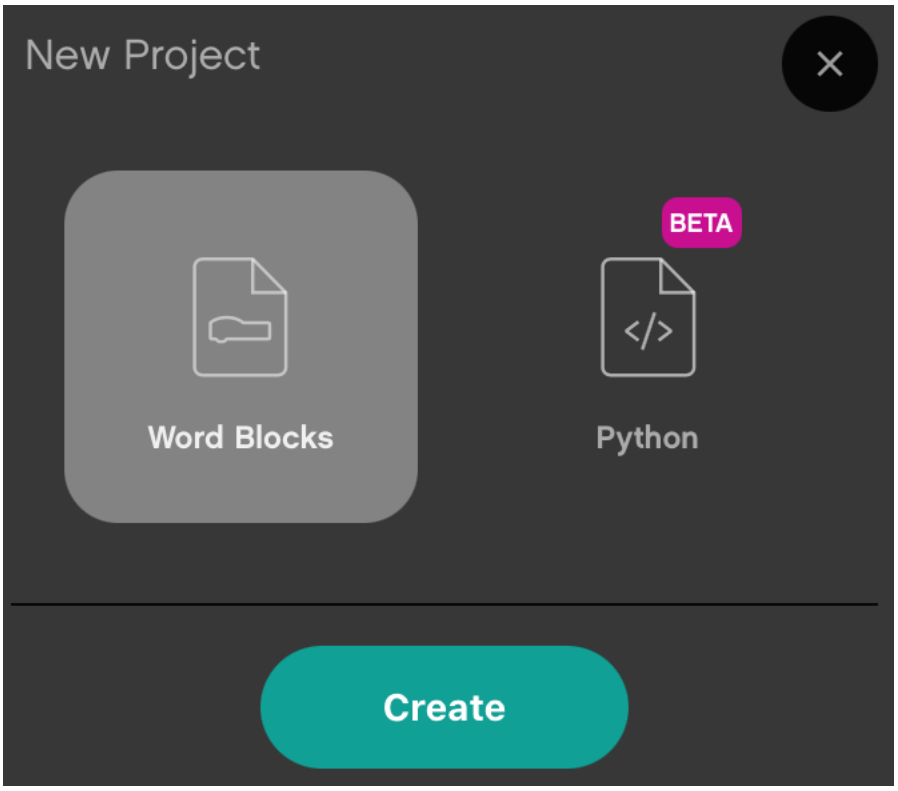

repeat
2
set movement motors to
E+A
set movement speed to
-50
%
move
for
3
cm
wait
.5
seconds
move
for
3
cm
wait
1
seconds

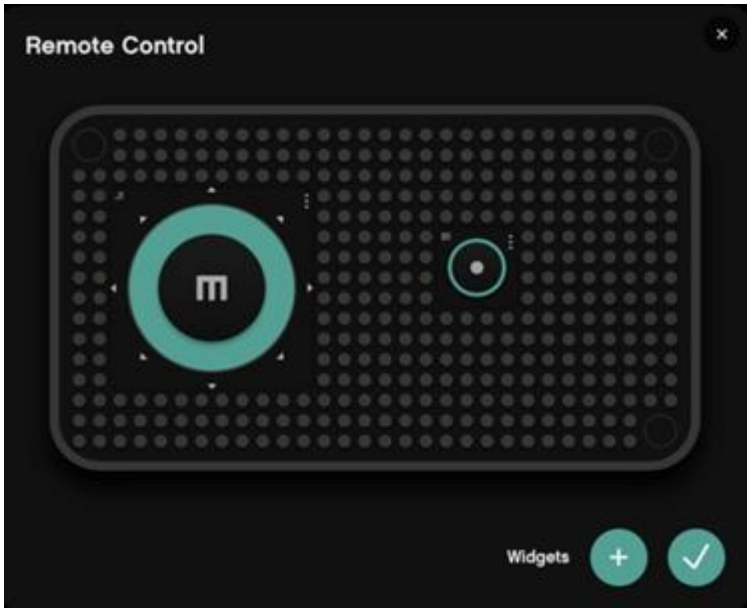

set movement motors to
F+B
set movement speed to
50
%
move
for
4
in

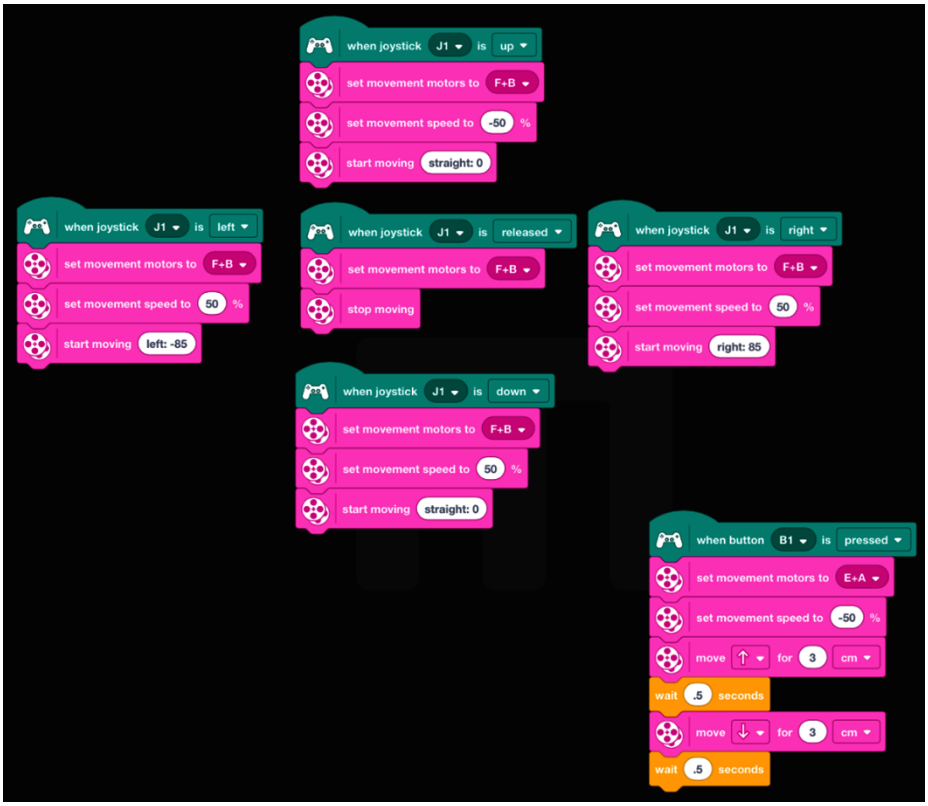

set movement motors to F+B
set movement speed to 50 %
move for 4 in
set Center Button light to


D when color is
set Center Button light to
repeat 2
set movement motors to E+A
set movement speed to -50 %
move for 3 cm
wait .5 seconds
move for 3 cm
wait 1 seconds
set movement motors to F+B
set movement speed to 50 %
move for 4 in
set Center Button light to
D when color is
set Center Button light to
repeat 2
set movement motors to E+A
set movement speed to -50 %
move for 3 cm
wait .5 seconds
move for 3 cm
wait 1 seconds
set movement motors to F+B
set movement speed to 50 %
move for 4 in
set Center Button light to

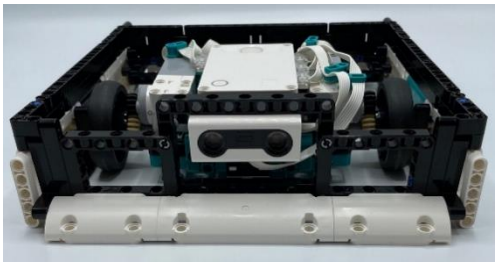

when program starts
C light up
set Center Button light to
turn on
C when closer than 15 %
set movement motors to F+B
set movement speed to 50 %
move right: 100 for 1.25 rotations
set Center Button light to
repeat 2
set movement motors to E+A
set movement speed to -50 %
move for 3 cm
wait .5 seconds
move for 3 cm
wait 1 seconds
D when color is
set Center Button light to
repeat 2
set movement motors to E+A
set movement speed to -50 %
move for 3 cm
wait .5 seconds
move for 3 cm
wait 1 seconds
set movement motors to F+B
set movement speed to 50 %
move for 4 in
set Center Button light to
D when color is
set Center Button light to
repeat 2
set movement motors to E+A
set movement speed to -50 %
move for 3 cm
wait .5 seconds
move for 3 cm
wait 1 seconds
set movement motors to F+B
set movement speed to 50 %
move for 4 in
set Center Button light to

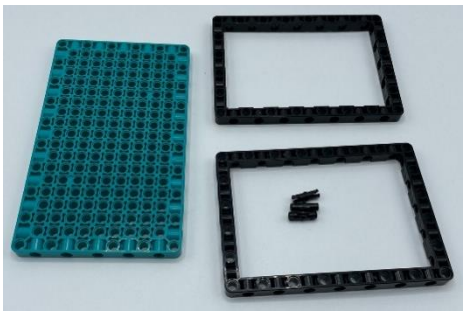

New Project
BETA
Word Blocks
Python
Create

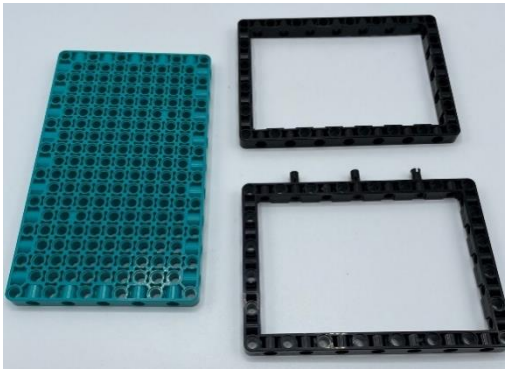

Remote Control
Widgets

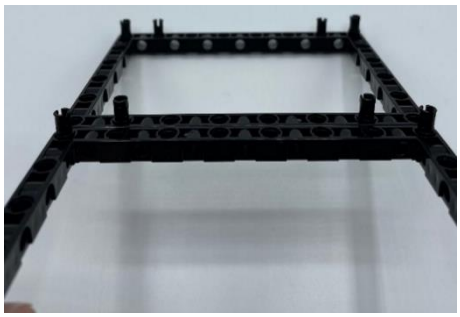

when joystick J1 is up
set movement motors to F+B
set movement speed to -50 %
start moving straight: 0
when joystick J1 is left
set movement motors to F+B
set movement speed to 50 %
start moving left: -85
when joystick J1 is released
set movement motors to F+B
stop moving
when joystick J1 is right
set movement motors to F+B
set movement speed to 50 %
start moving right: 85
when joystick J1 is down
set movement motors to F+B
set movement speed to 50 %
start moving straight: 0
when button B1 is pressed
set movement motors to E+A
set movement speed to -50 %
move for 3 cm
wait .5 seconds
move for 3 cm
wait .5 seconds

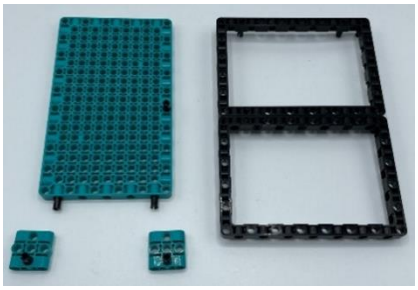
Chapter 6: Building a Solid Sumobot.

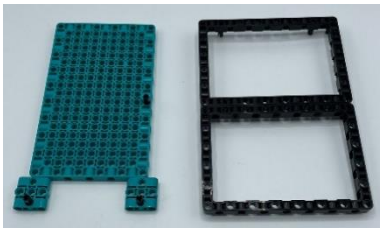


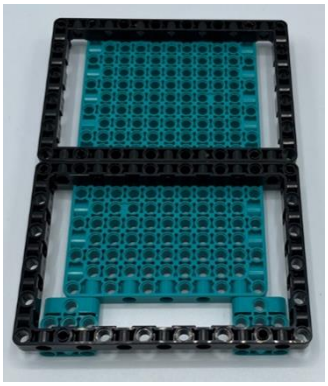


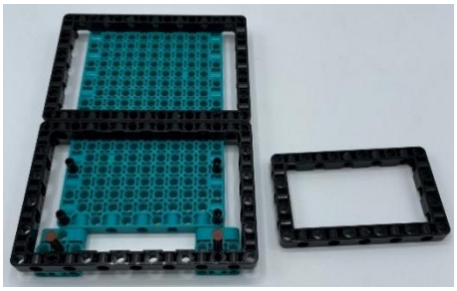


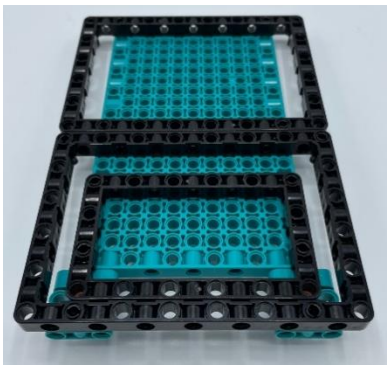


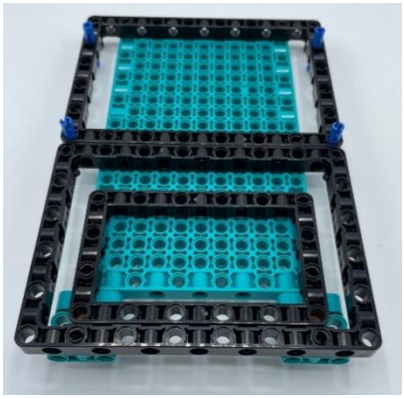


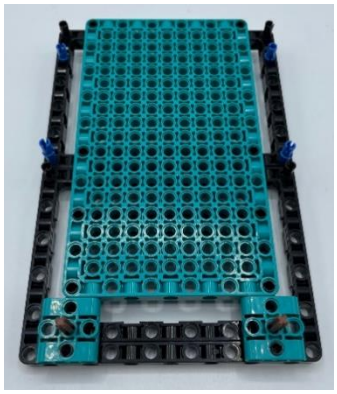


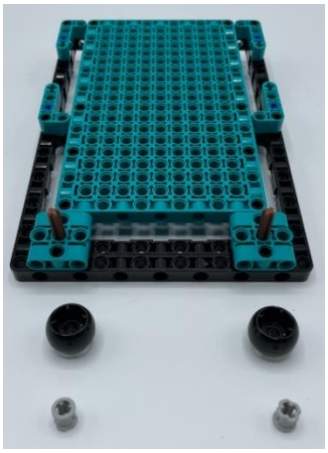


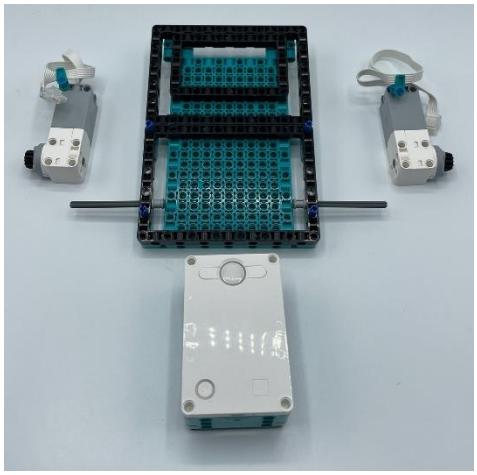


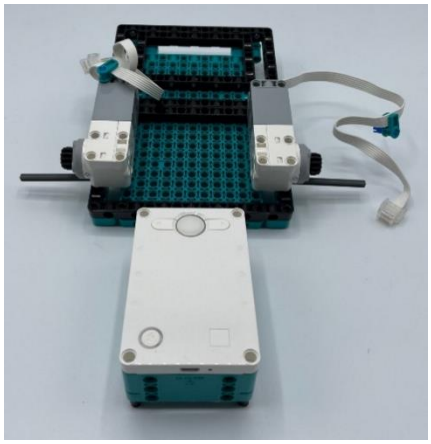


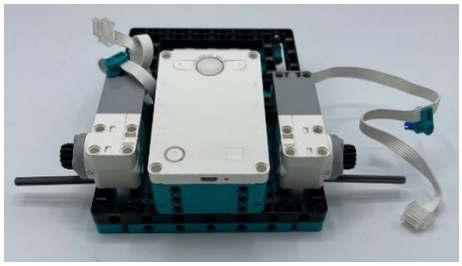


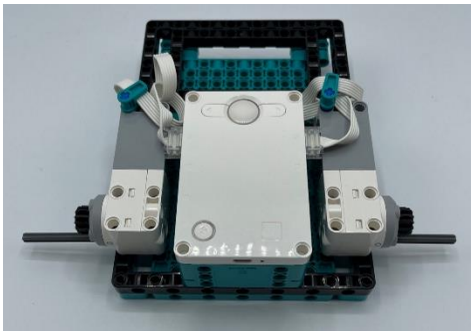


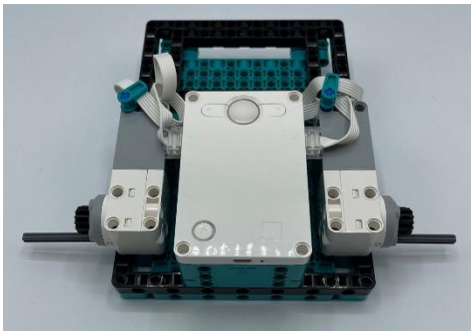


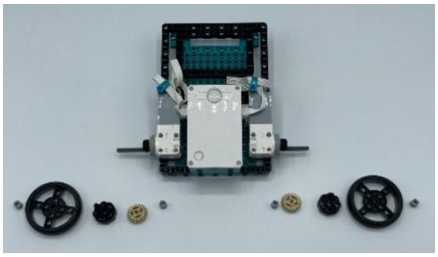


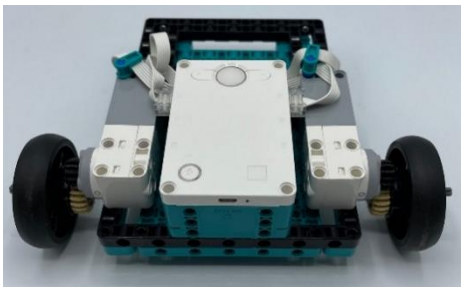


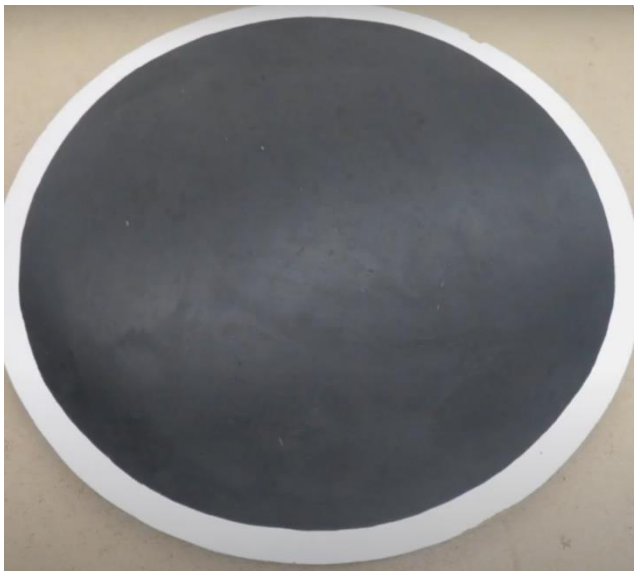


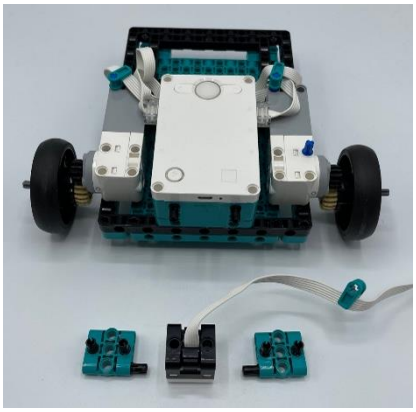


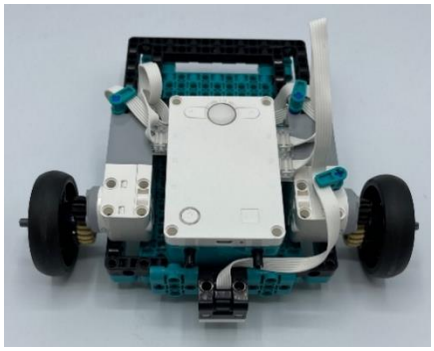


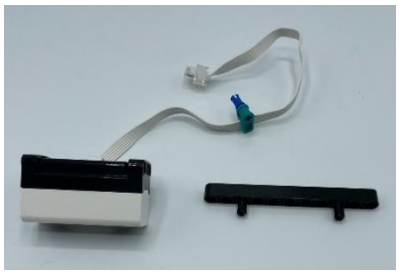


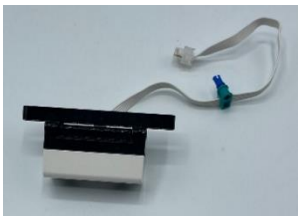


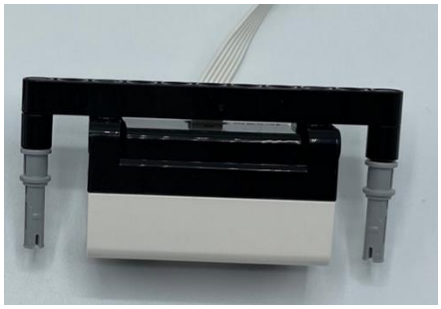


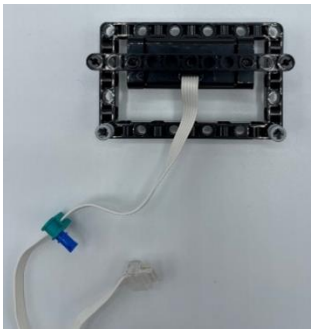


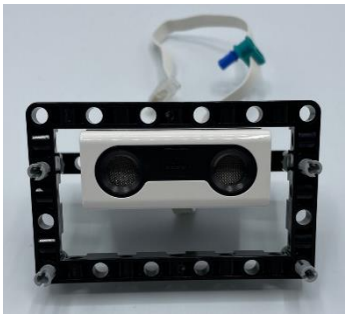


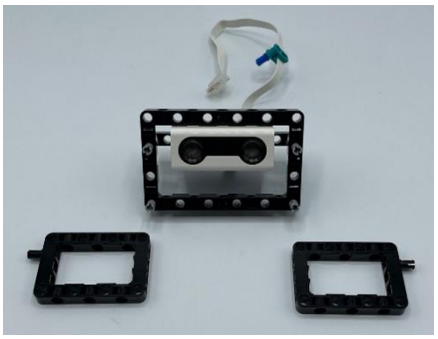


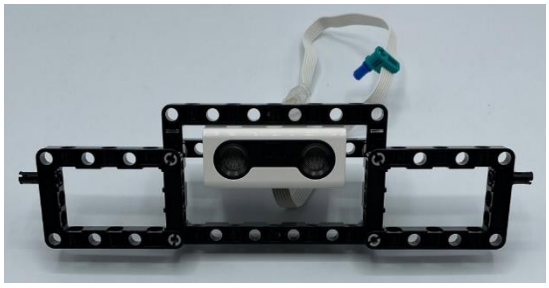


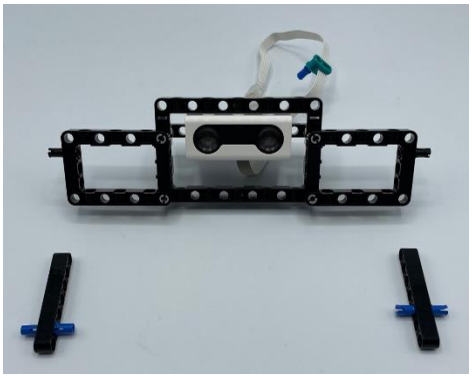


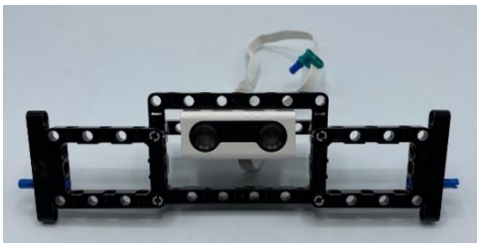


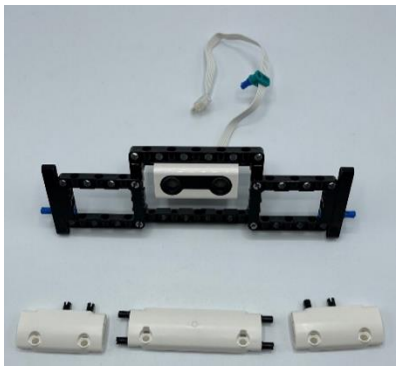


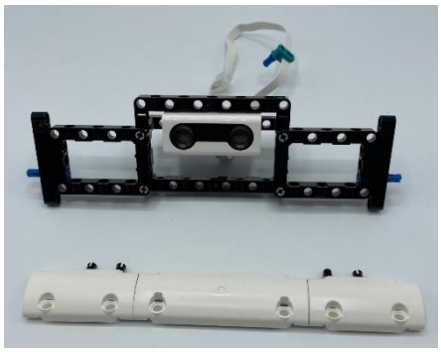


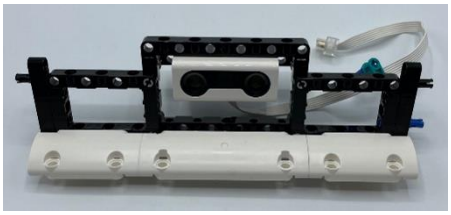


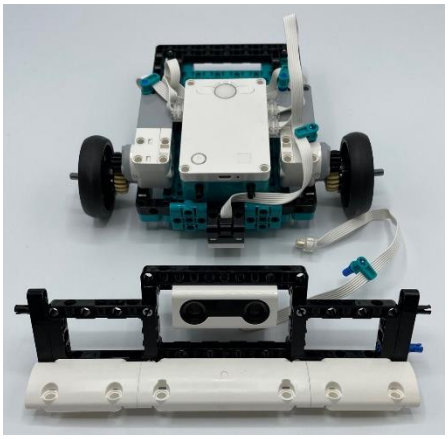


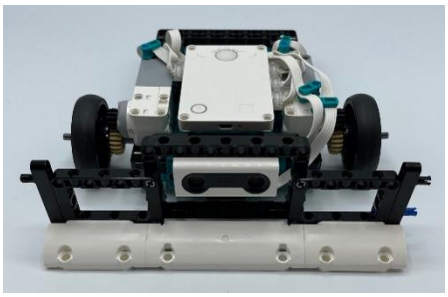


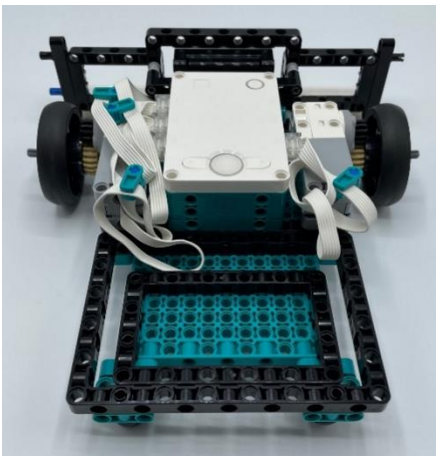


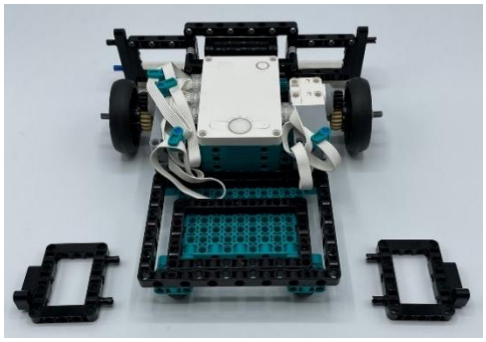


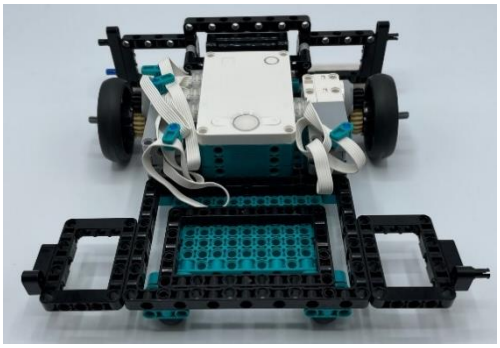


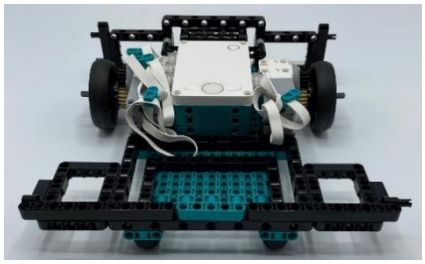


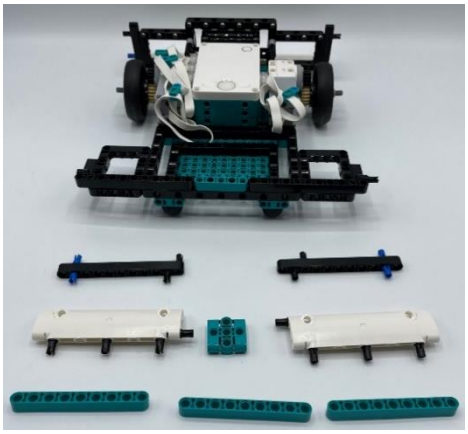


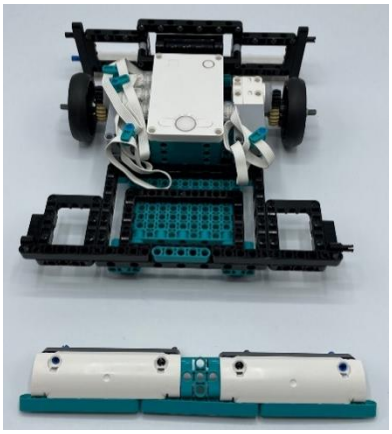


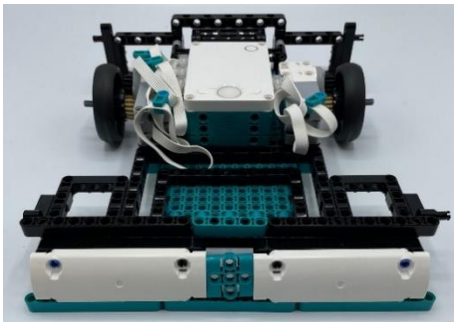


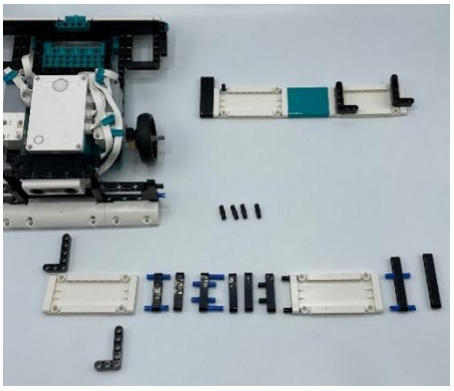


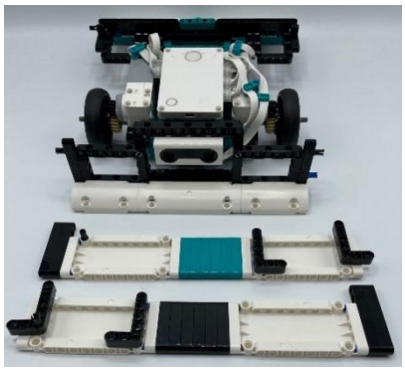


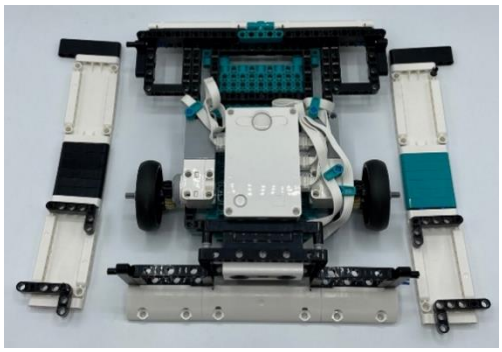


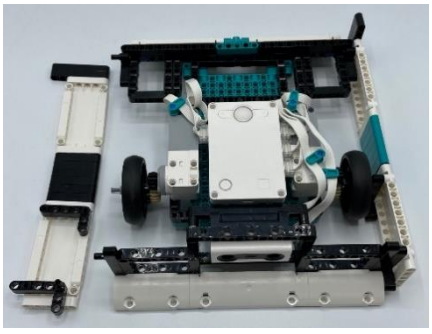


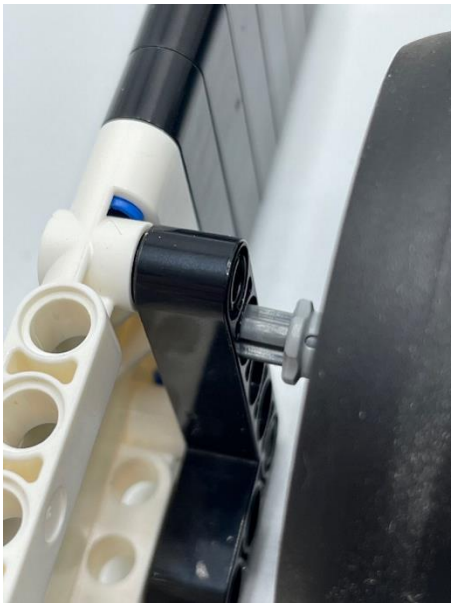


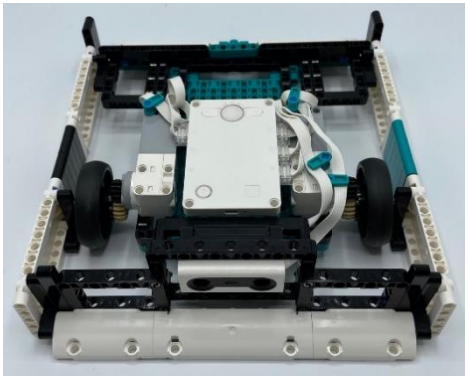


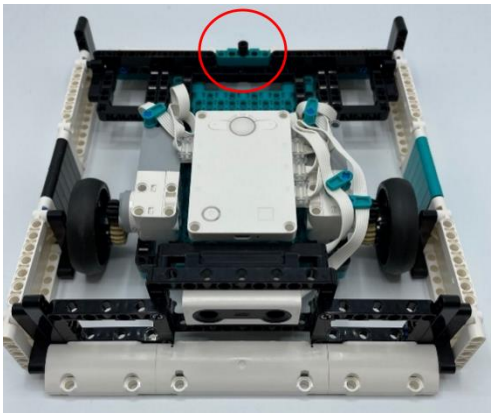


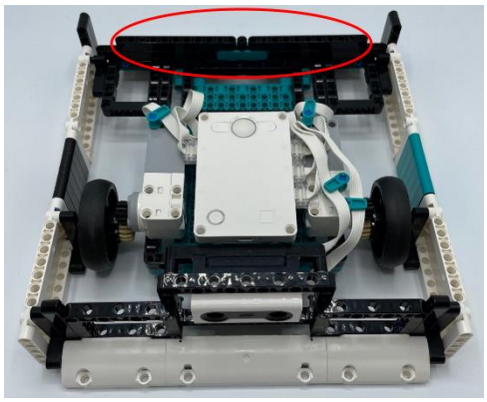


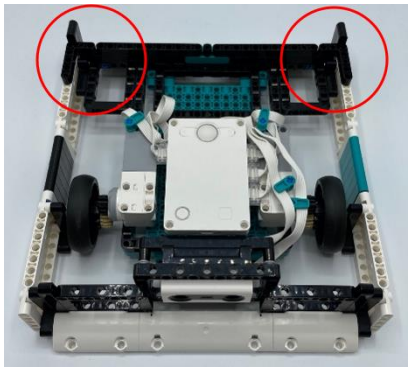


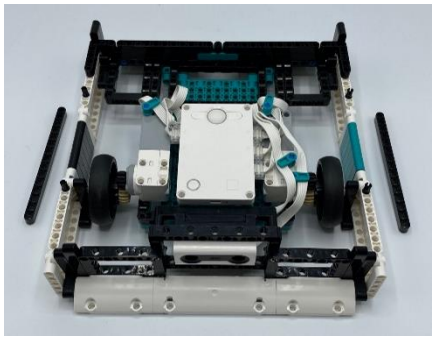


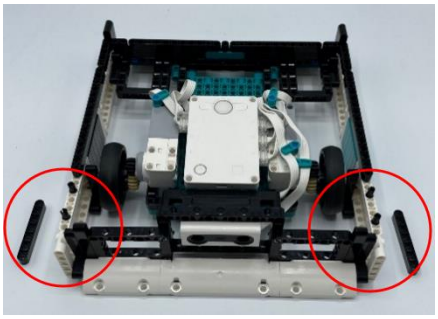


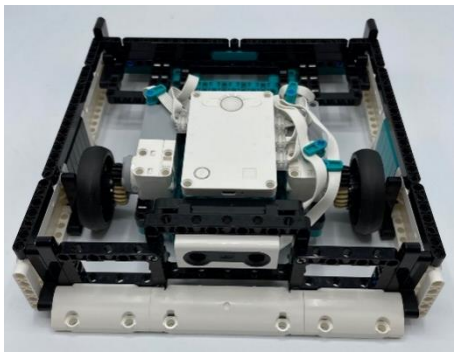


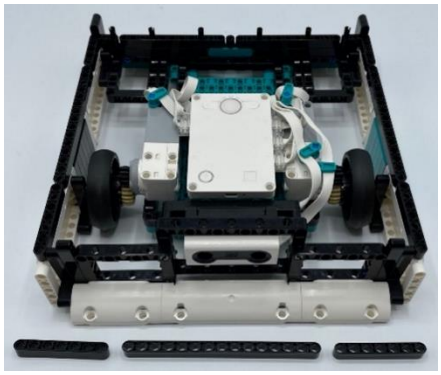


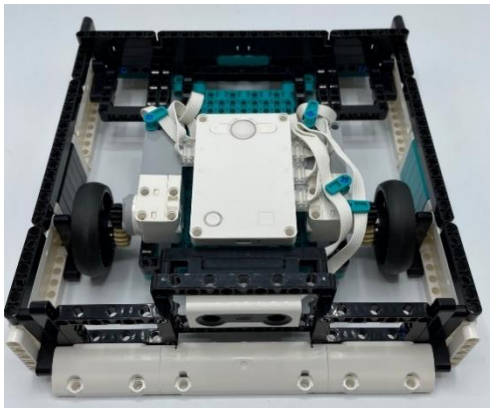


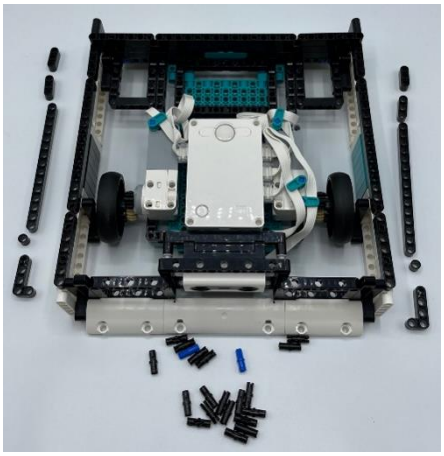


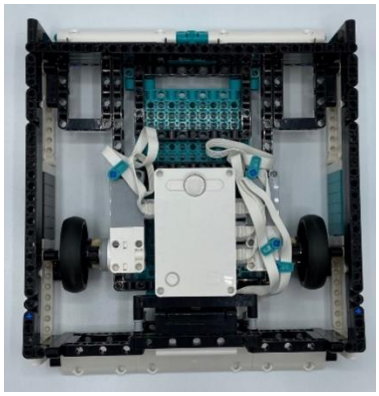


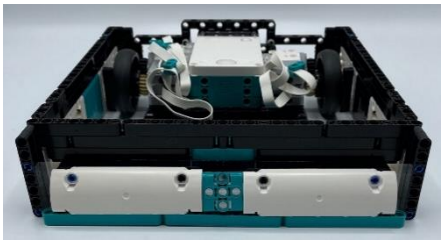




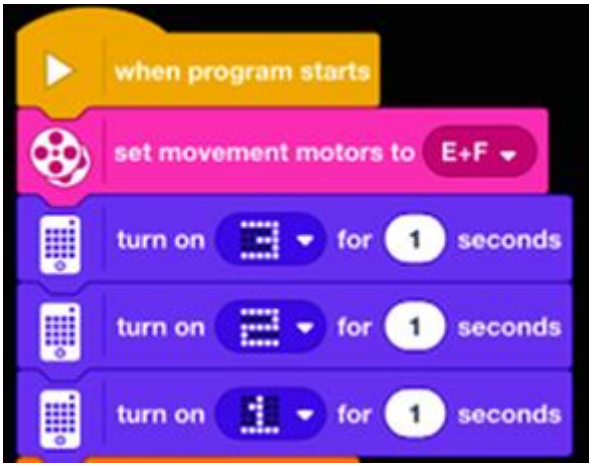


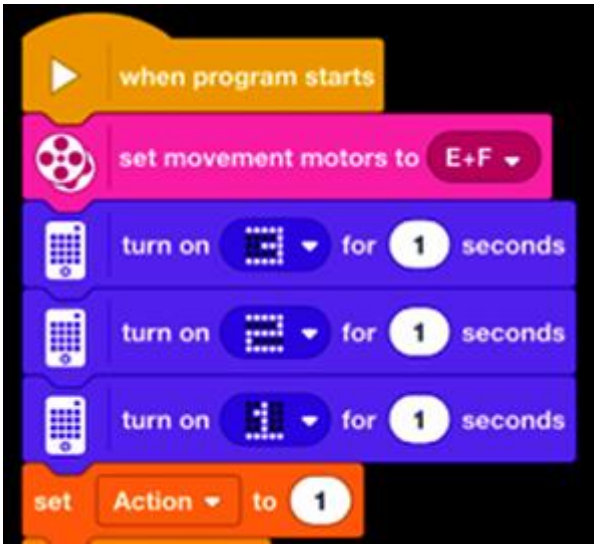


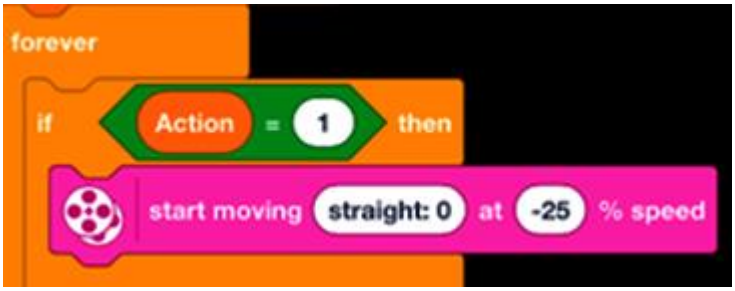


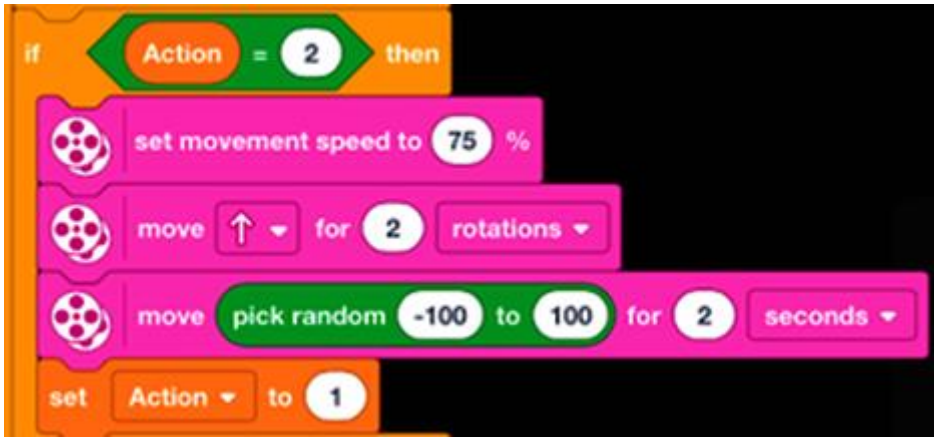


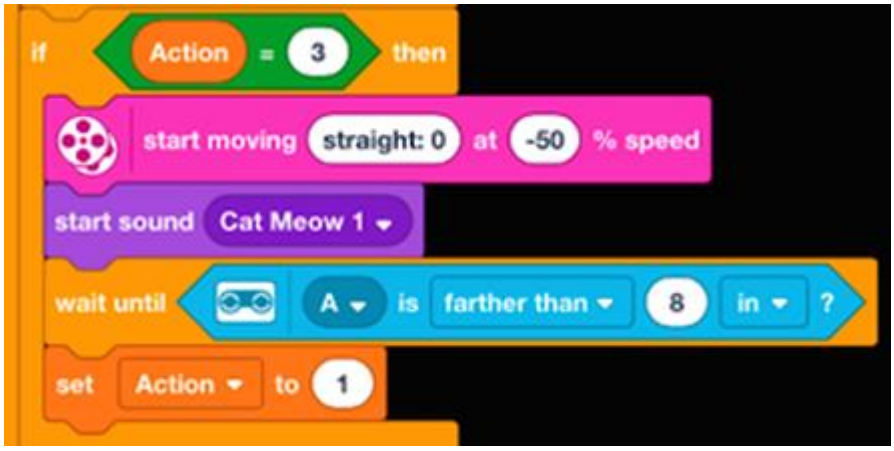
Tilt angle
Orientation
Gyro rate
Acceleration
Yaw:
96
Pitch:
-28
Roll:
12
A
4IN
C
1%
E
269°
A
B
C
D
E
F
F
73°

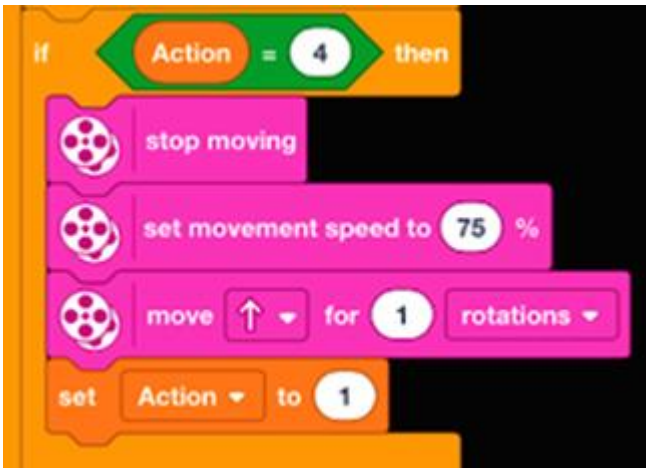

when program starts
set movement motors to E+F
turn on for 1 seconds
turn on for 1 seconds
turn on for 1 seconds

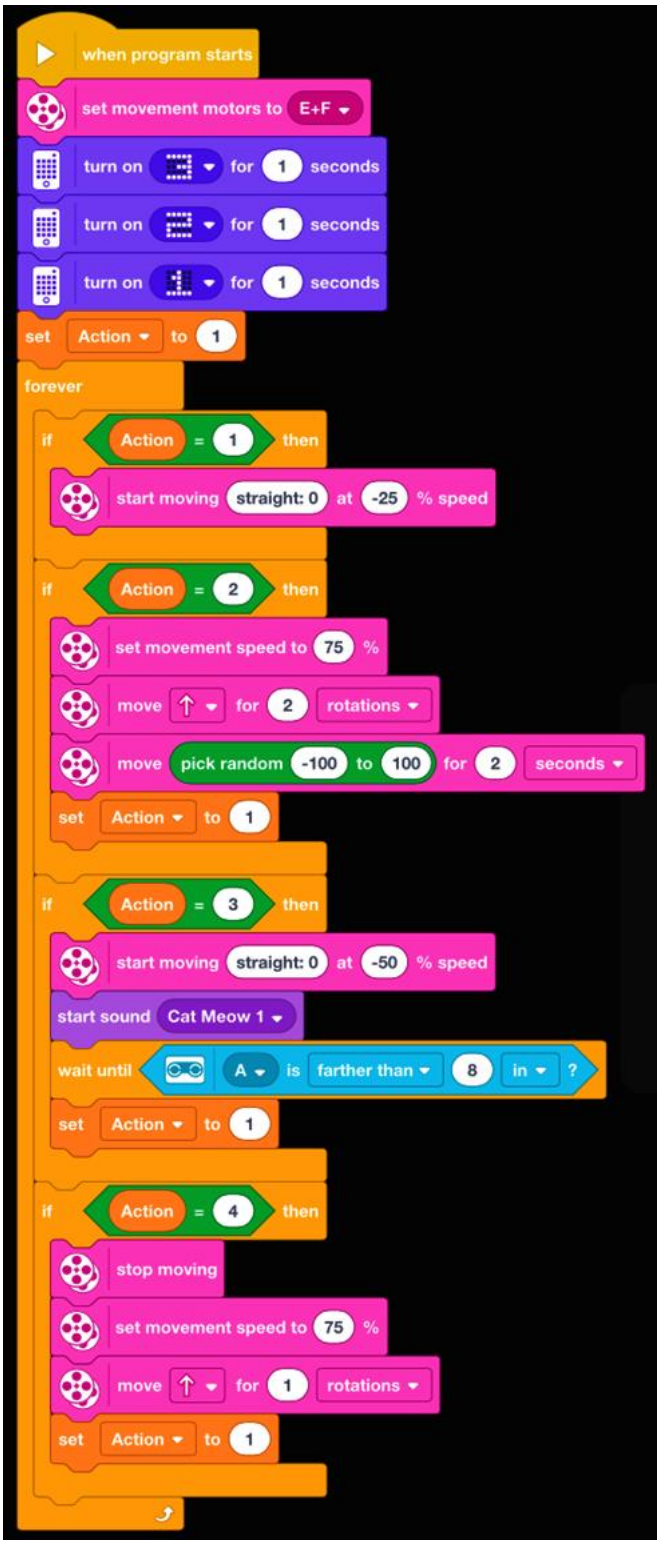

when program starts
set movement motors to E+F
turn on for 1 seconds
turn on for 1 seconds
turn on for 1 seconds
set Action to 1

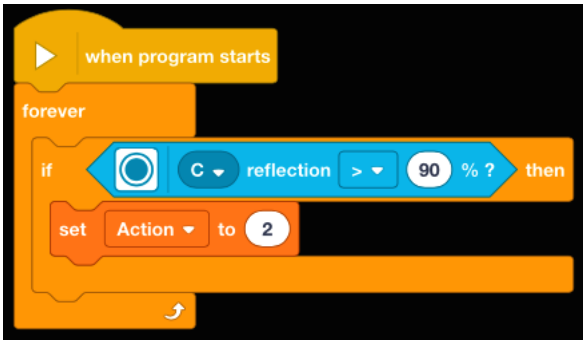

forever
if Action = 1 then
start moving straight: 0 at -25 % speed

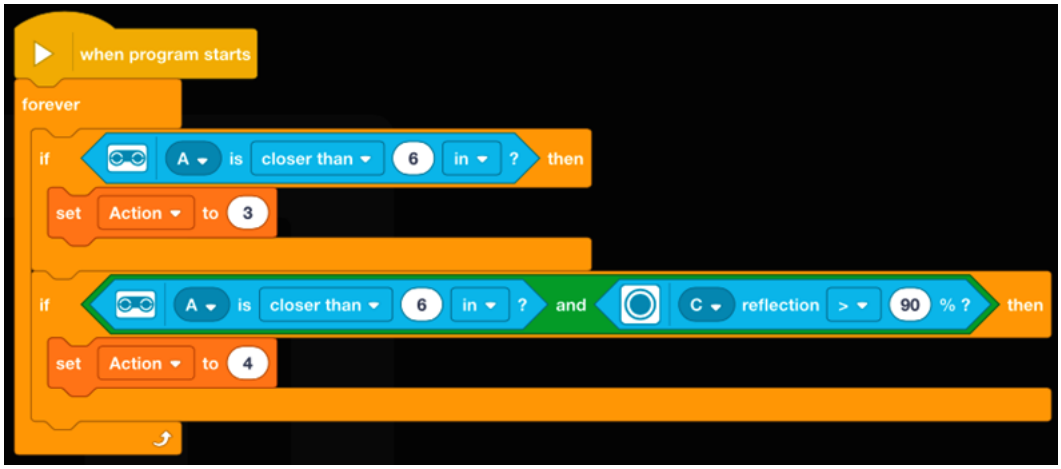

if Action = 2 then
set movement speed to 75 %
move for 2 rotations
move pick random -100 to 100 for 2 seconds
set Action to 1

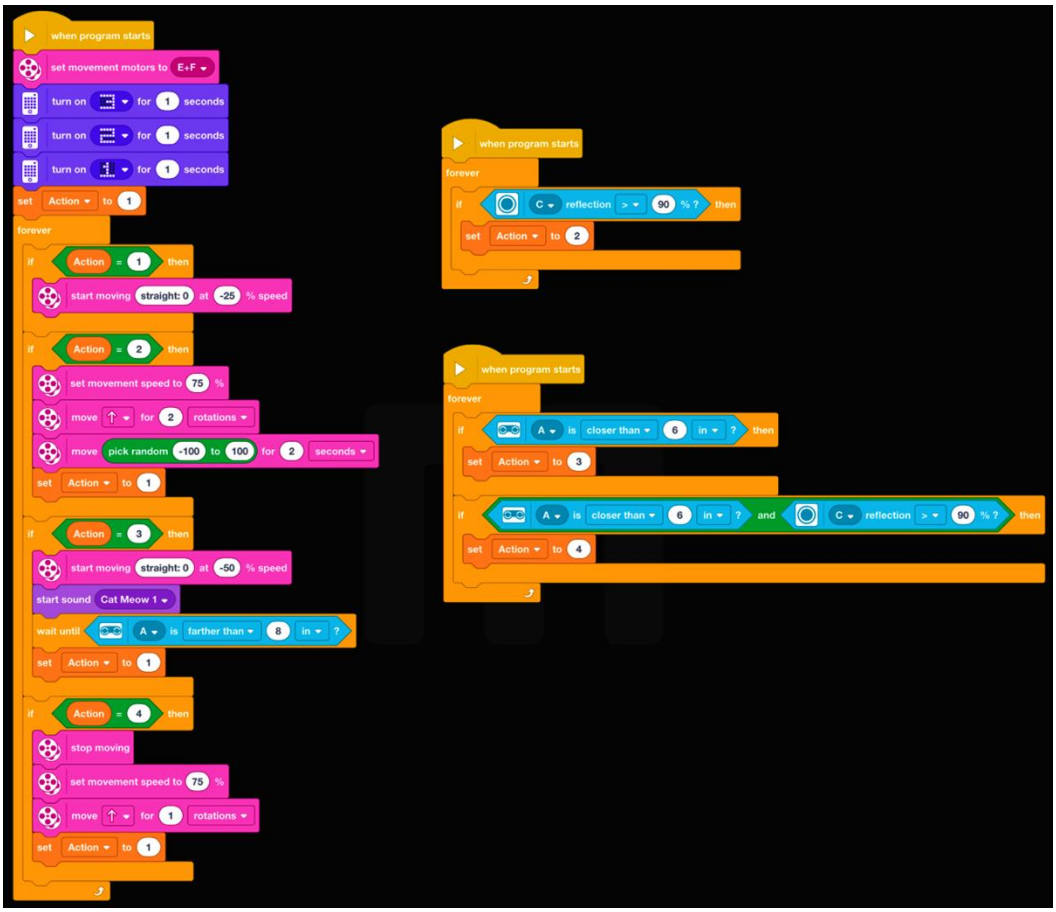

if
Action
=
3
then
start moving
straight: 0
at
-50
% speed
start sound
Cat Meow 1
wait until
A
is
farther than
8
in
?
set
Action
to
1


if
Action
=
4
then
stop moving
set movement speed to
75
%
move
for
1
rotations
set
Action
to
1

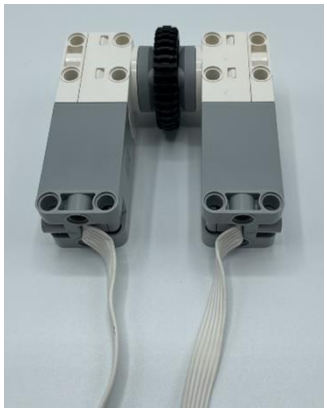

when program starts
set movement motors to E+F
turn on for 1 seconds
turn on for 1 seconds
turn on for 1 seconds
set Action to 1
forever
if Action = 1 then
start moving straight: 0 at -25 % speed
if Action = 2 then
set movement speed to 75 %
move for 2 rotations
move pick random -100 to 100 for 2 seconds
set Action to 1
if Action = 3 then
start moving straight: 0 at -50 % speed
start sound Cat Meow 1
wait until A is farther than 8 in ?
set Action to 1
if Action = 4 then
stop moving
set movement speed to 75 %
move for 1 rotations
set Action to 1

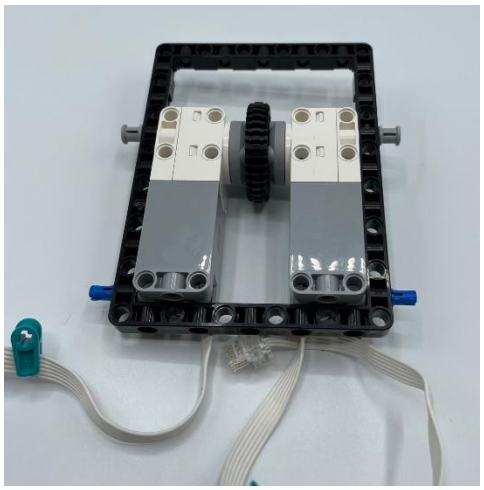

when program starts
forever
if
C
reflection
>
90
% ?
then
set
Action
to
2

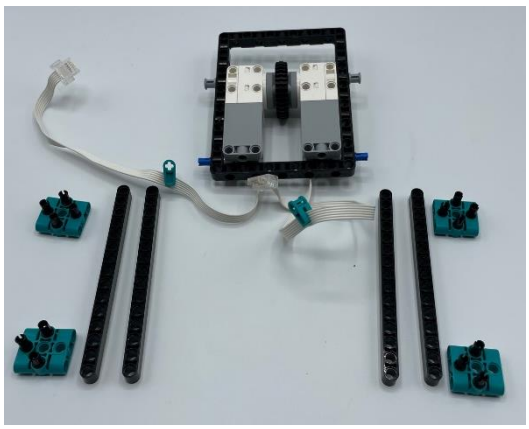

when program starts
forever
if
A
is
closer than
6
in
?
then
set
Action
to
3
if
A
is
closer than
6
in
?
and
C
reflection
>
90
% ?
then
set
Action
to
4

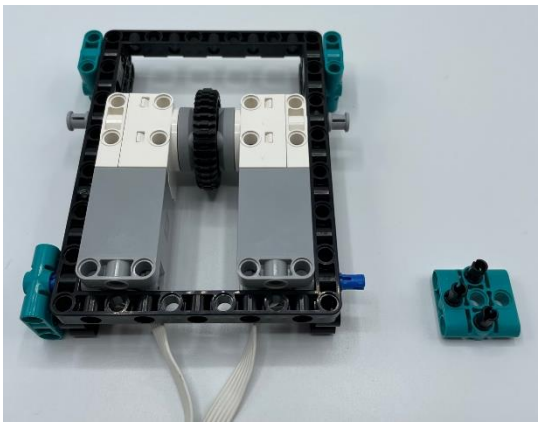

when program starts
set movement motors to E+F
turn on for 1 seconds
turn on for 1 seconds
turn on for 1 seconds
set Action to 1
forever
if Action = 1 then
start moving straight: 0 at -25 % speed
if Action = 2 then
set movement speed to 75 %
move for 2 rotations
move pick random -100 to 100 for 2 seconds
set Action to 1
if Action = 3 then
start moving straight: 0 at -50 % speed
start sound Cat Meow 1
wait until A is farther than 8 in ?
set Action to 1
if Action = 4 then
stop moving
set movement speed to 75 %
move for 1 rotations
set Action to 1
when program starts
forever
if C reflection > 90 % ? then
set Action to 2
when program starts
forever
if A is closer than 6 in ? then
set Action to 3
if A is closer than 6 in ? and C reflection > 90 % ? then
set Action to 4

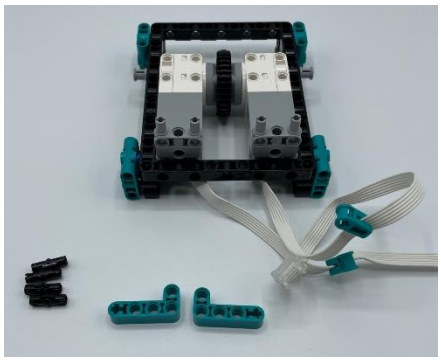
Chapter 7: Building a Dragster.

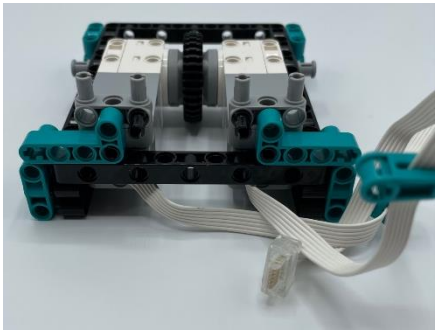


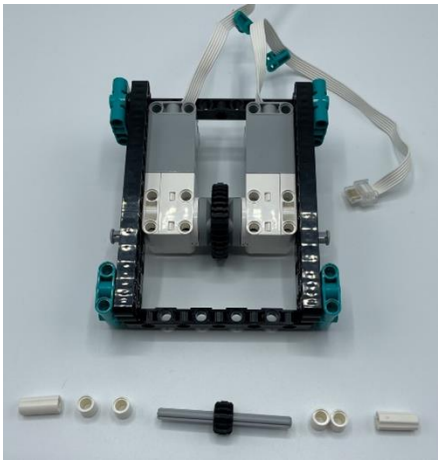


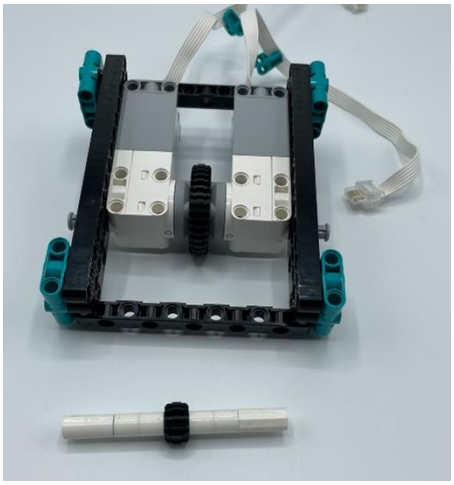


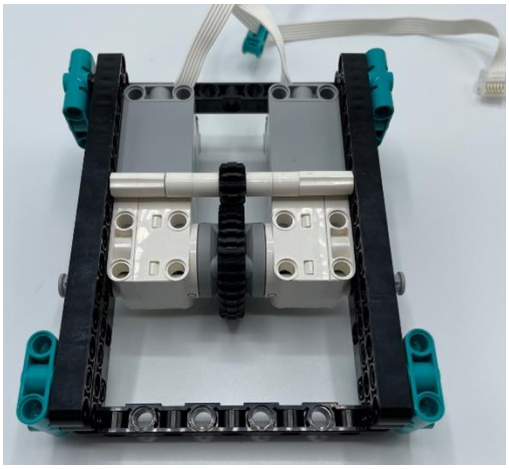


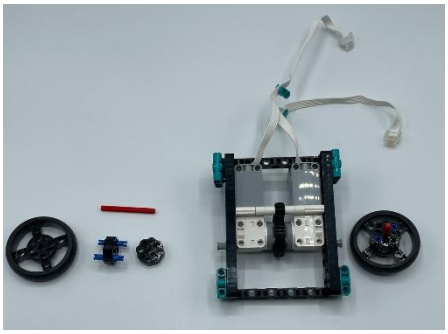


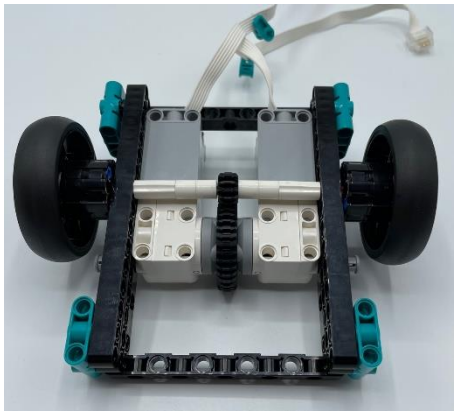


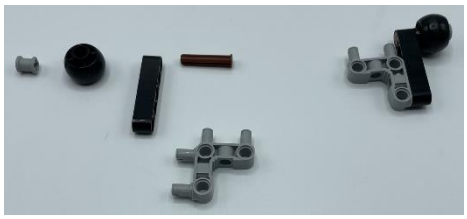


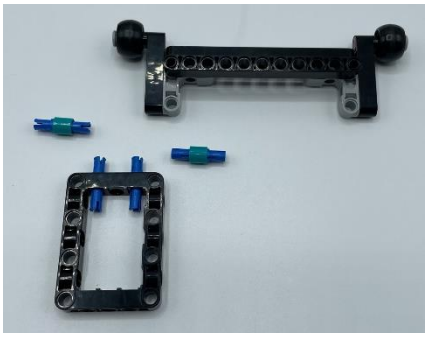


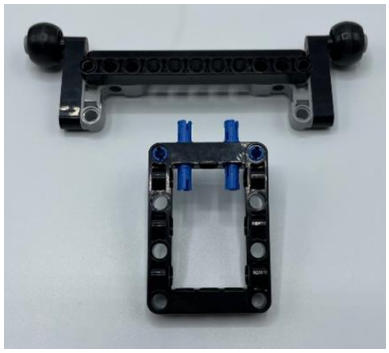


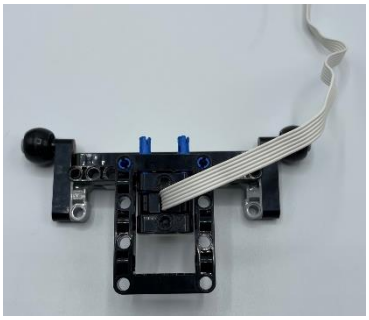


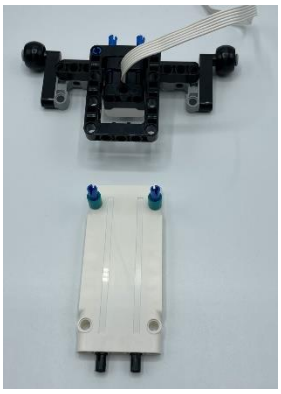


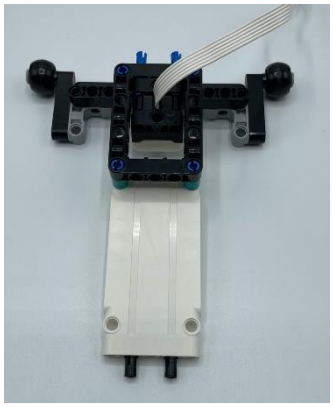


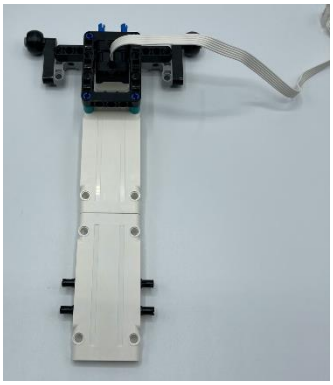


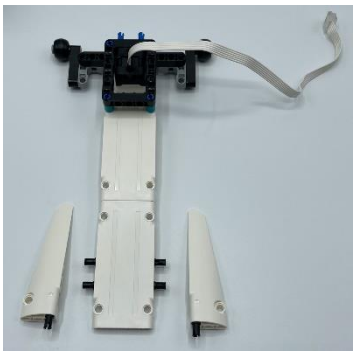


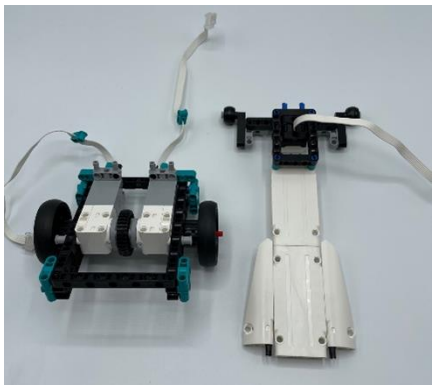


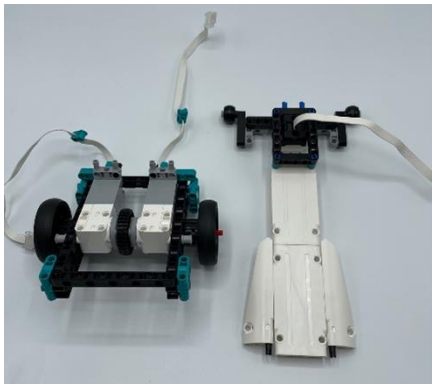


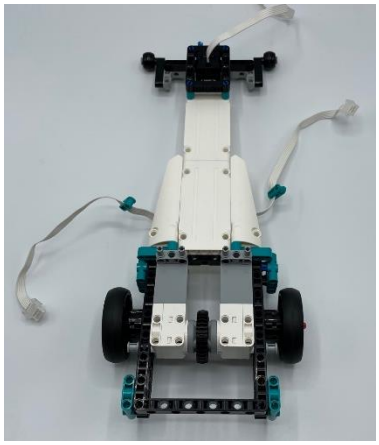


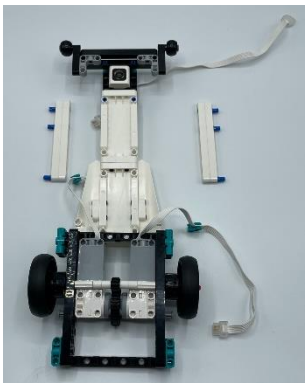


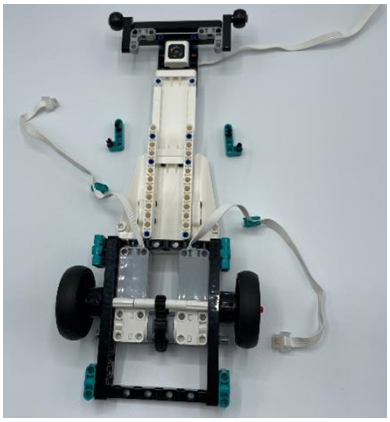


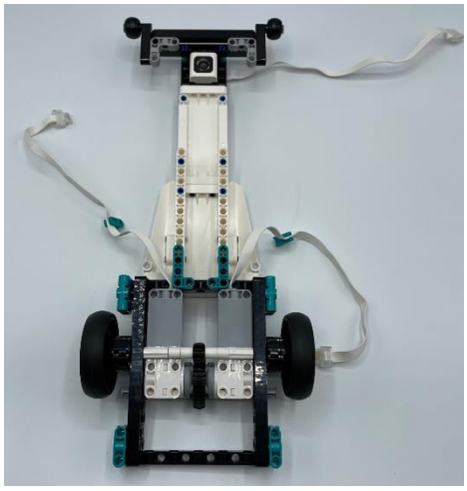


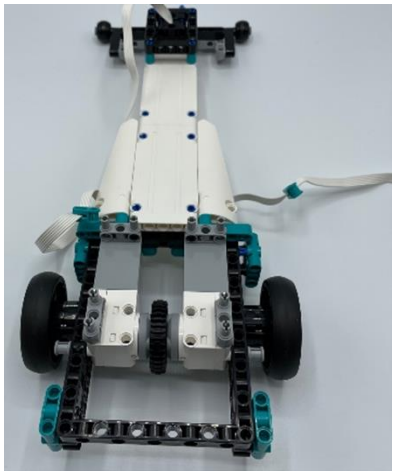


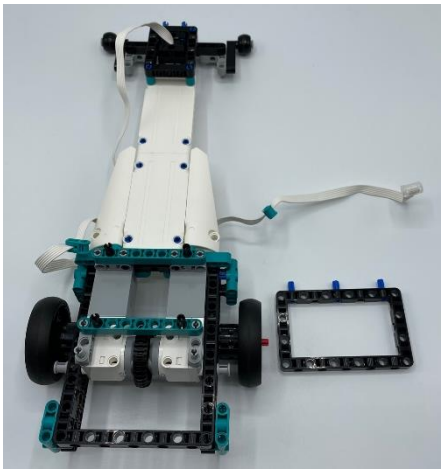


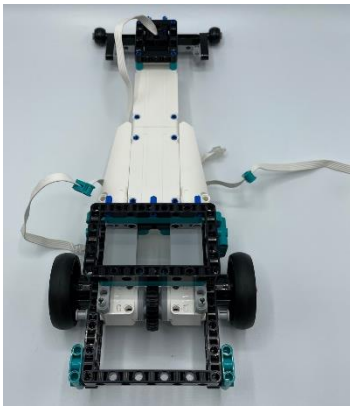


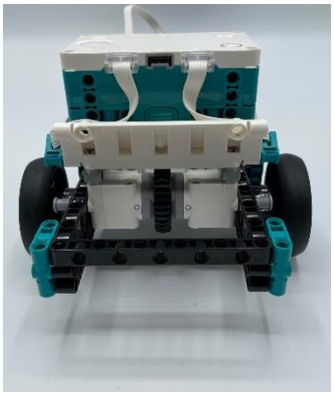


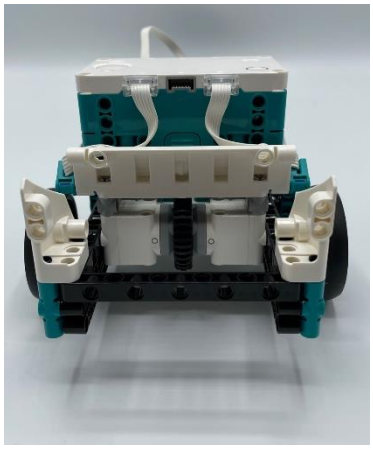


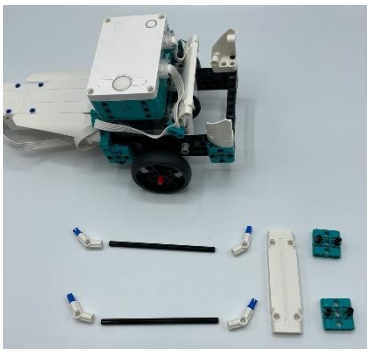


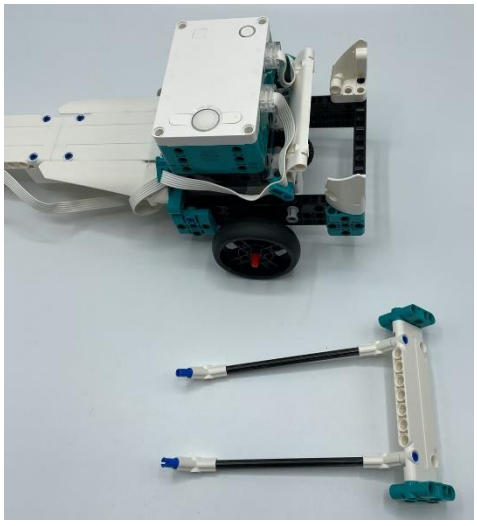


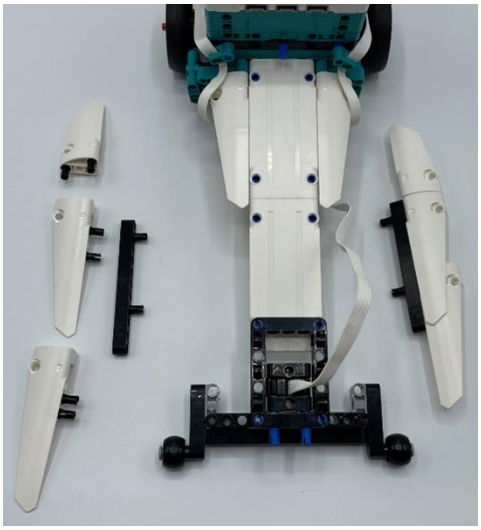


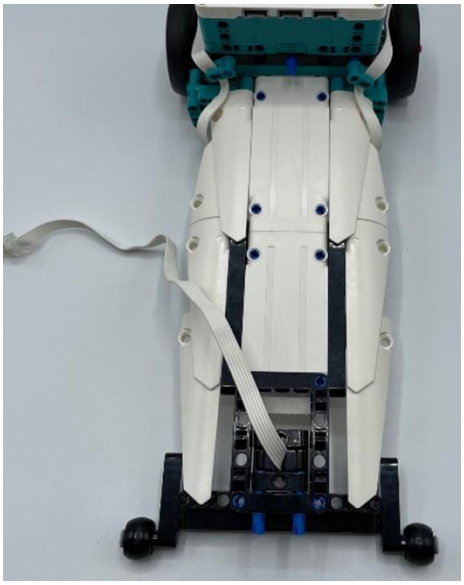


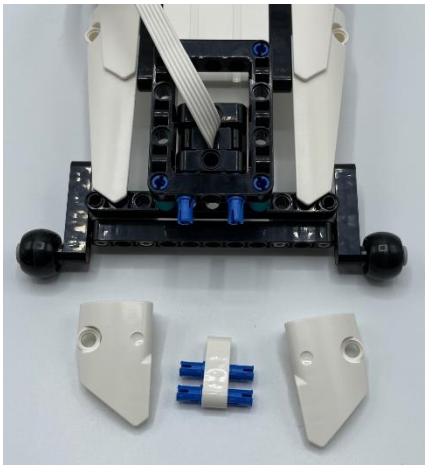


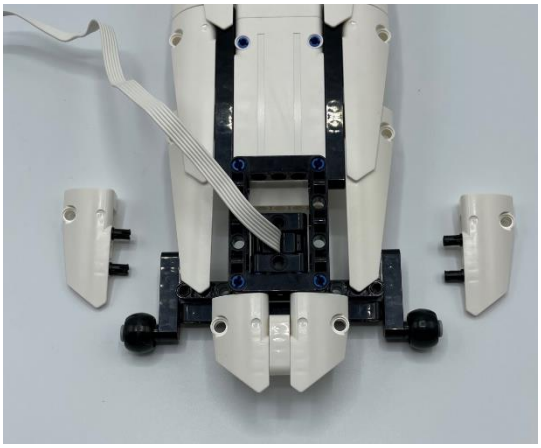


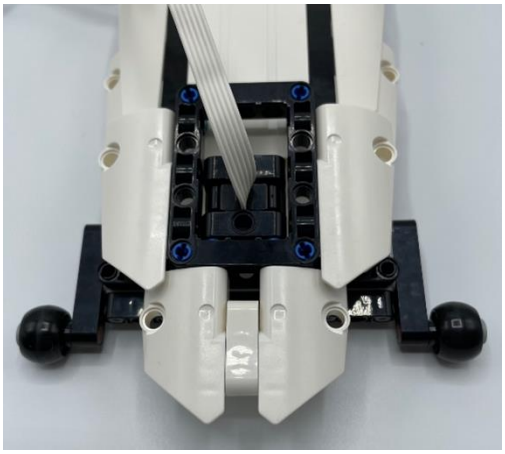


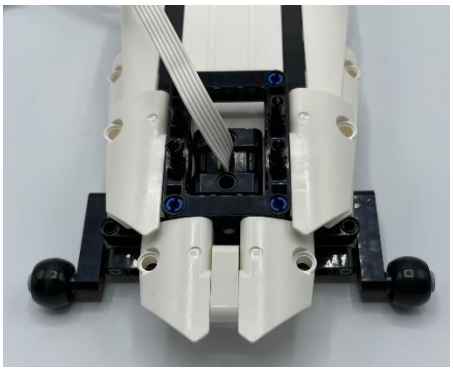


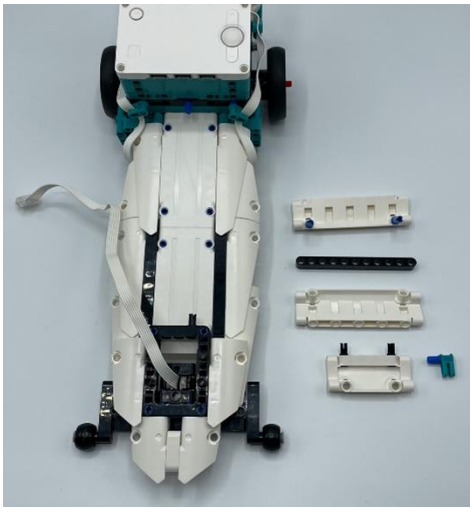


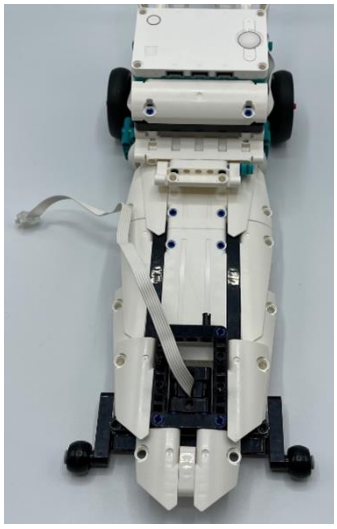


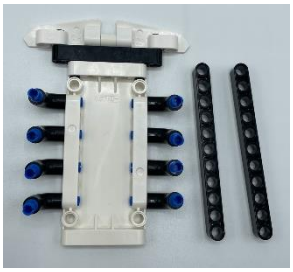


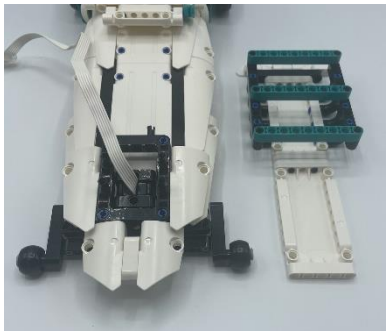


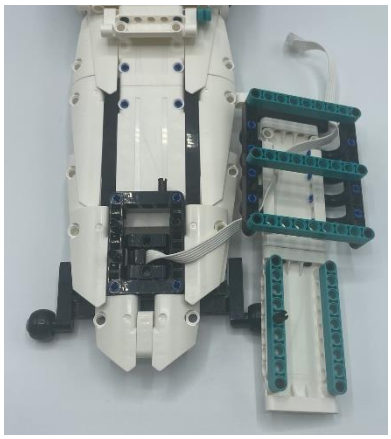


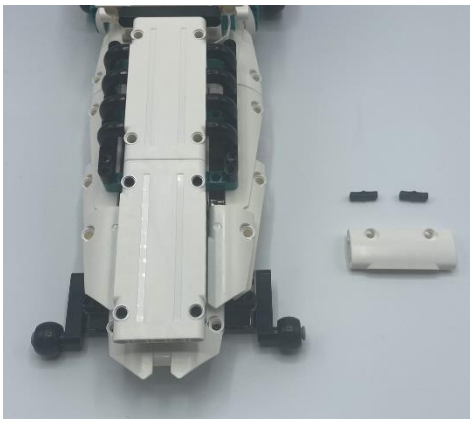


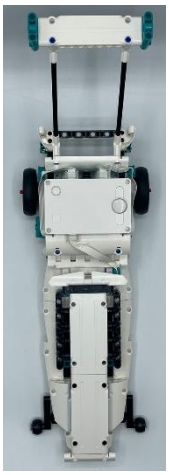


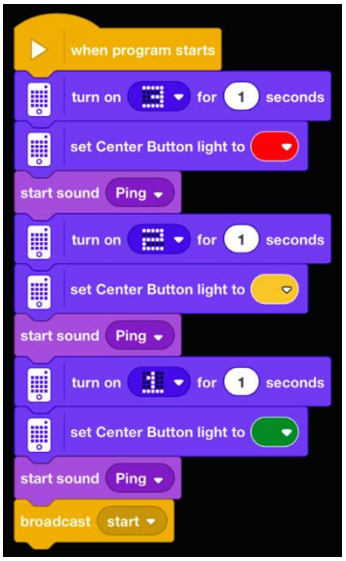


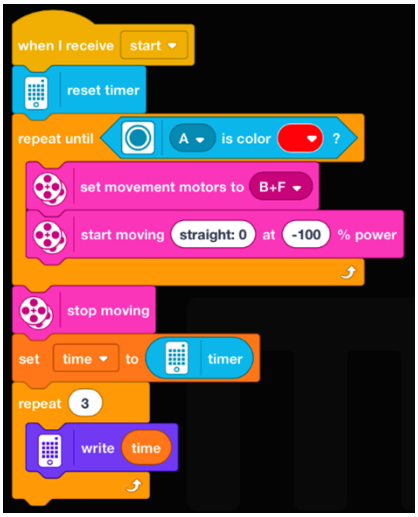


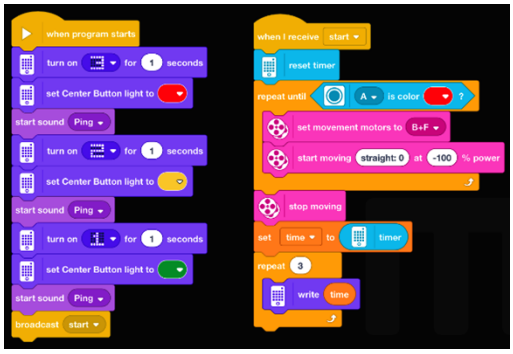




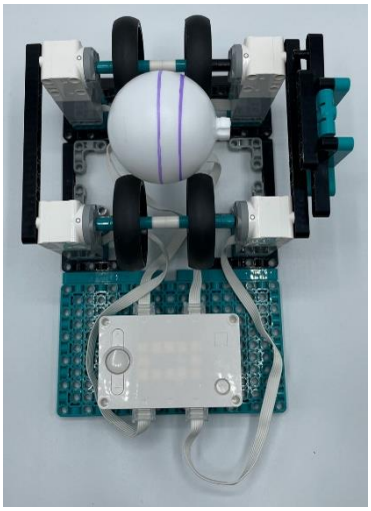


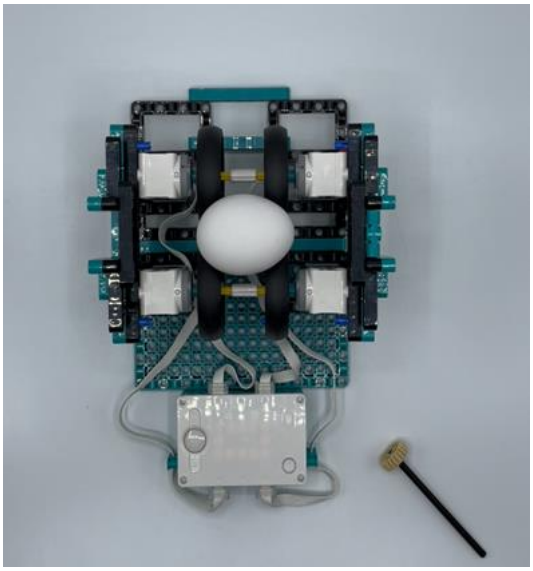

when program starts
turn on for 1 seconds
set Center Button light to
start sound Ping
turn on for 1 seconds
set Center Button light to
start sound Ping
turn on for 1 seconds
set Center Button light to
start sound Ping
broadcast start

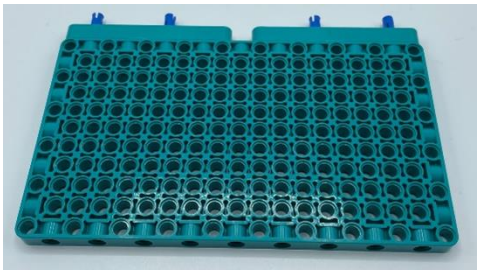

when I receive start
reset timer
repeat until A is color ?
set movement motors to B+F
start moving straight: 0 at -100 % power
stop moving
set time to timer
repeat 3
write time

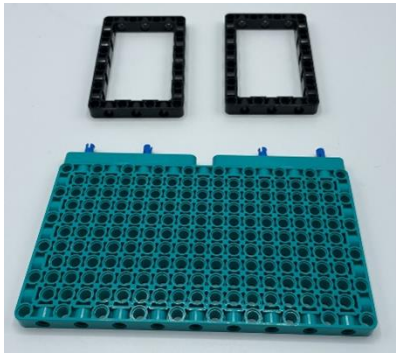

when program starts
turn on for 1 seconds
set Center Button light to
start sound Ping
turn on for 1 seconds
set Center Button light to
start sound Ping
turn on for 1 seconds
set Center Button light to
start sound Ping
broadcast start
when I receive start
reset timer
repeat until A is color ?
set movement motors to B+F
start moving straight: 0 at -100 % power
stop moving
set time to timer
repeat 3
write time

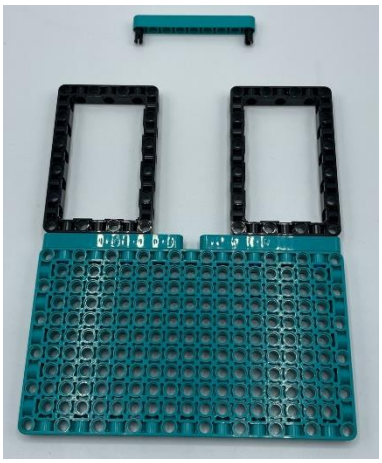
Chapter 8: Building an Egg and Ornament Decorator.

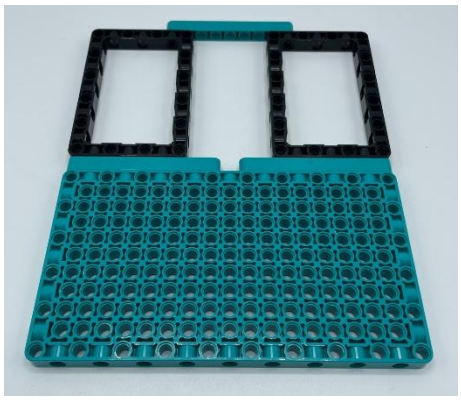


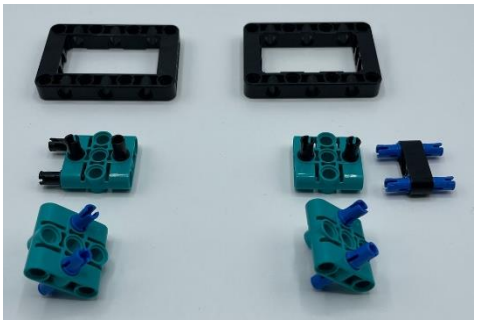


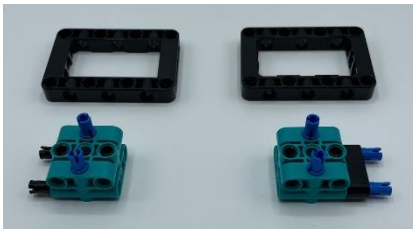


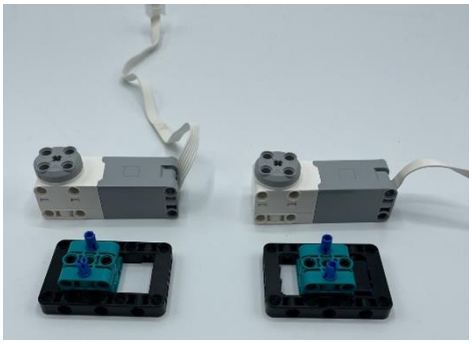


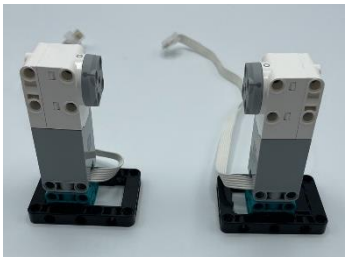


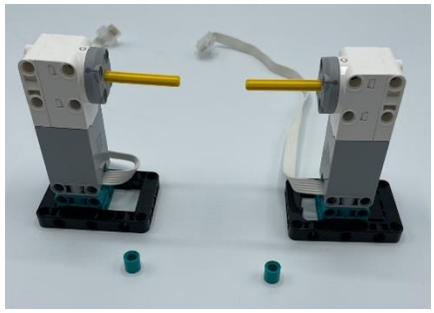


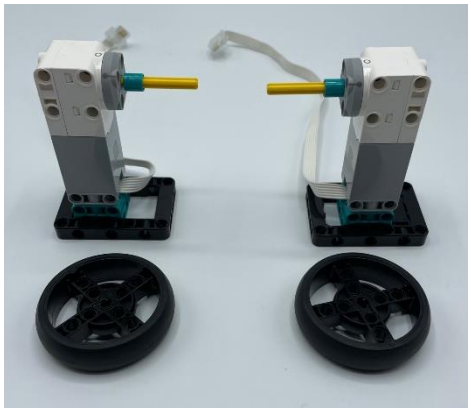


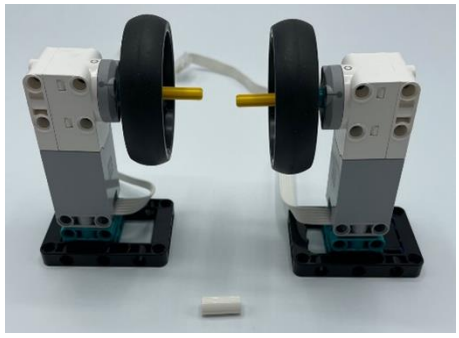


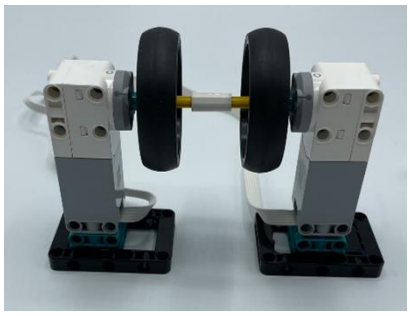


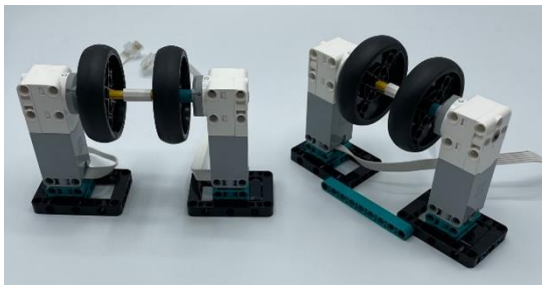


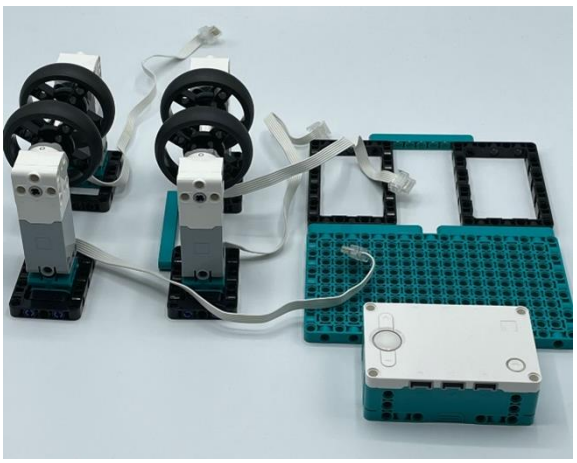


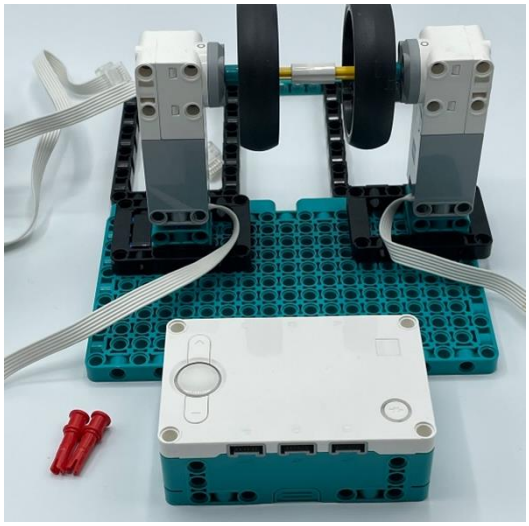


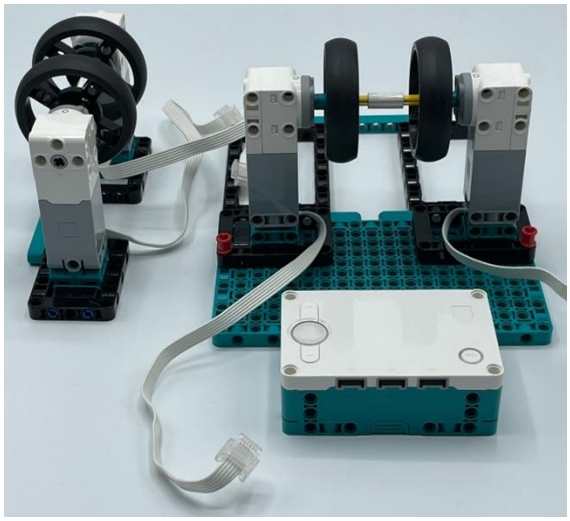


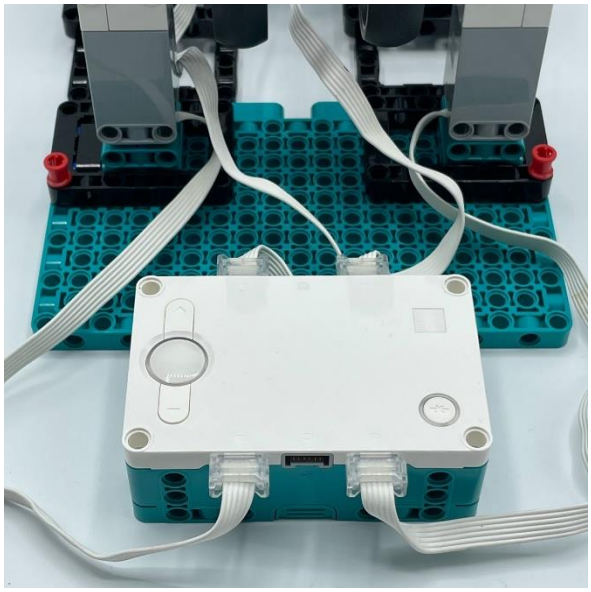


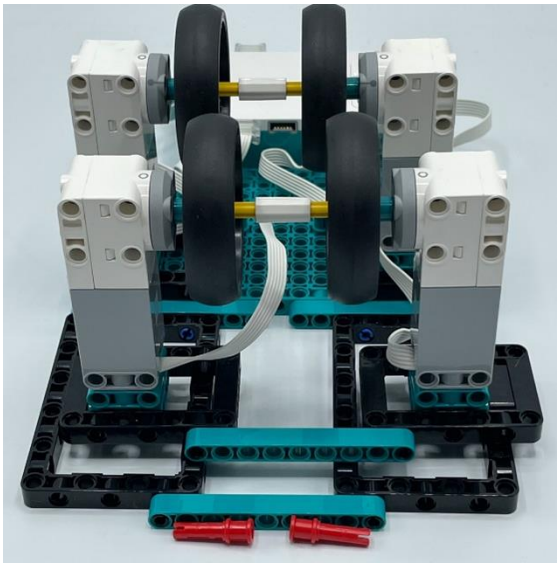


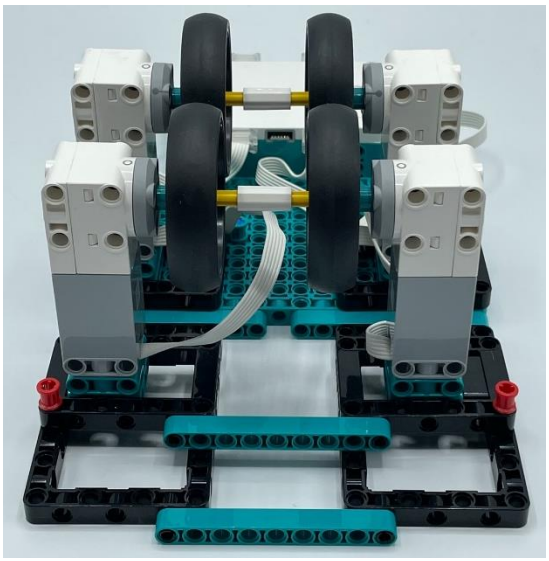


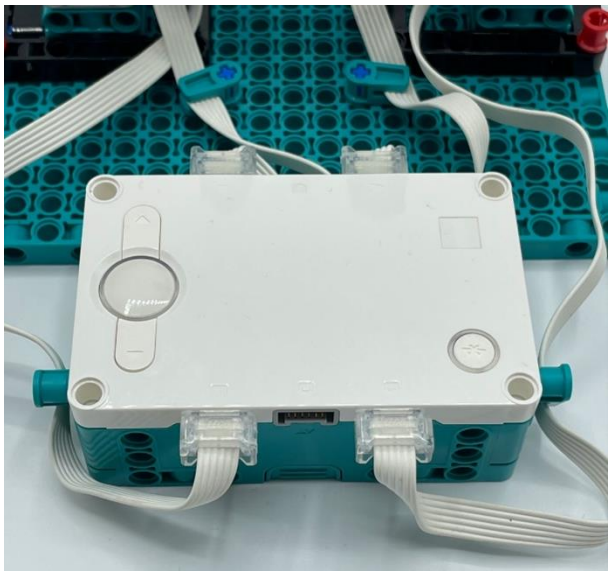


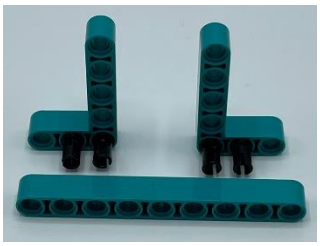


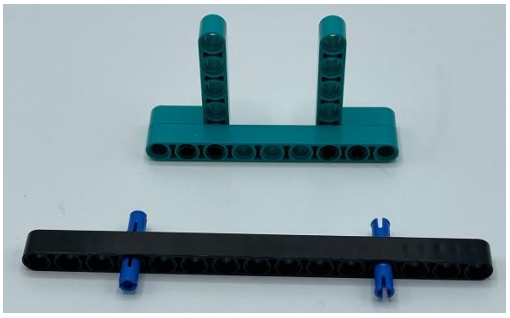


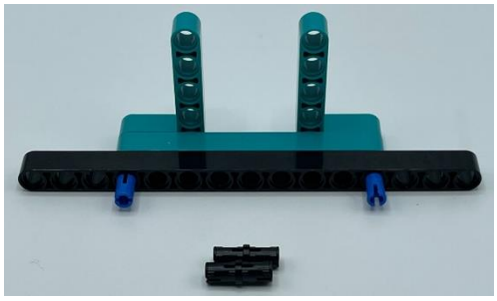


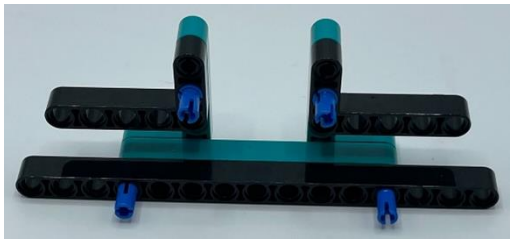


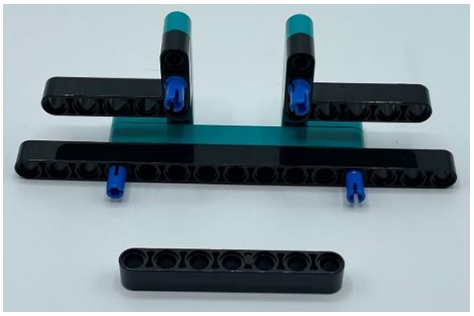


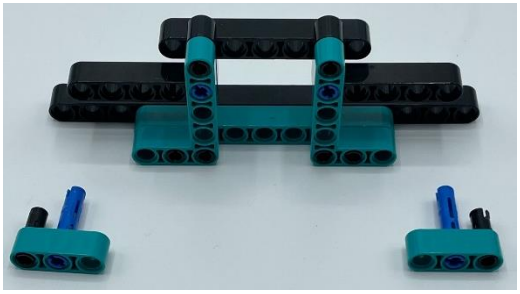


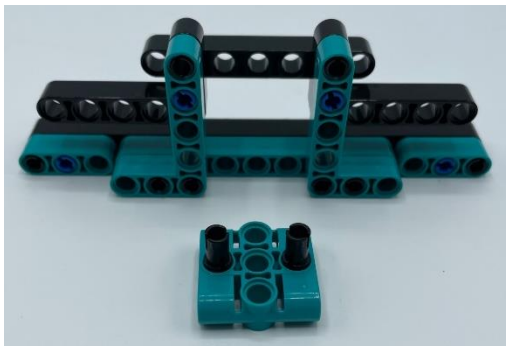


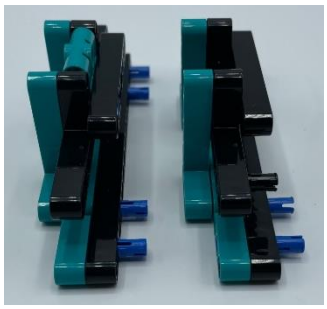


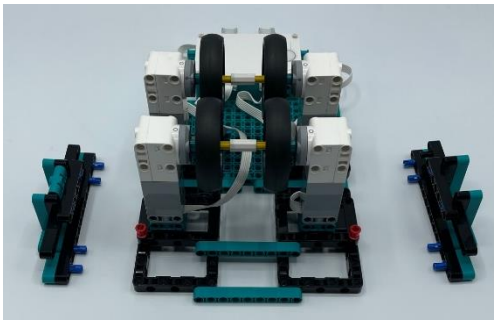


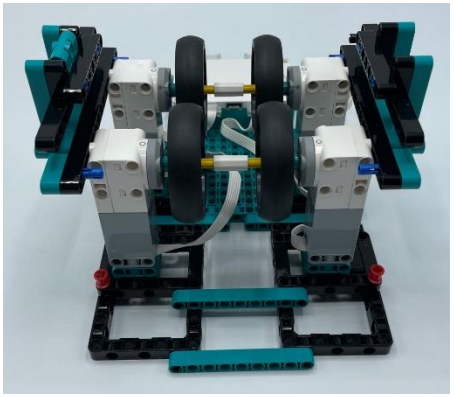


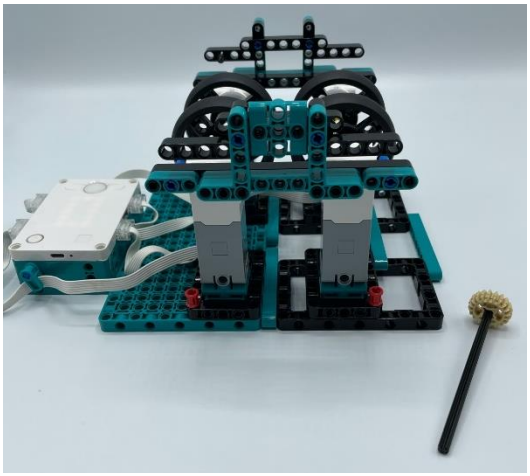


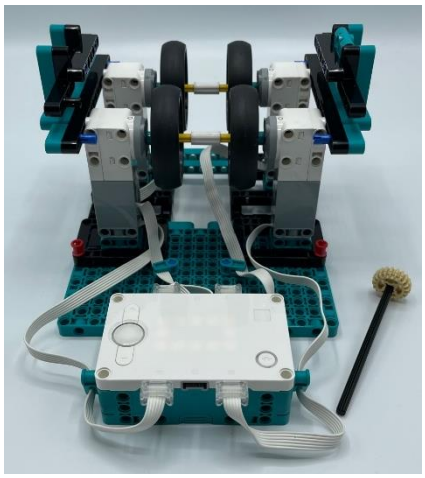




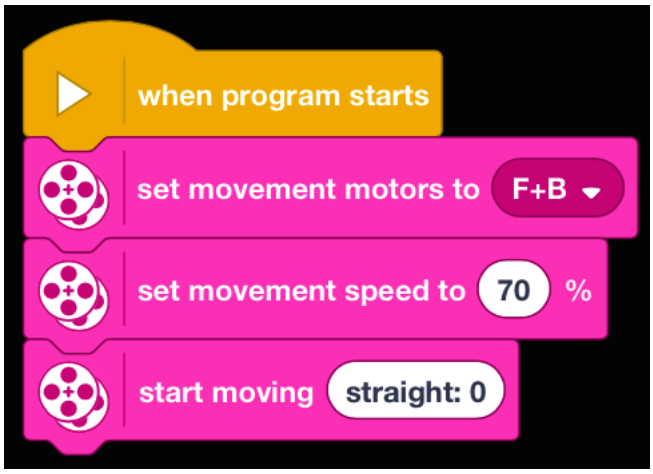


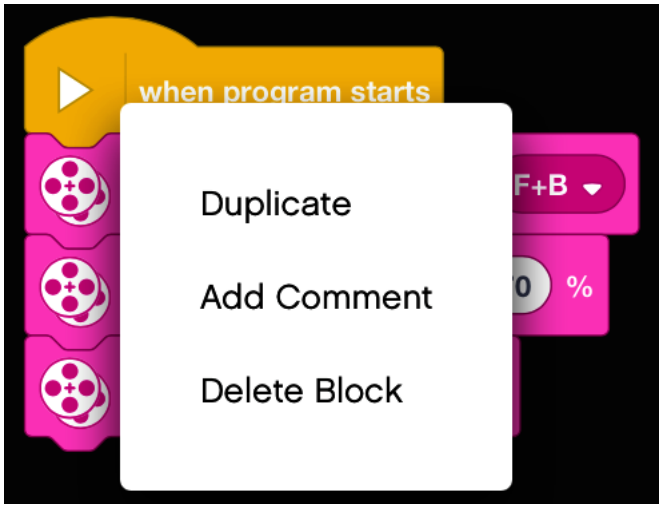


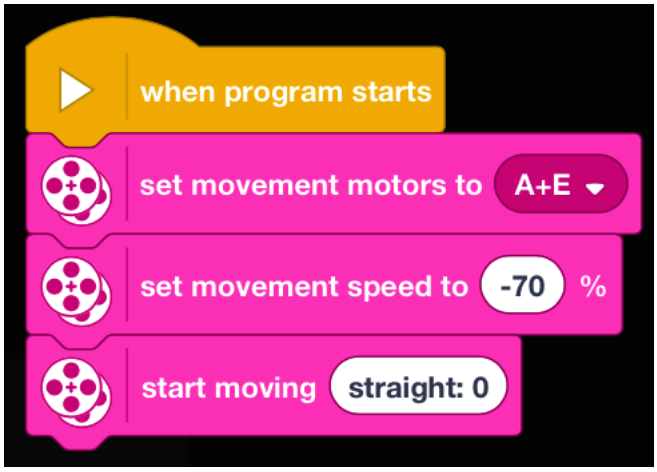


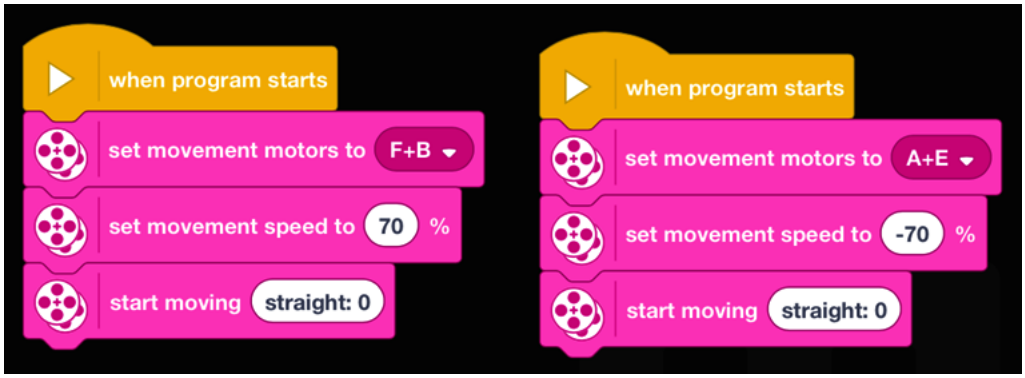


when program starts

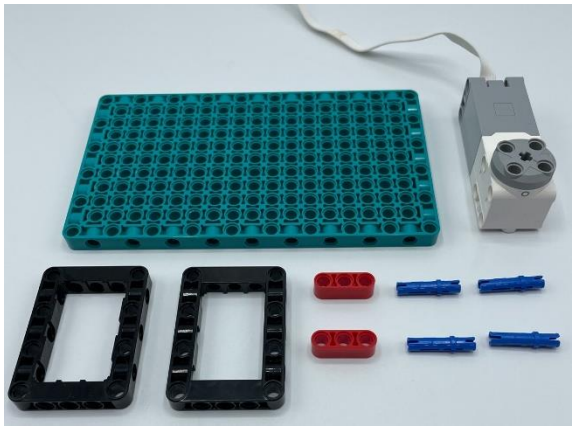

when program starts
set movement motors to F+B
set movement speed to 70 %
start moving straight: 0

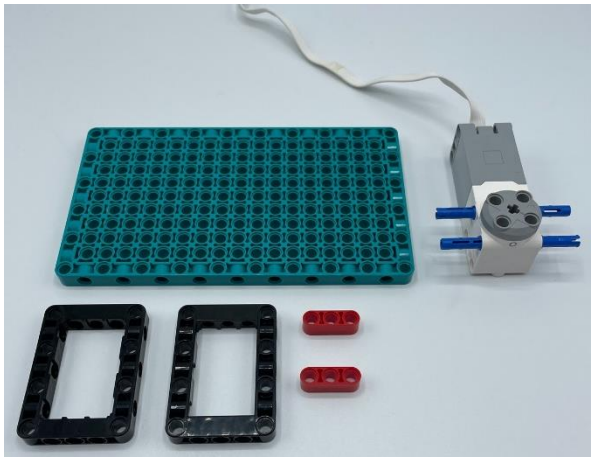

when program starts
Duplicate
Add Comment
Delete Block
F+B
0
%

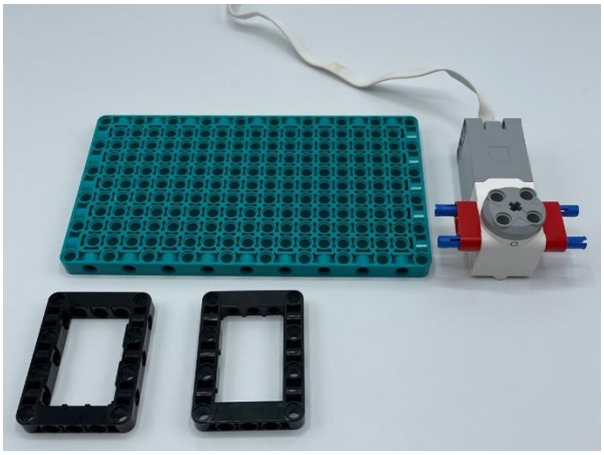

when program starts
set movement motors to A+E
set movement speed to -70 %
start moving straight: 0

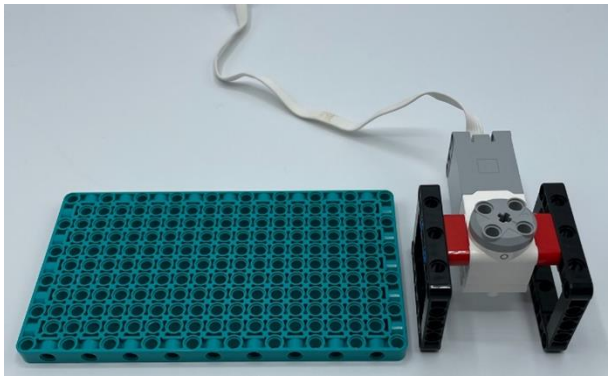

when program starts
set movement motors to F+B
set movement speed to 70 %
start moving straight: 0
when program starts
set movement motors to A+E
set movement speed to -70 %
start moving straight: 0

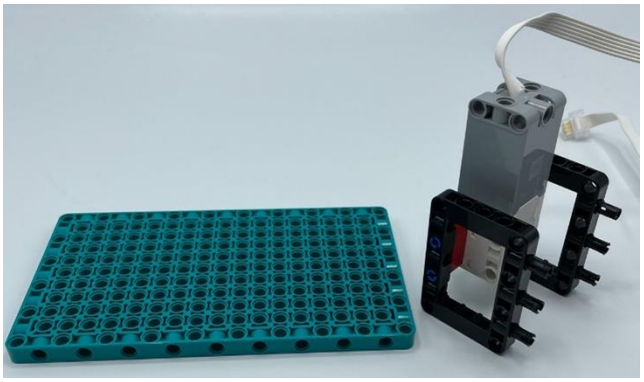
Chapter 9: Creating Plankton from SpongeBob SquarePants – Part 1.

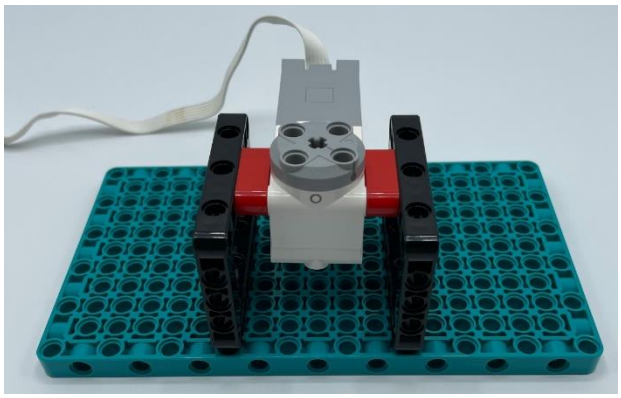


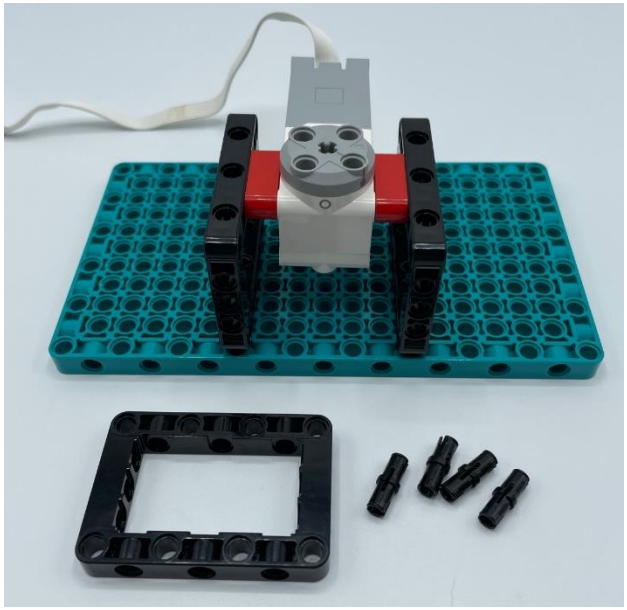


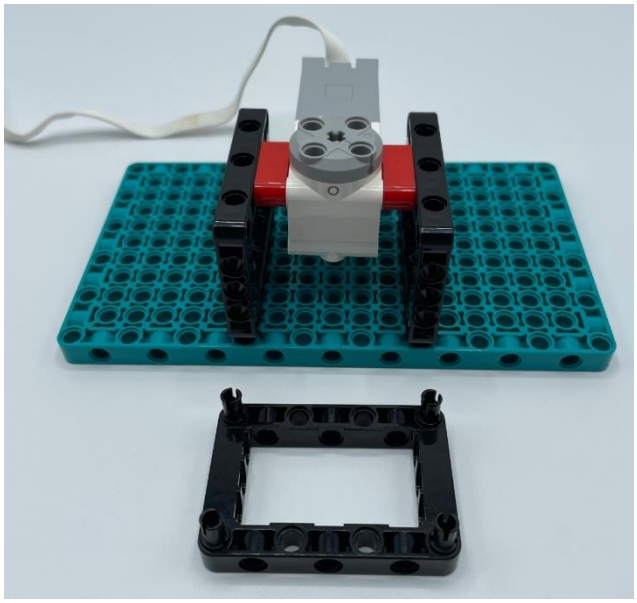


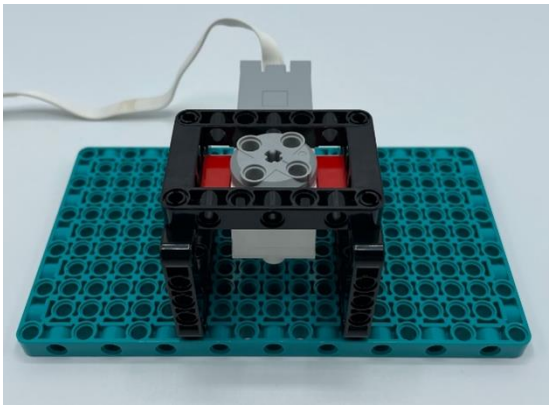


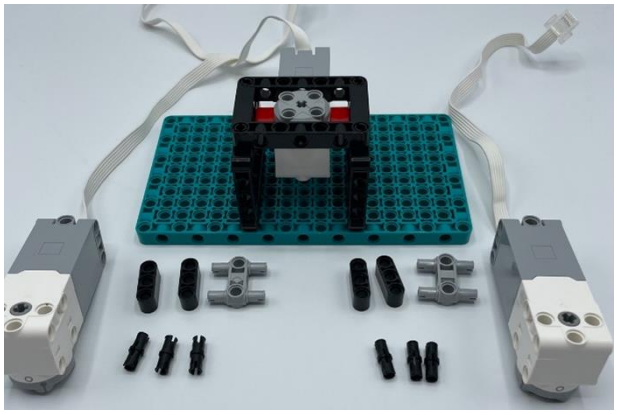


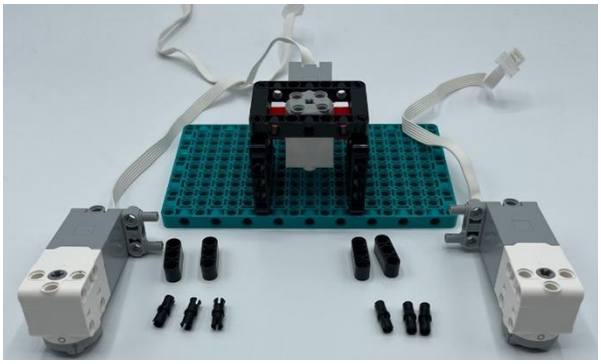


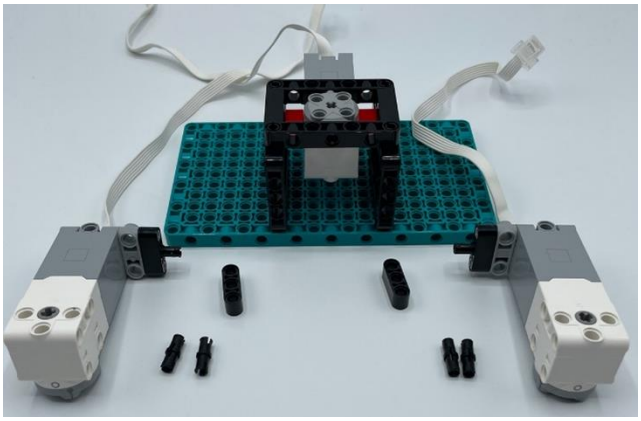


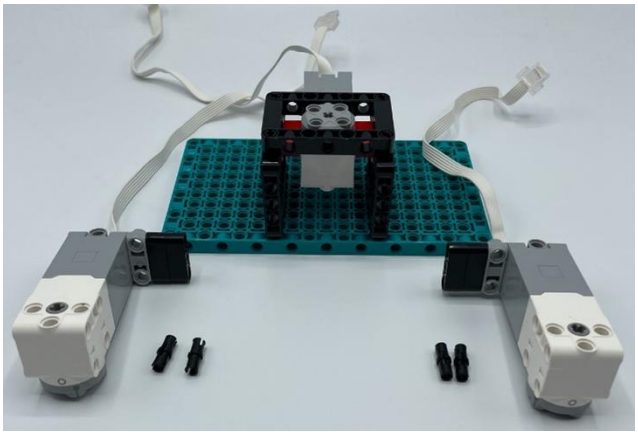


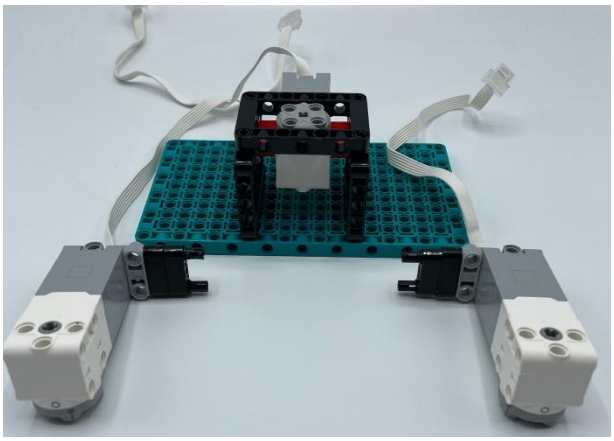


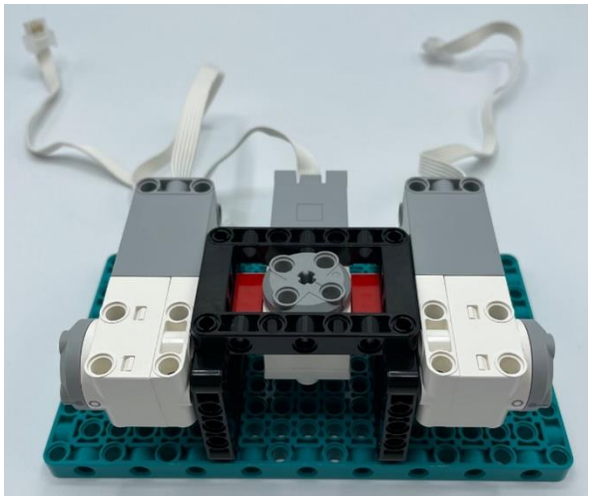


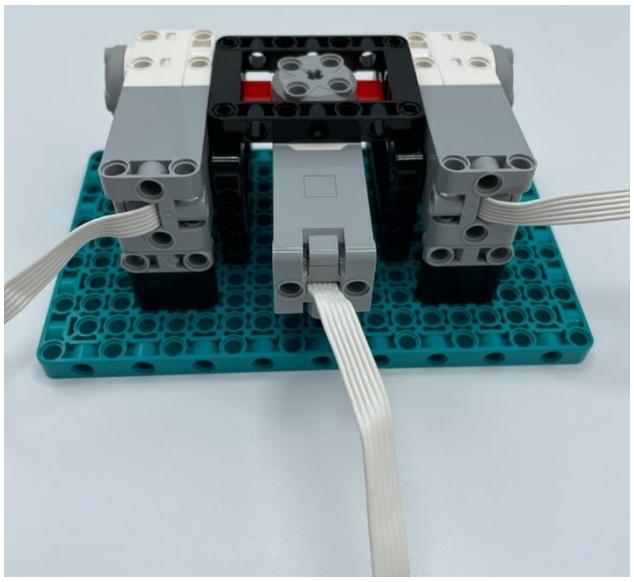


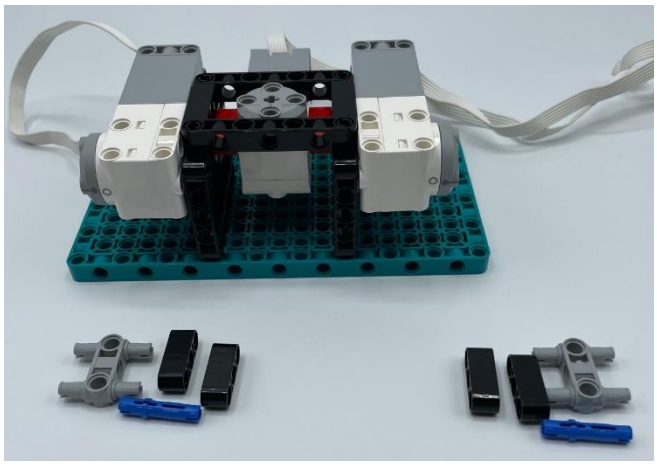


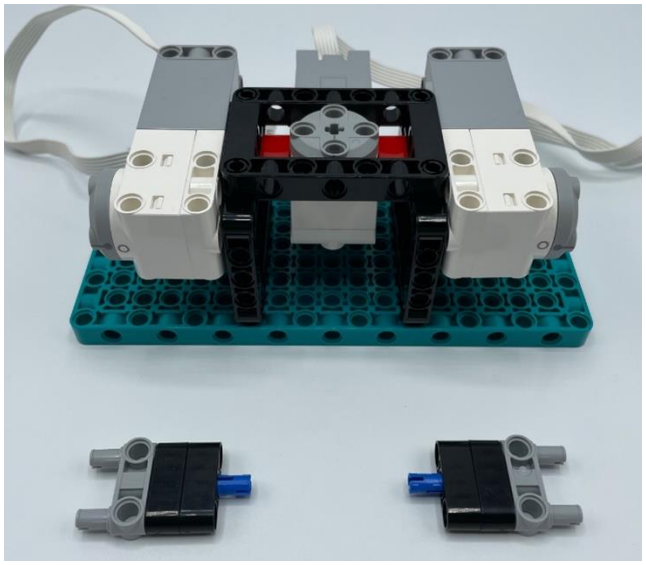


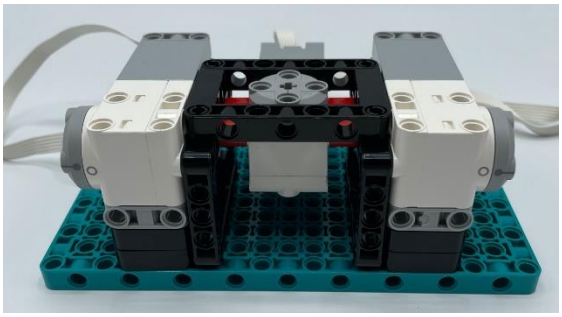


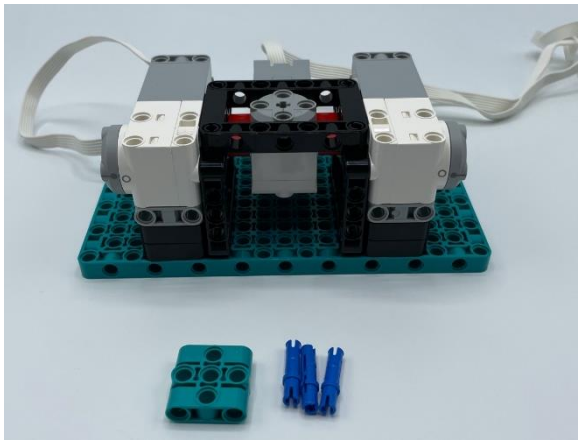


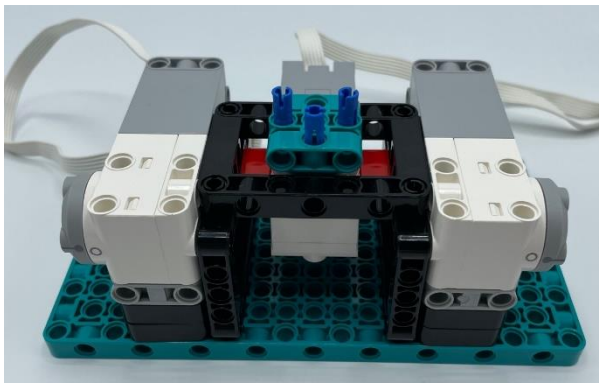


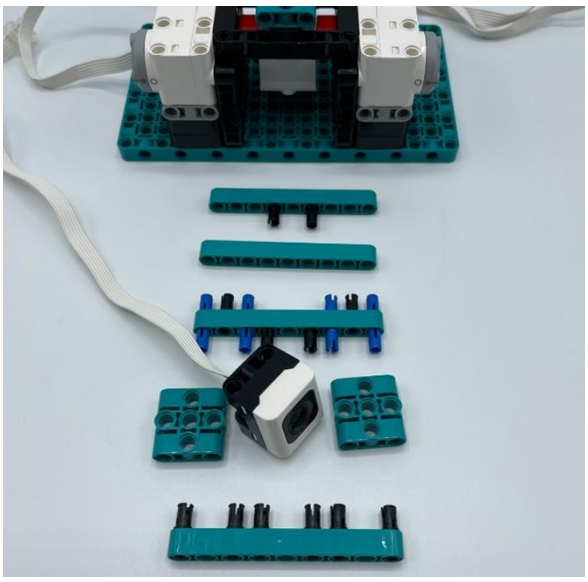


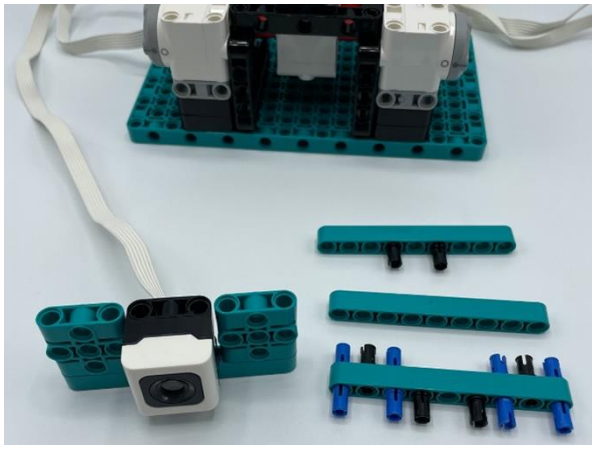


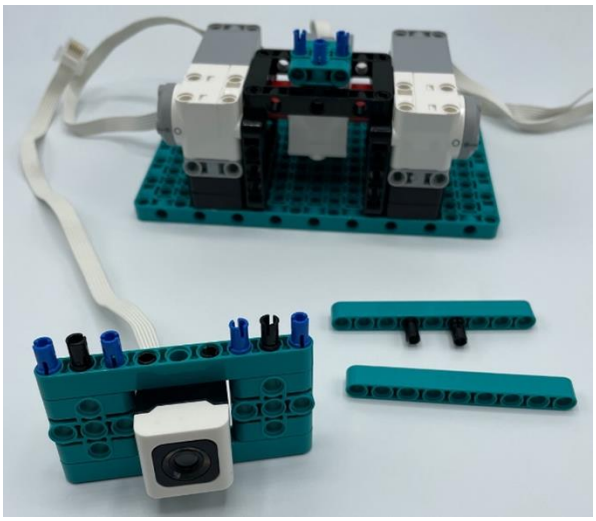


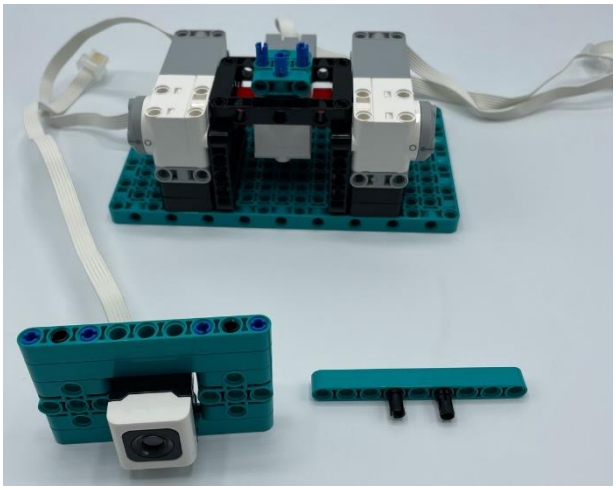


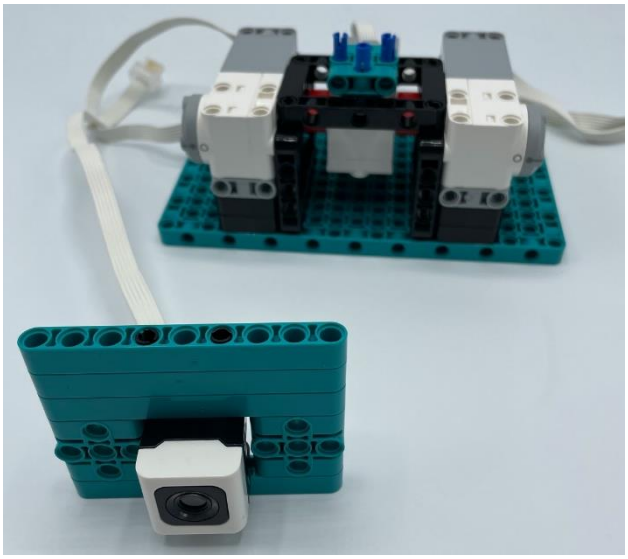


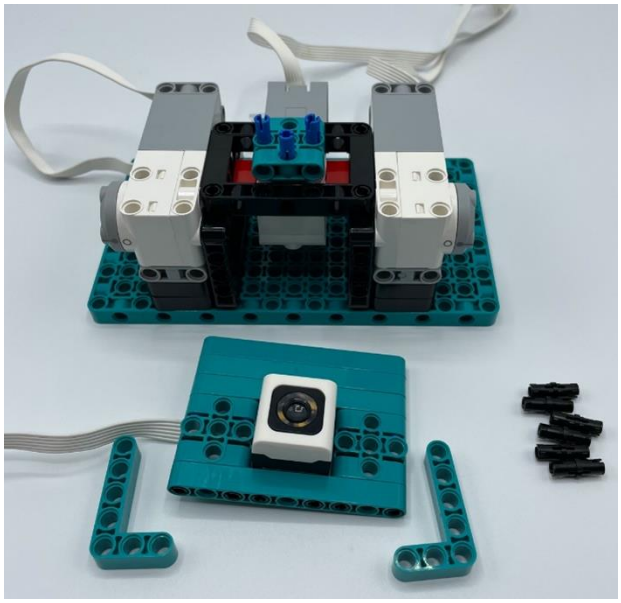


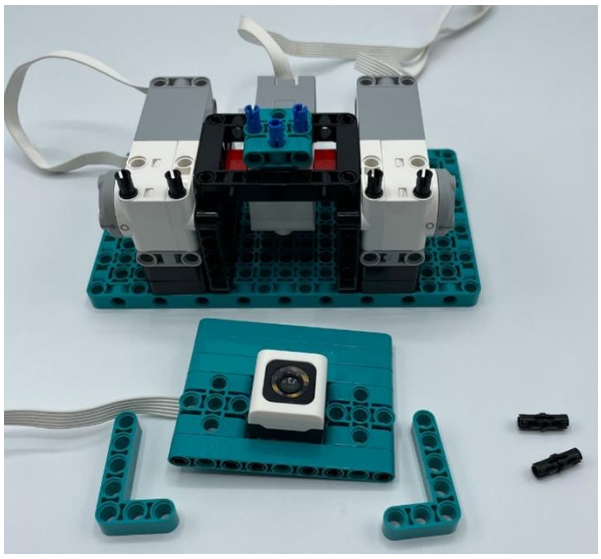


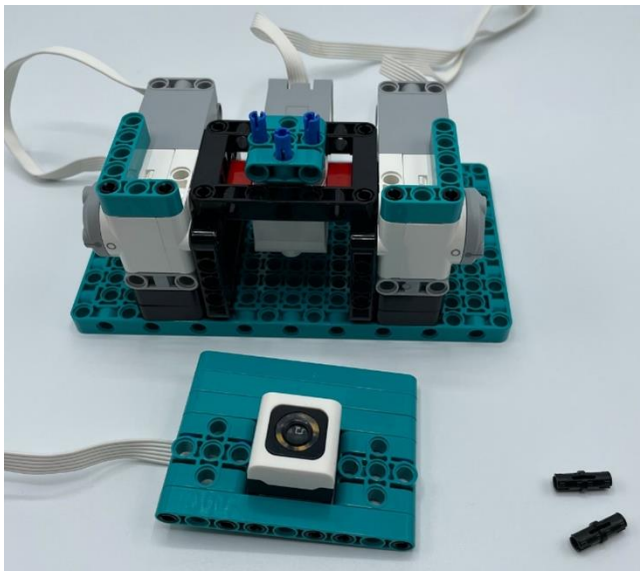


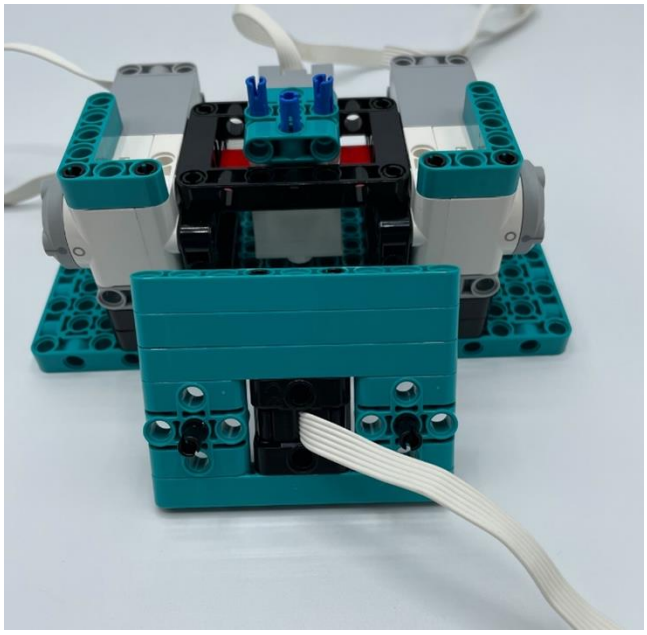


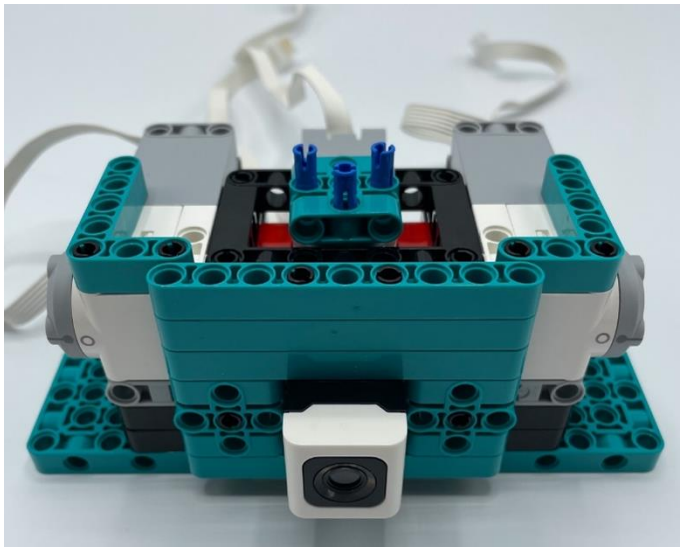


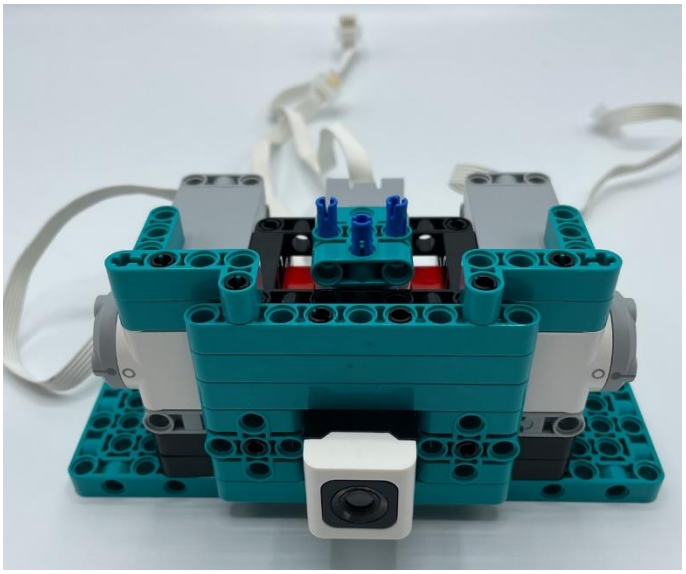


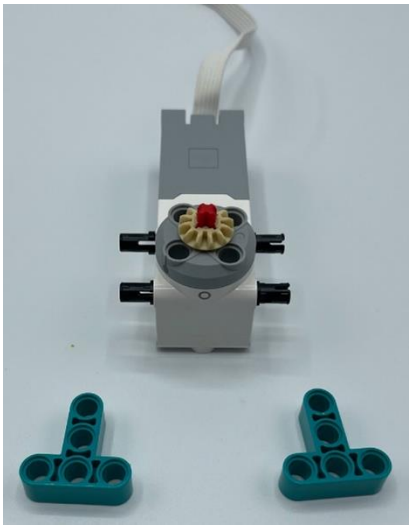


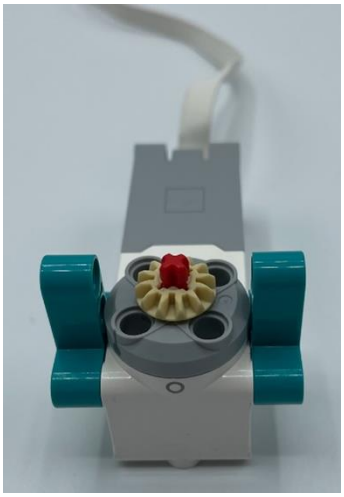


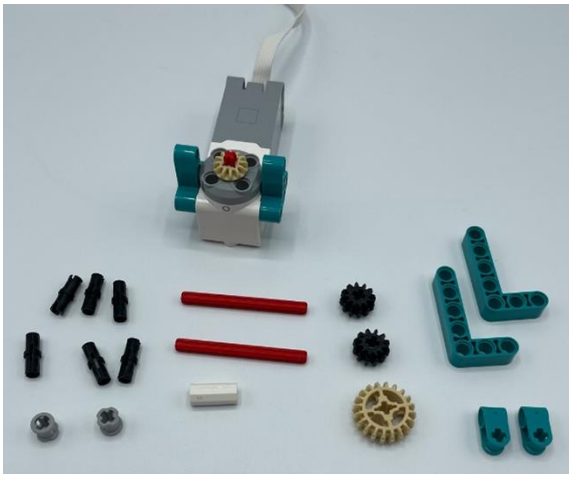


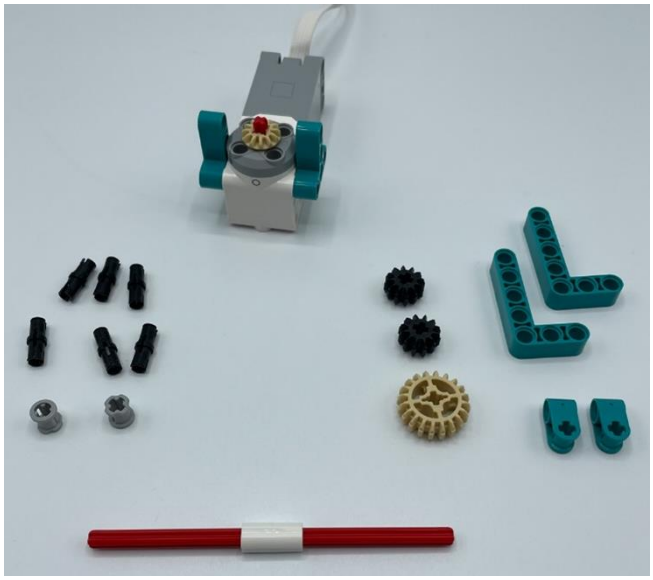


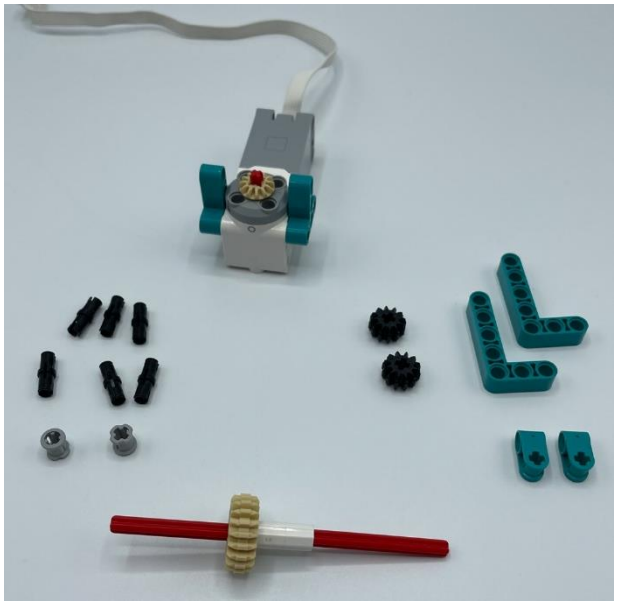


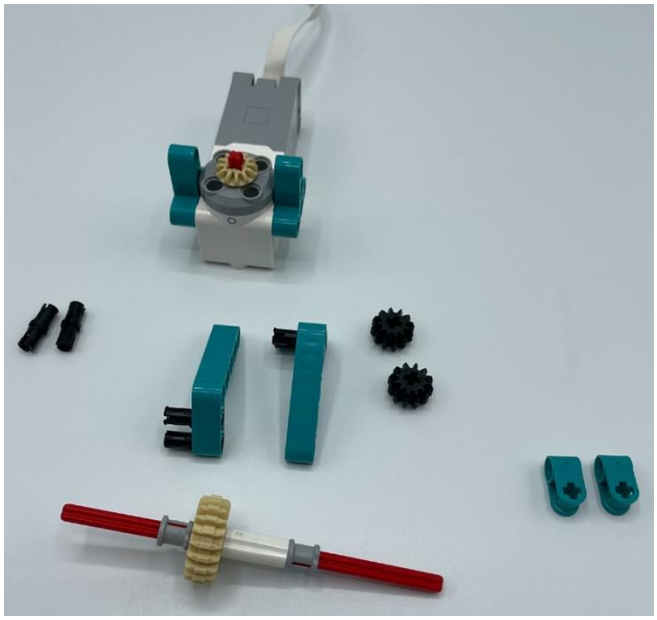


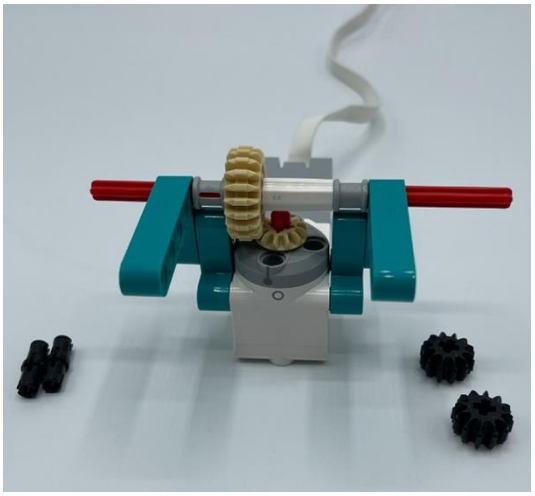


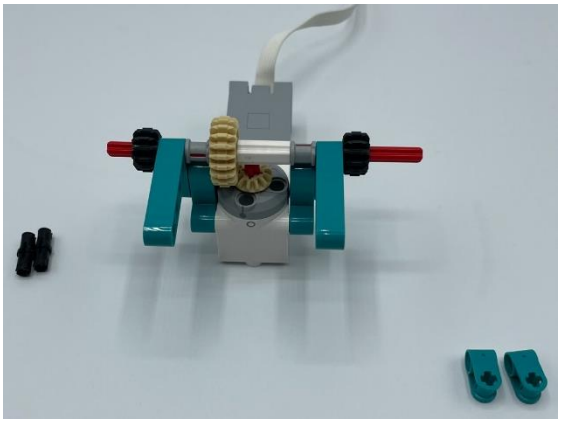


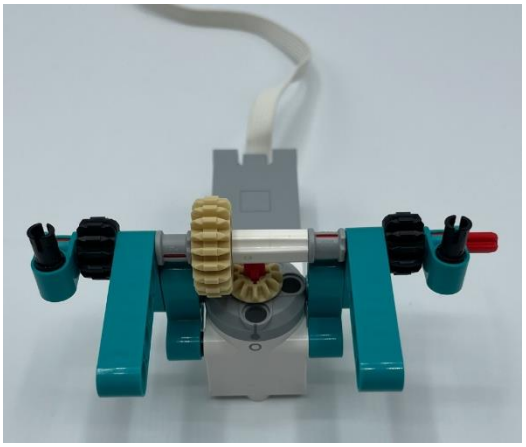


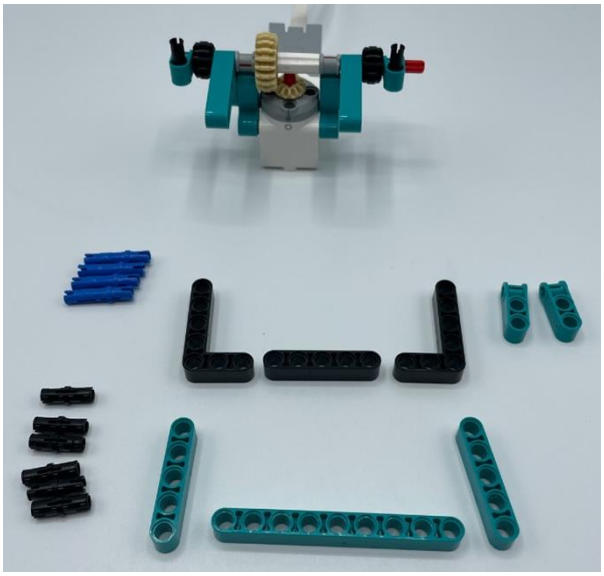


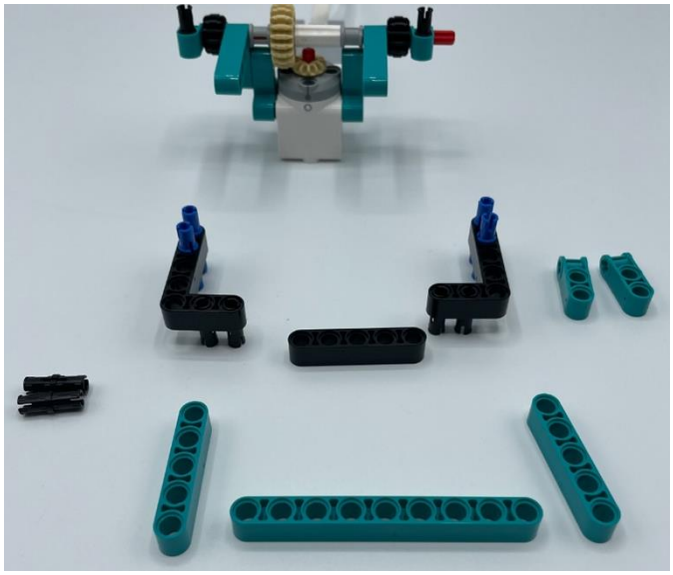


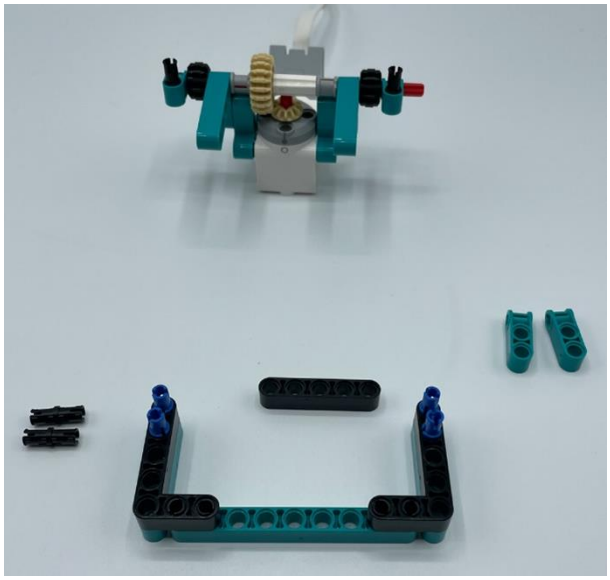


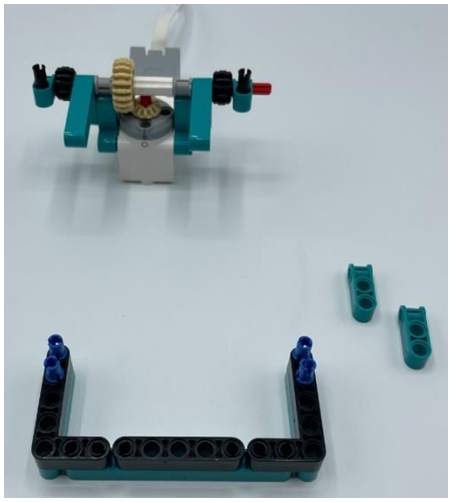


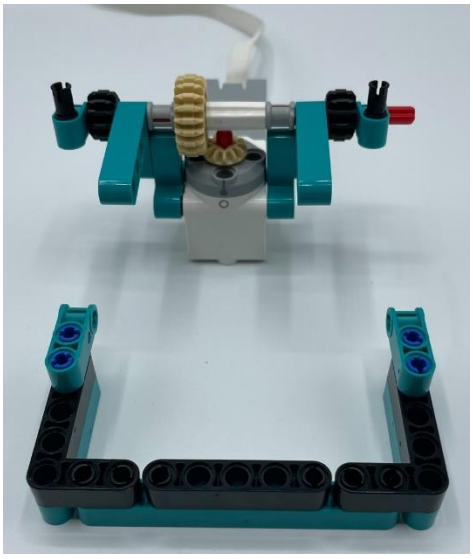


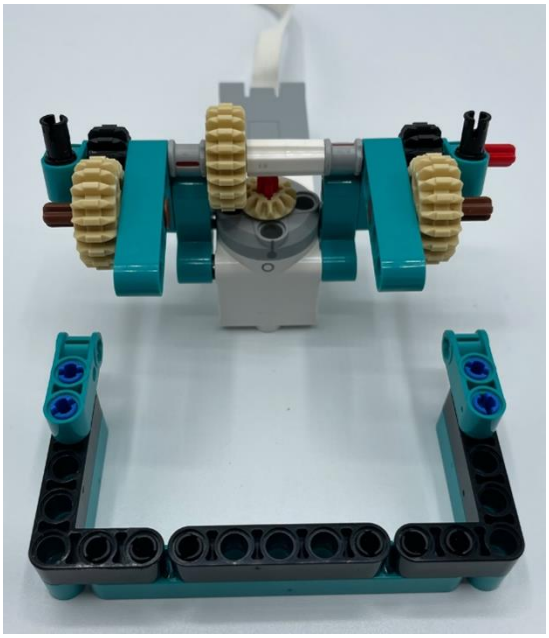


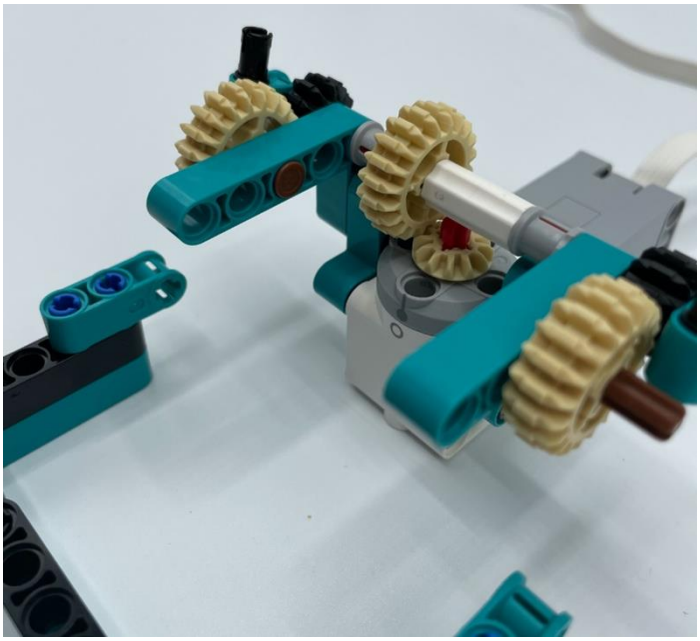


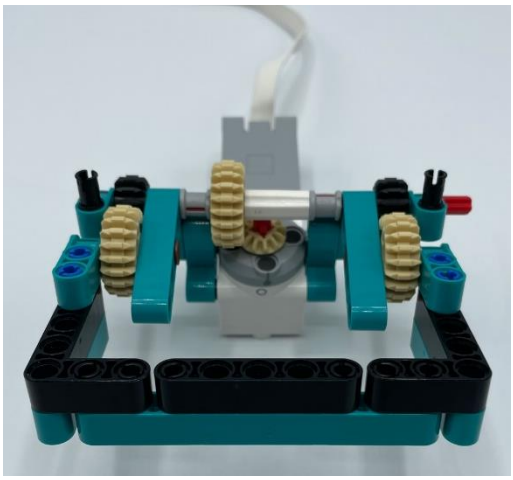


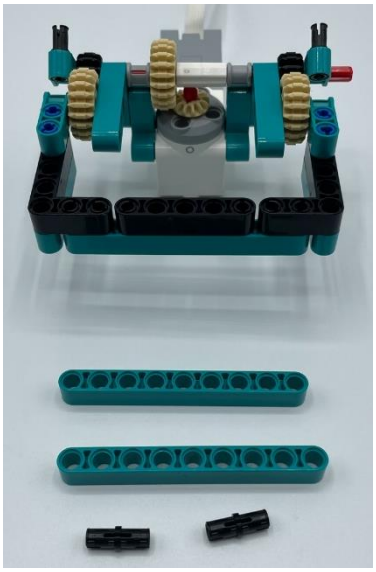


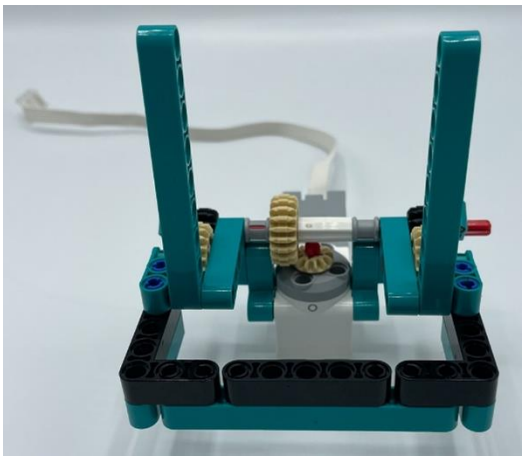


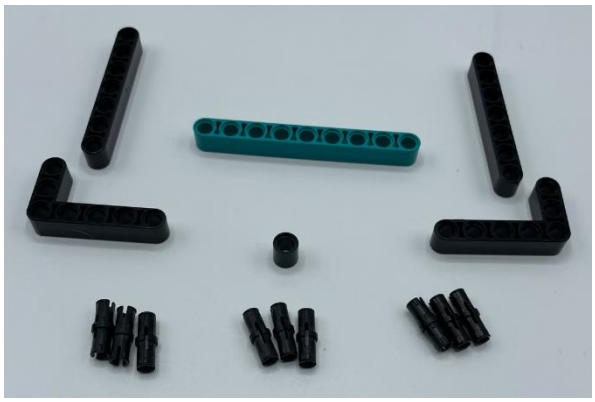


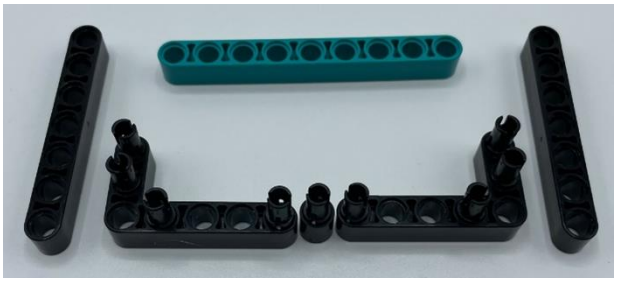


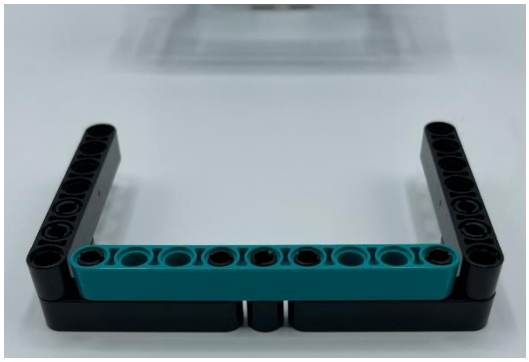


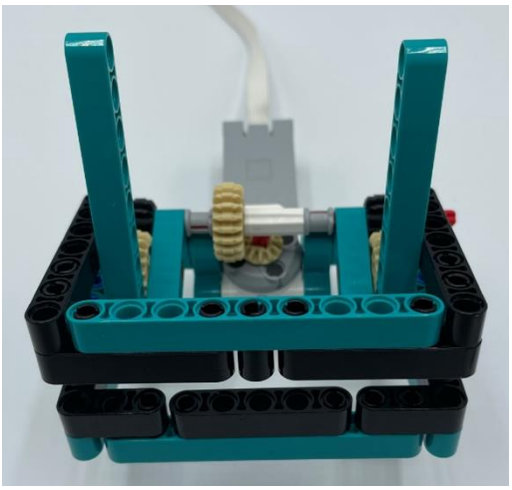


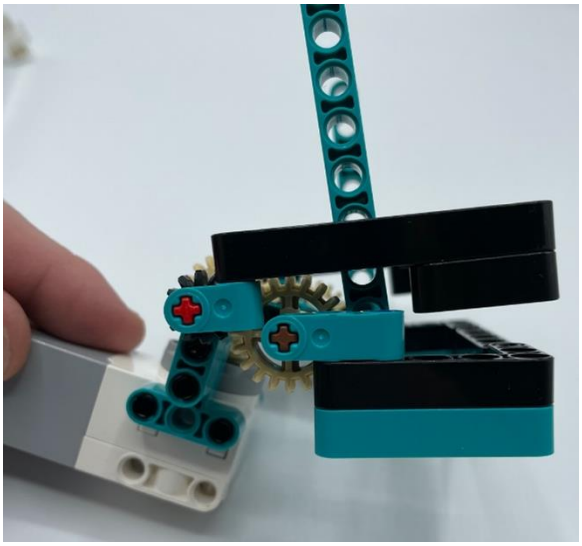


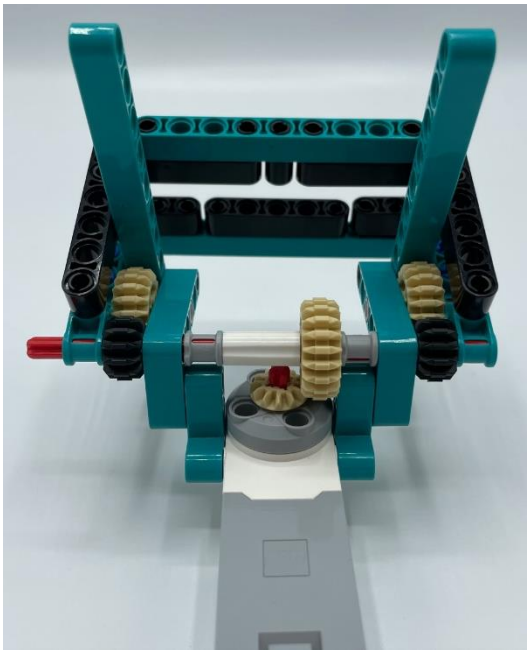


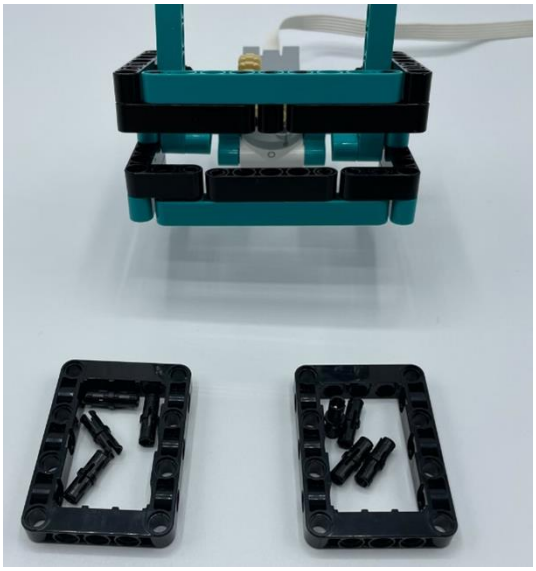


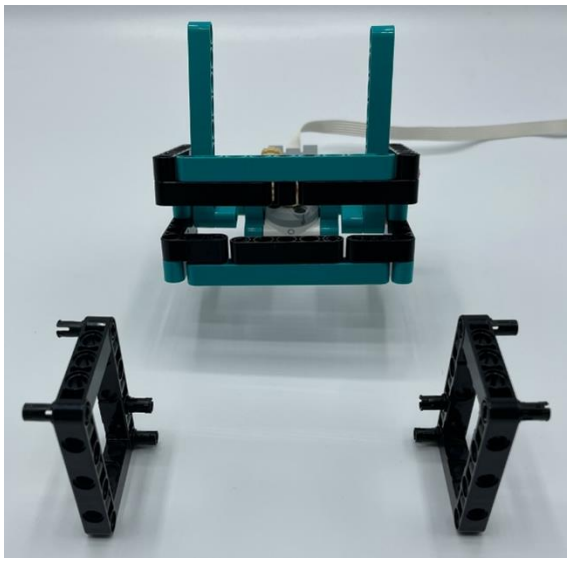


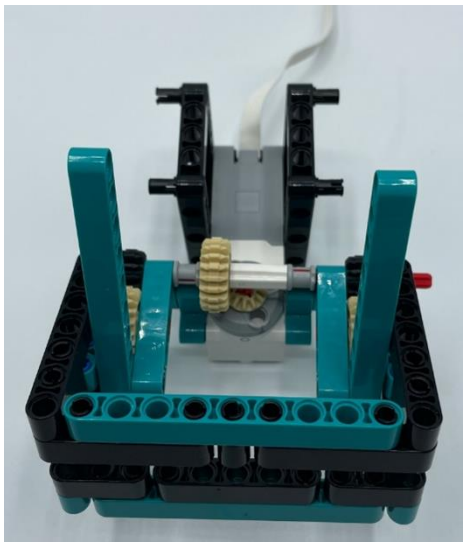


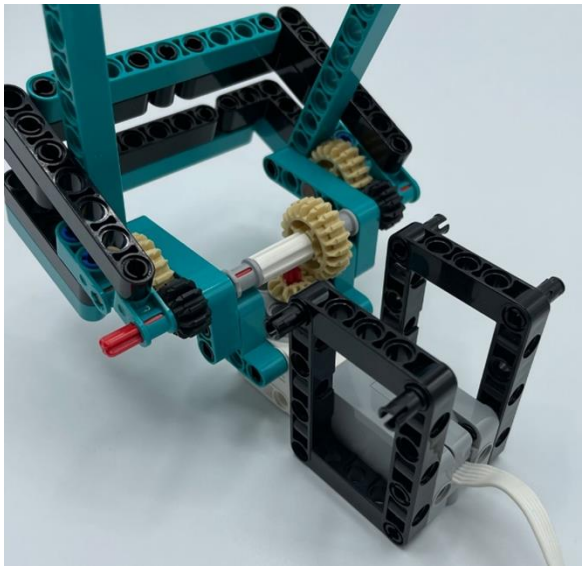


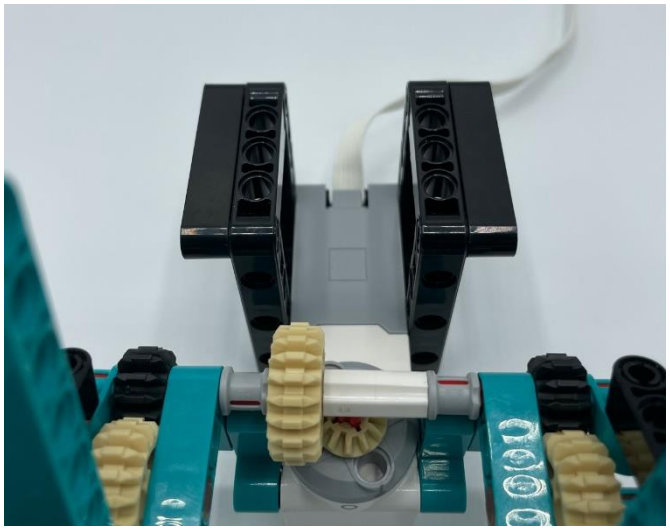


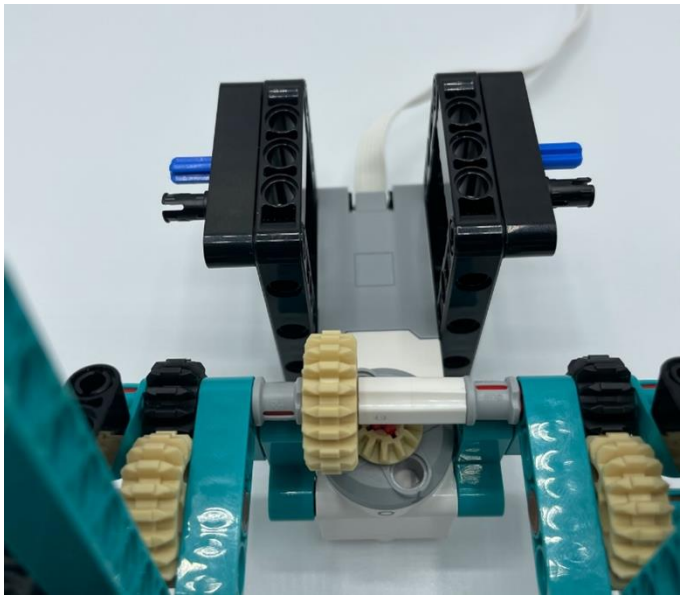


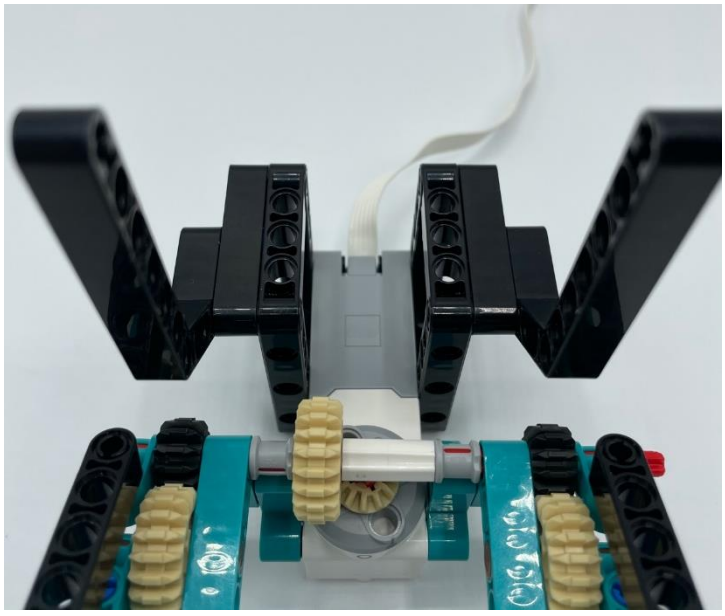


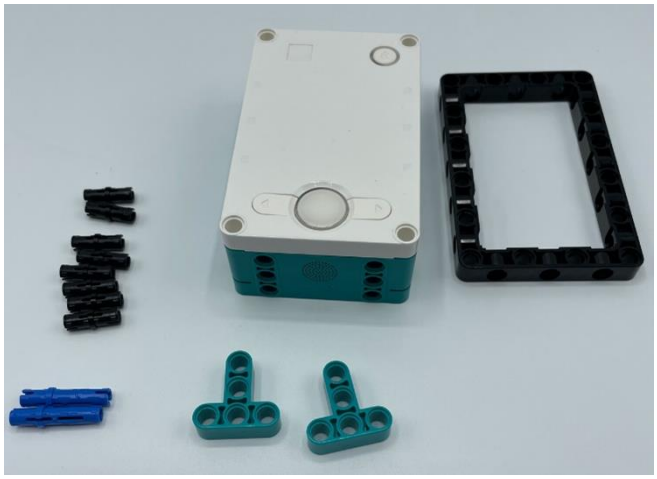


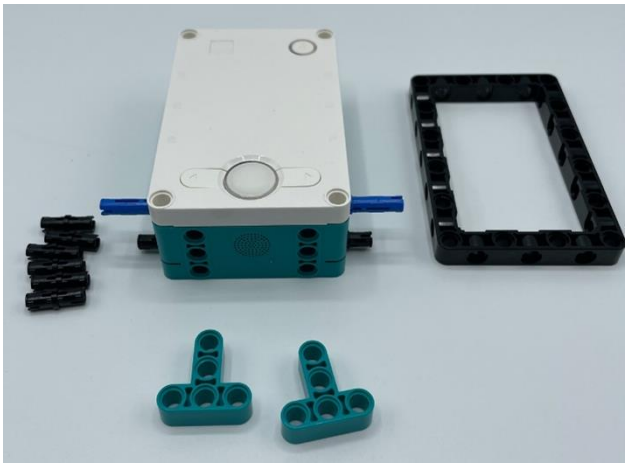


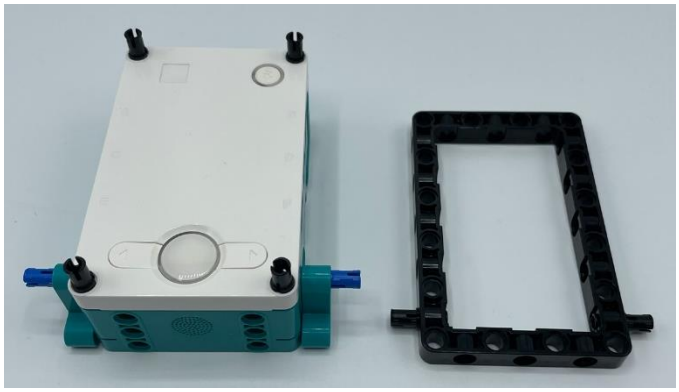


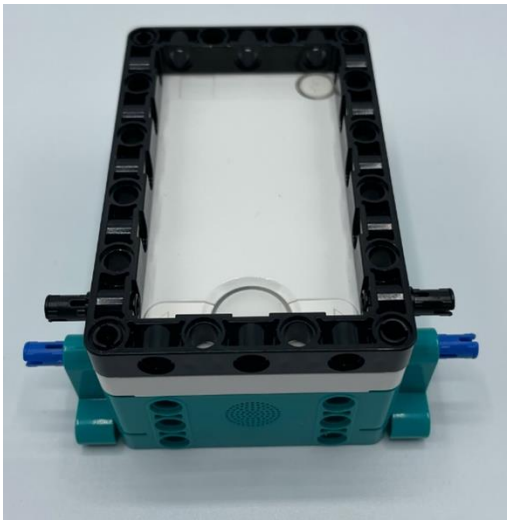


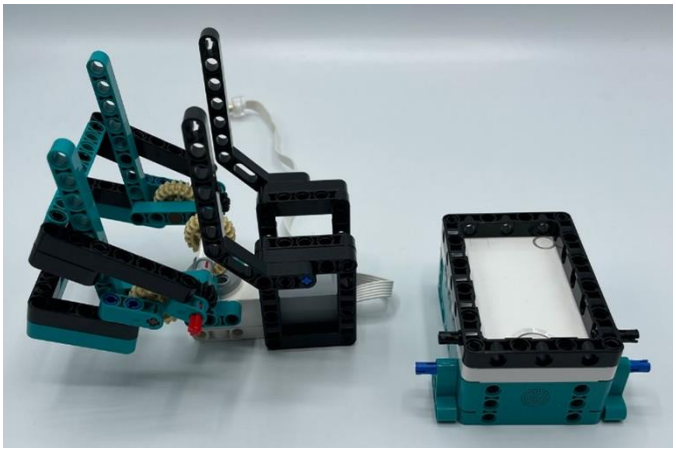


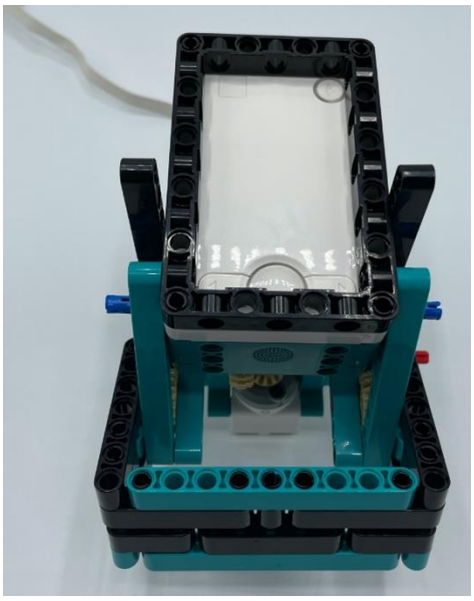


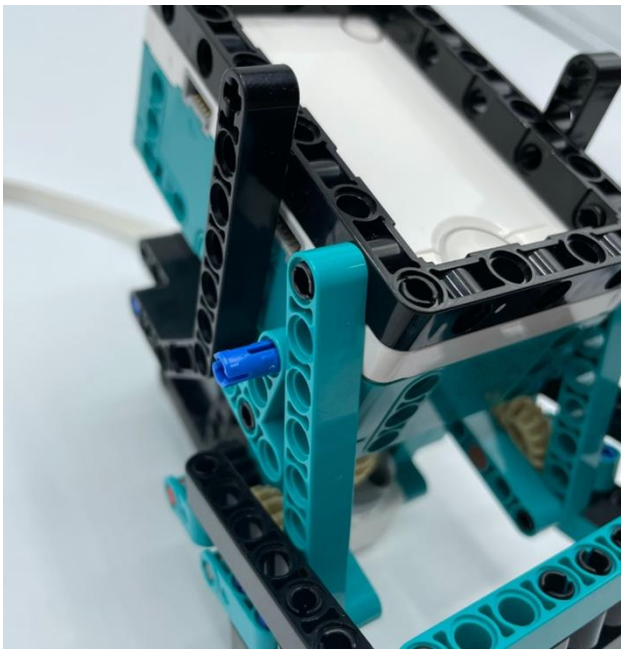


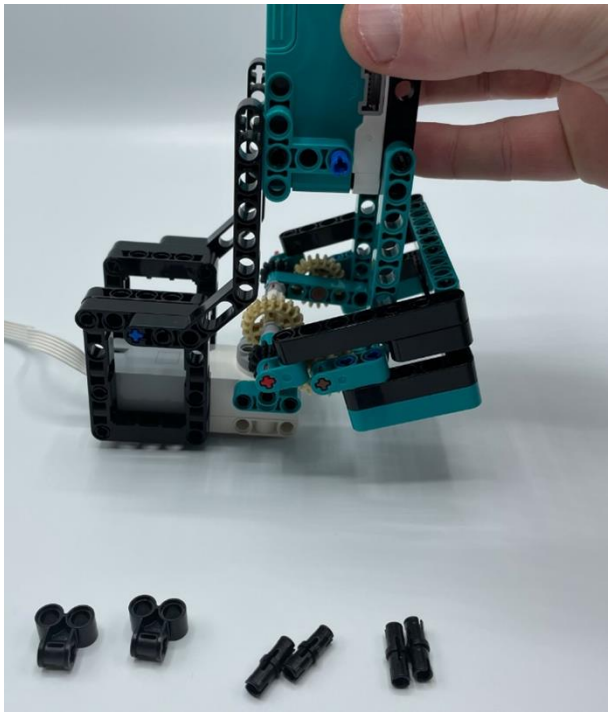


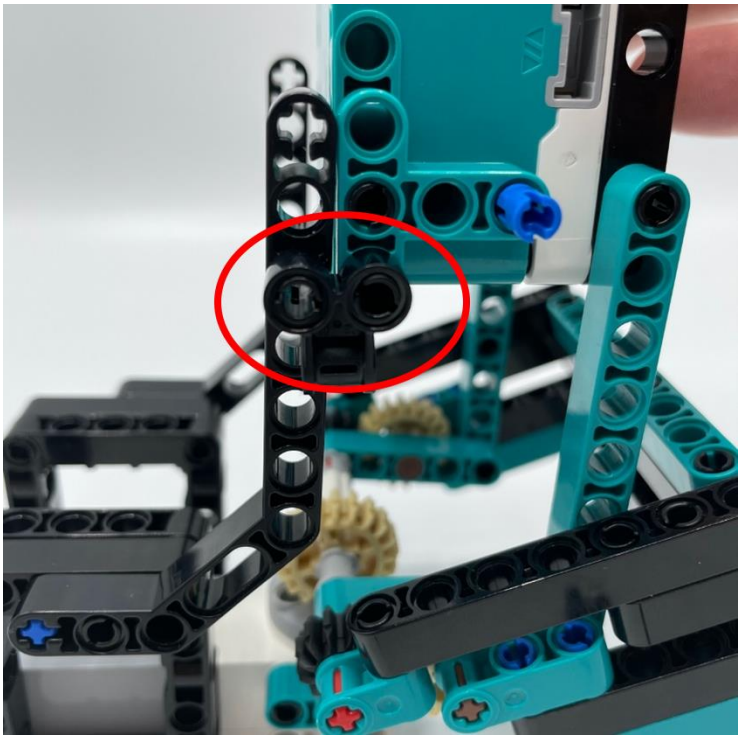


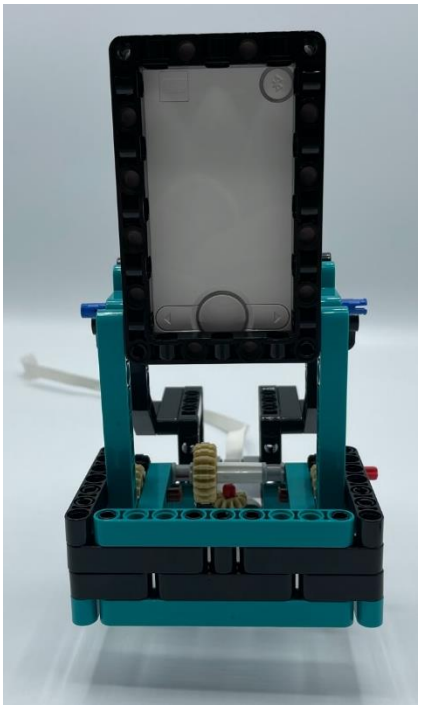


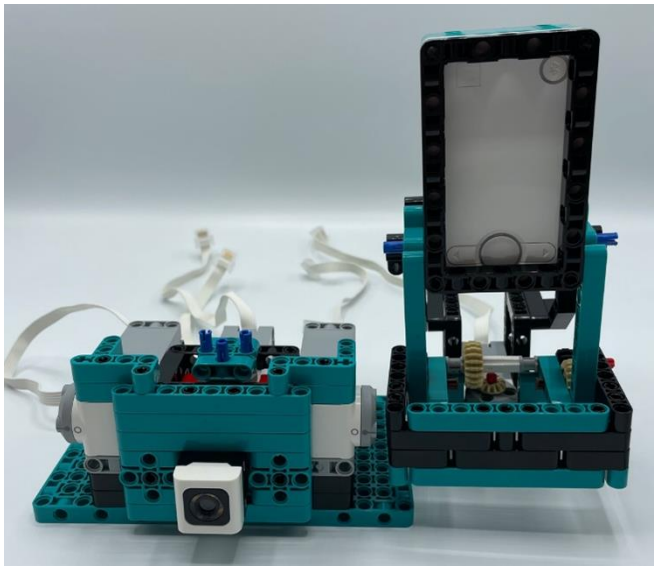


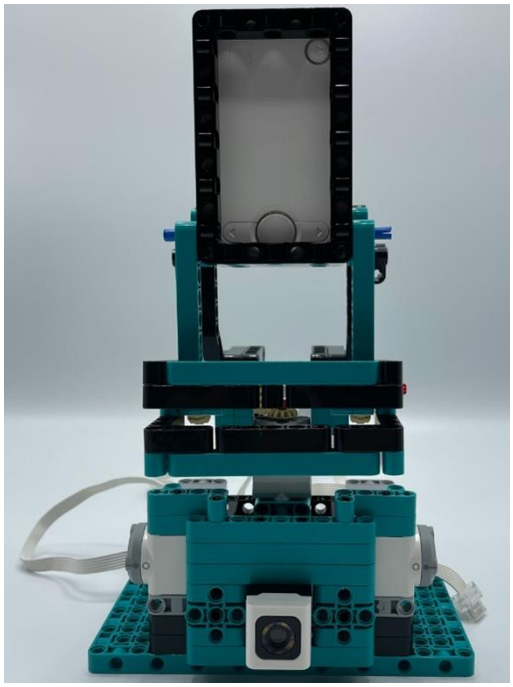




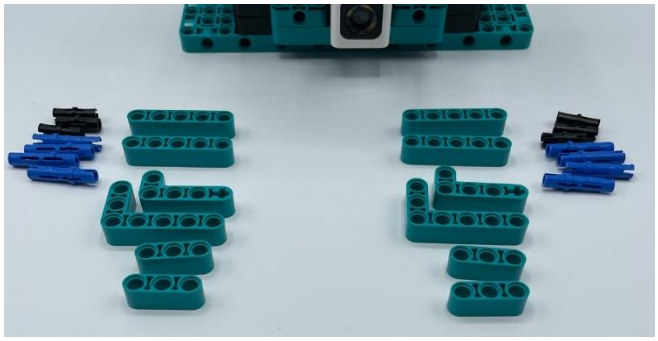


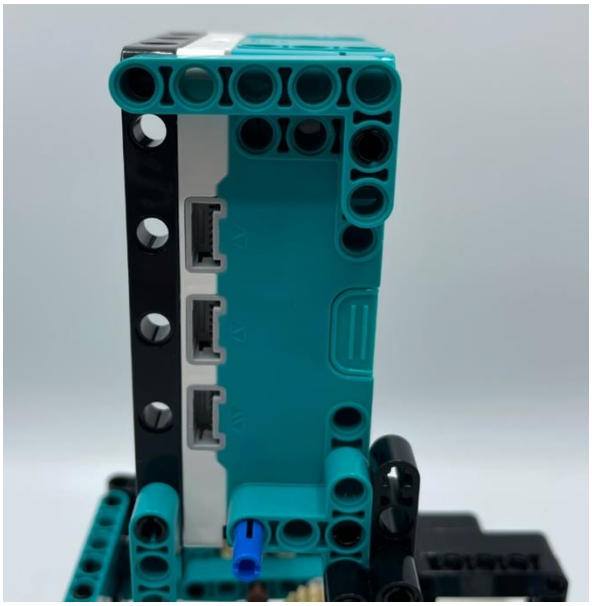


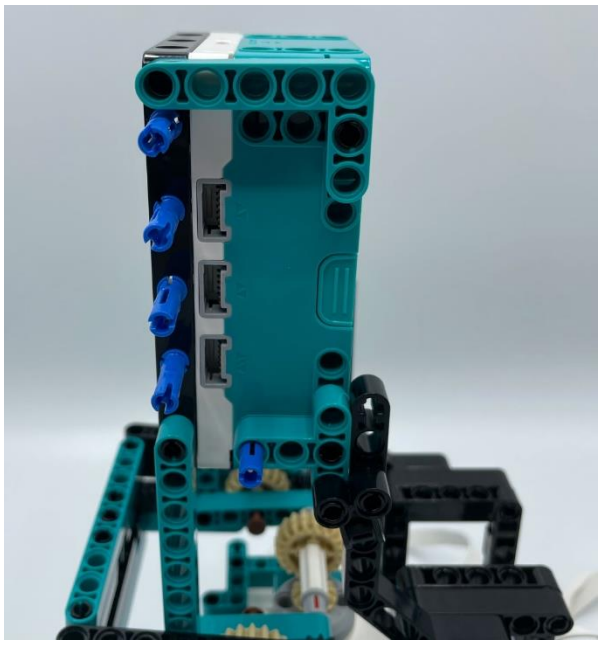


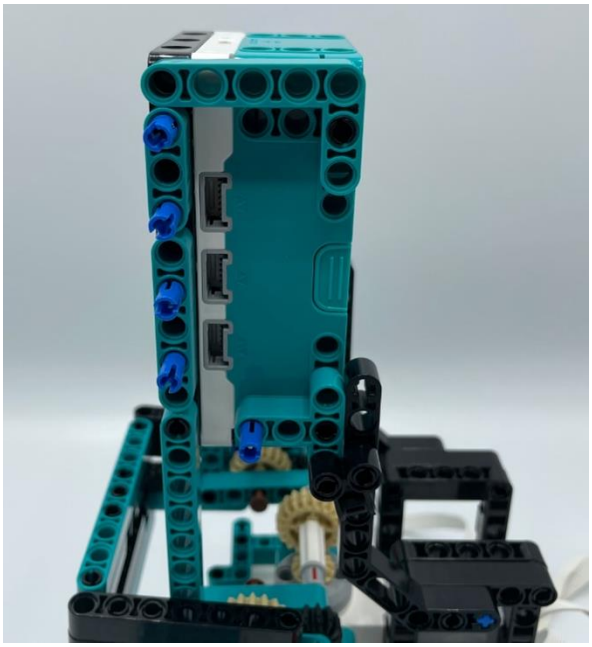


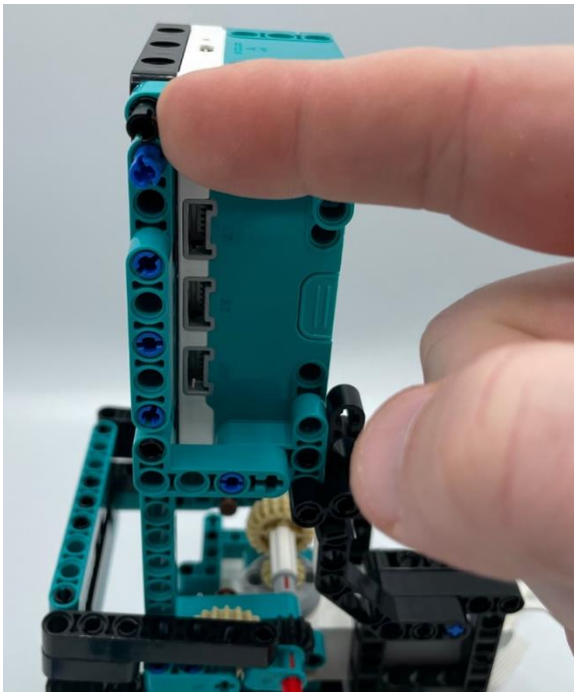
Chapter 10: Creating Plankton from SpongeBob SquarePants – Part 2.

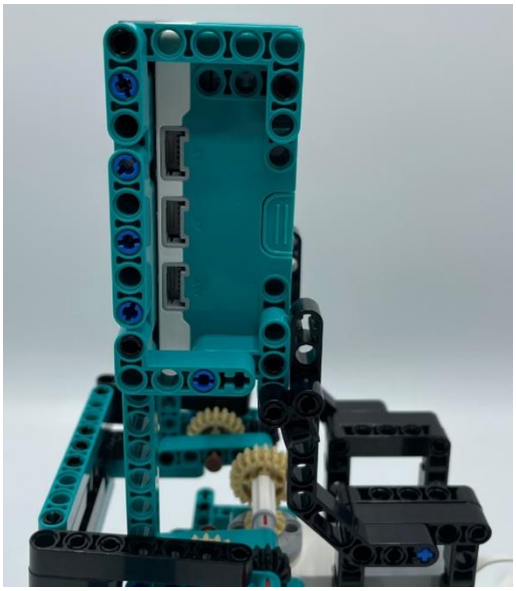


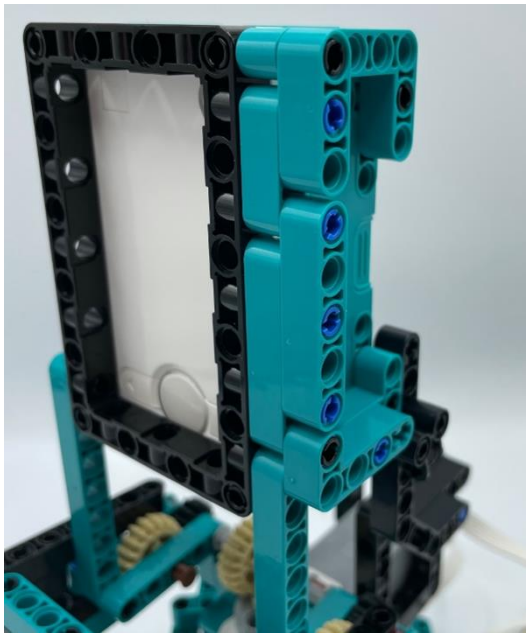


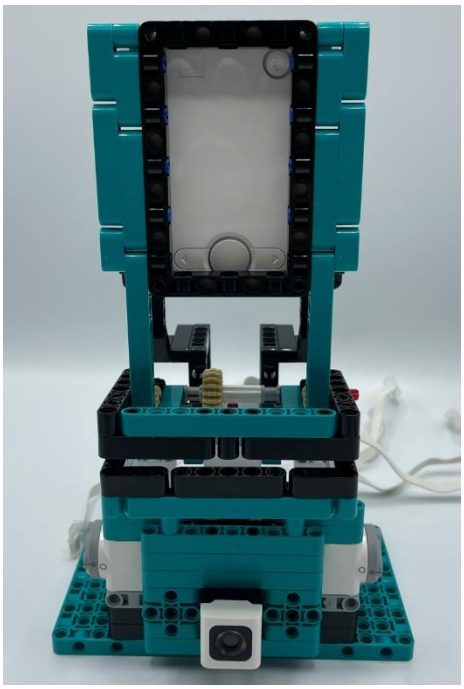


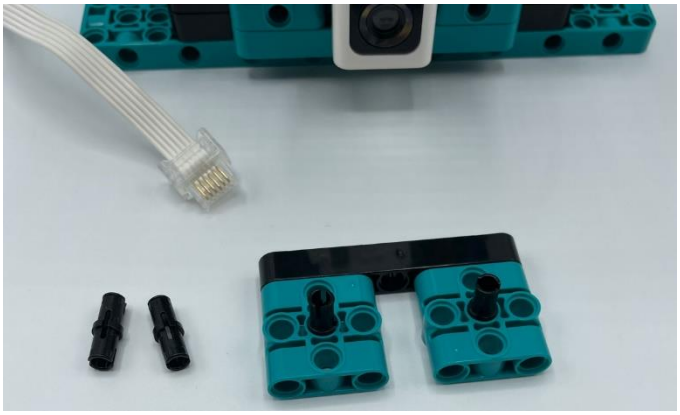


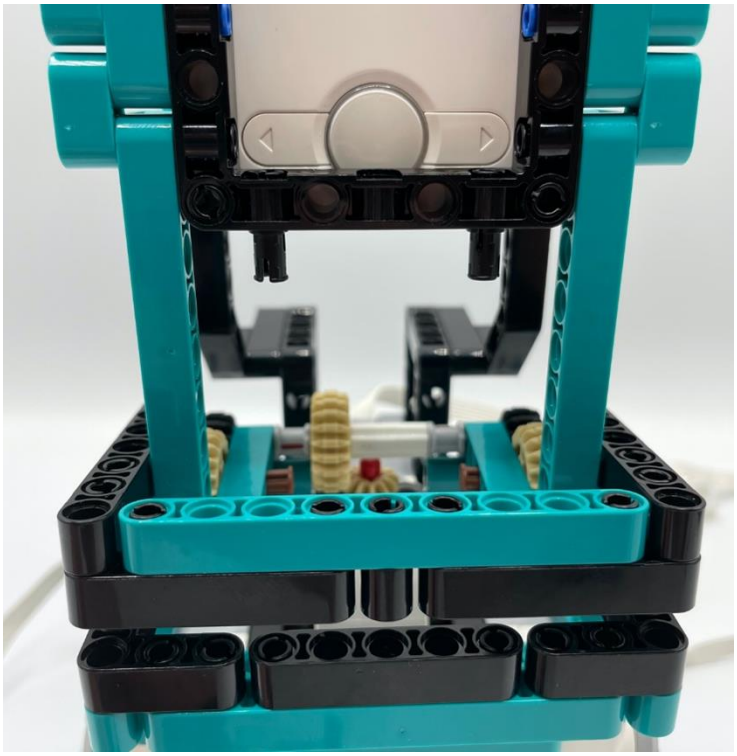


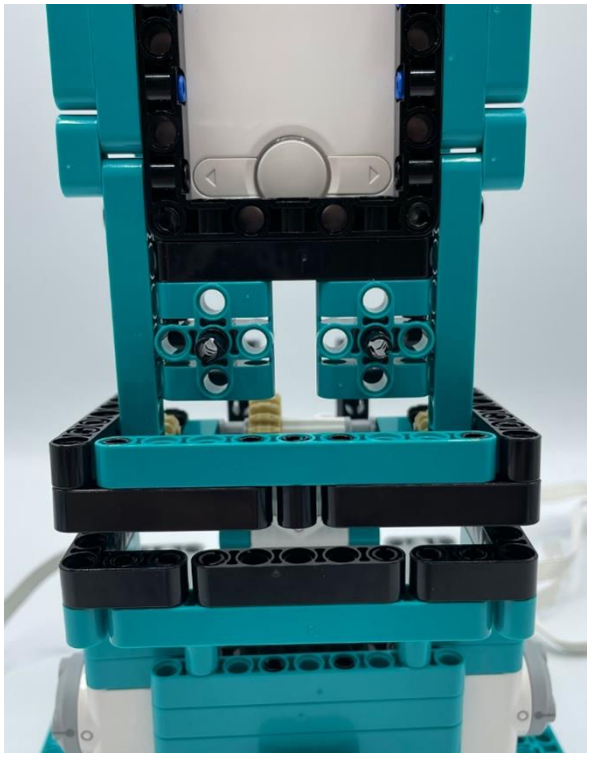


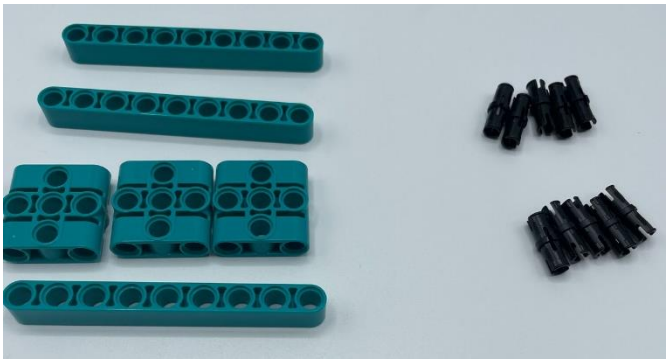


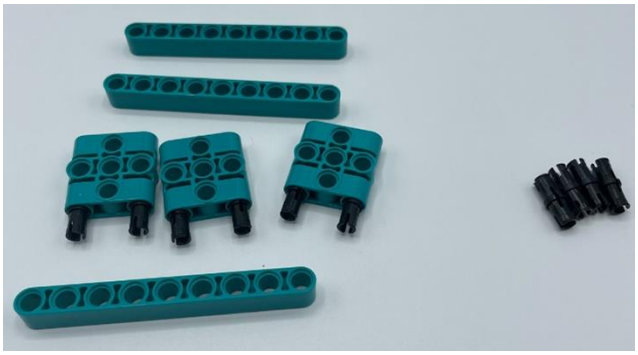


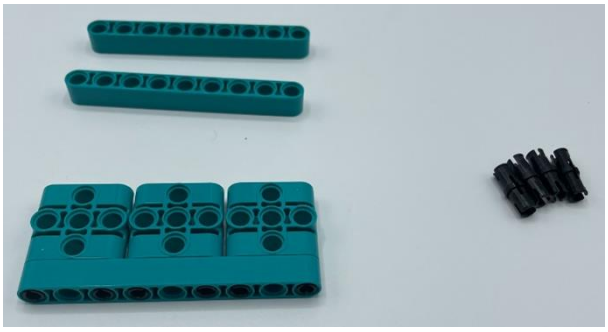


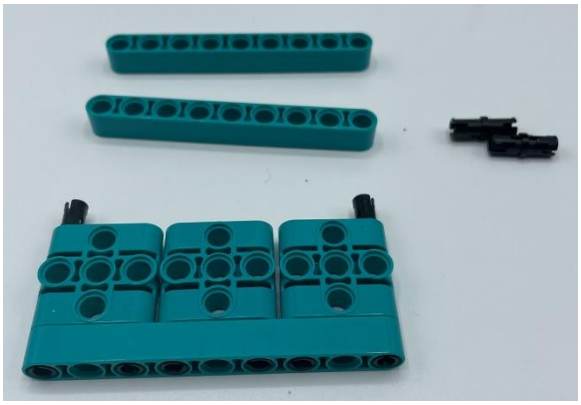


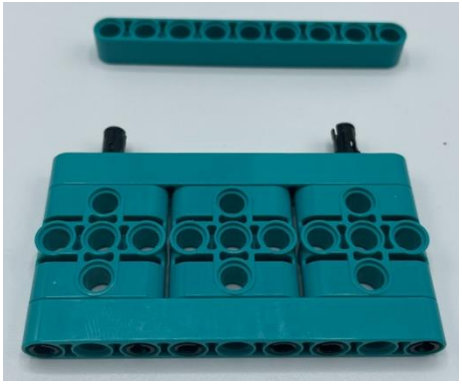


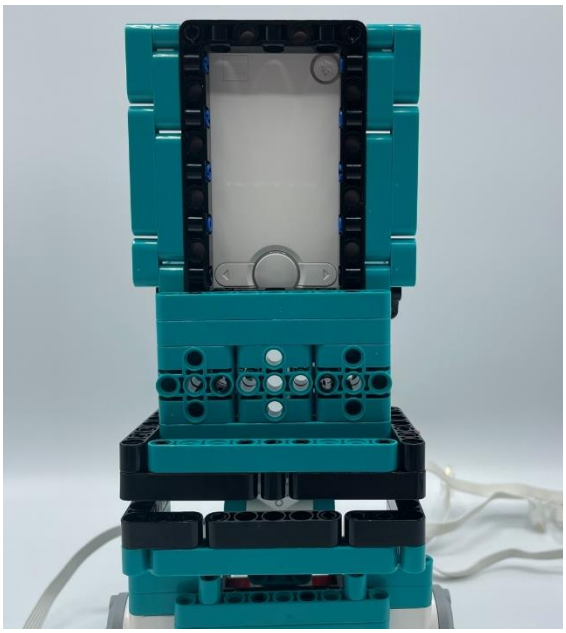


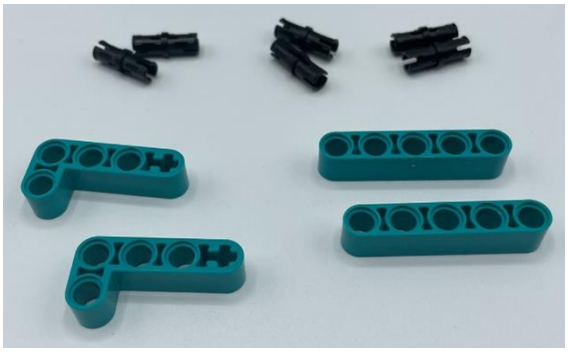


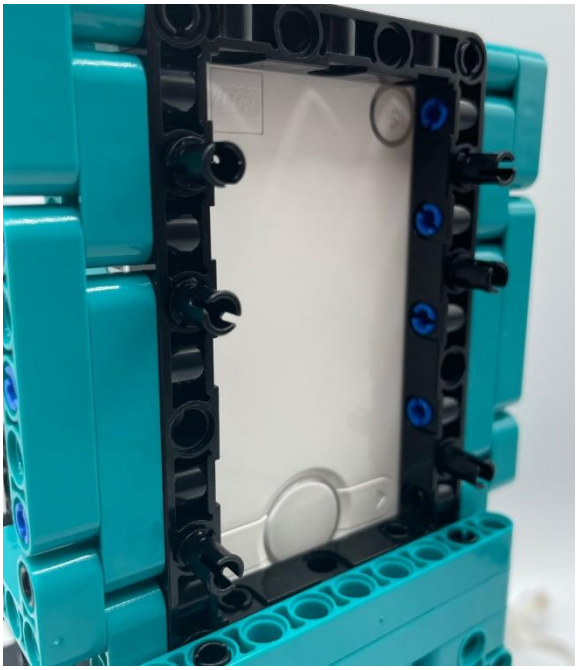


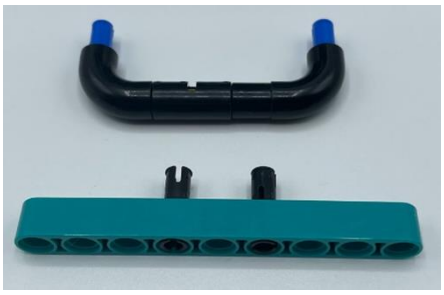


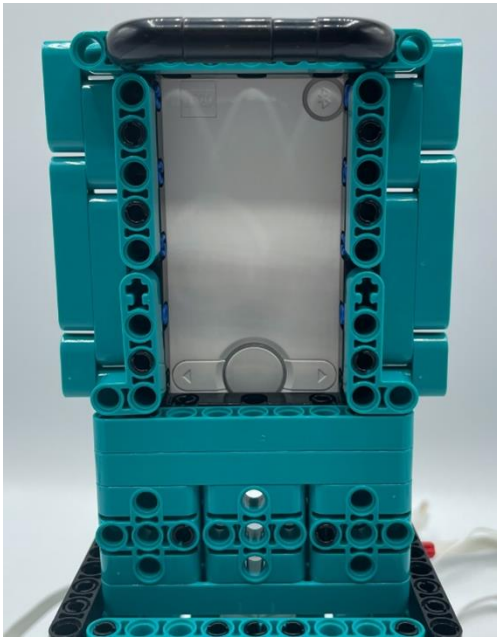


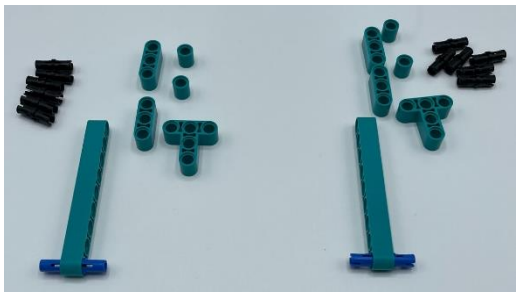


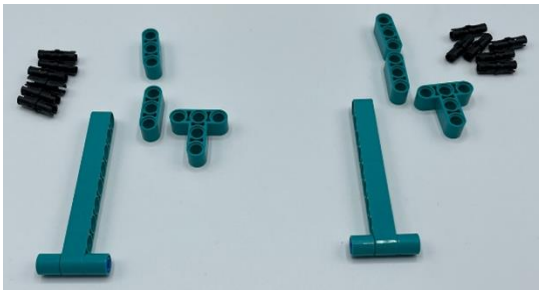


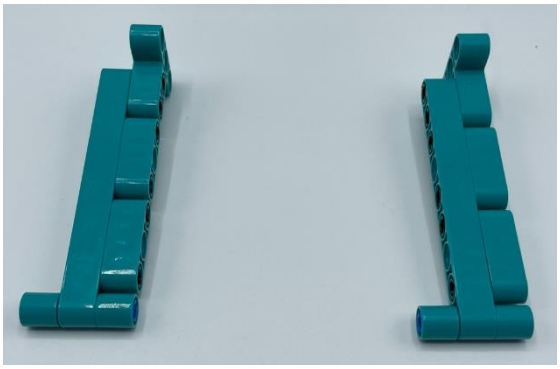


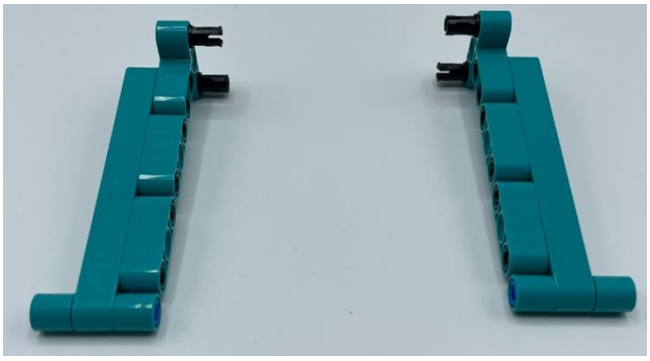


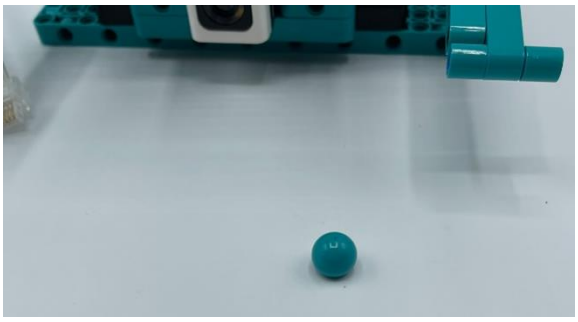


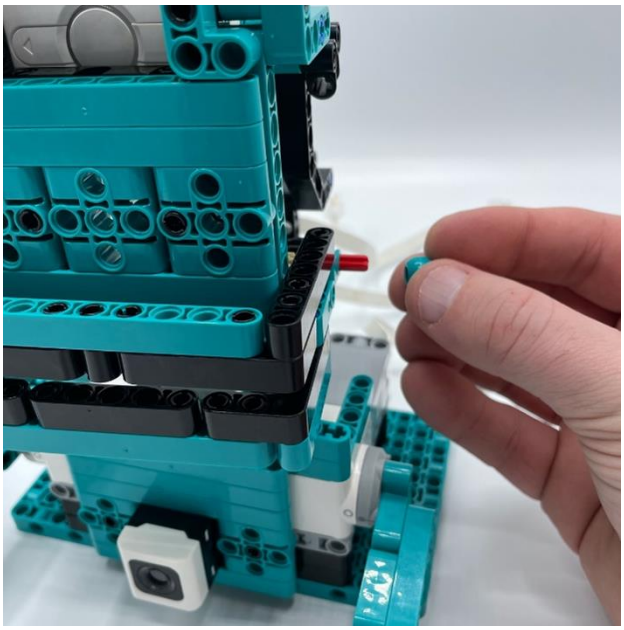


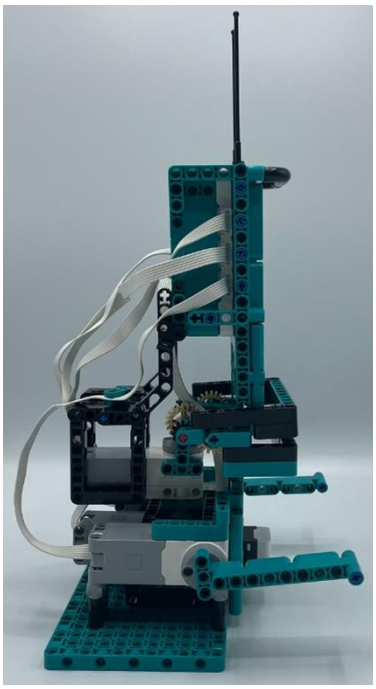




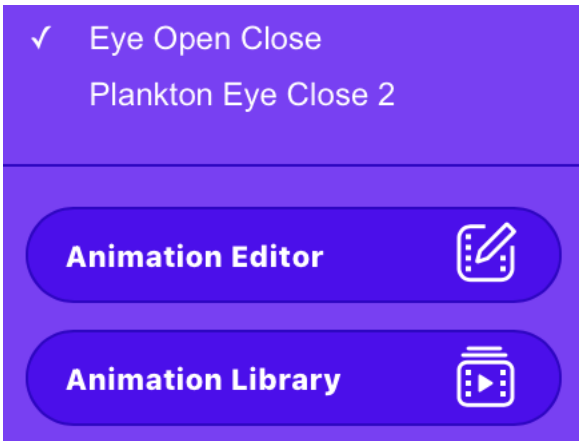


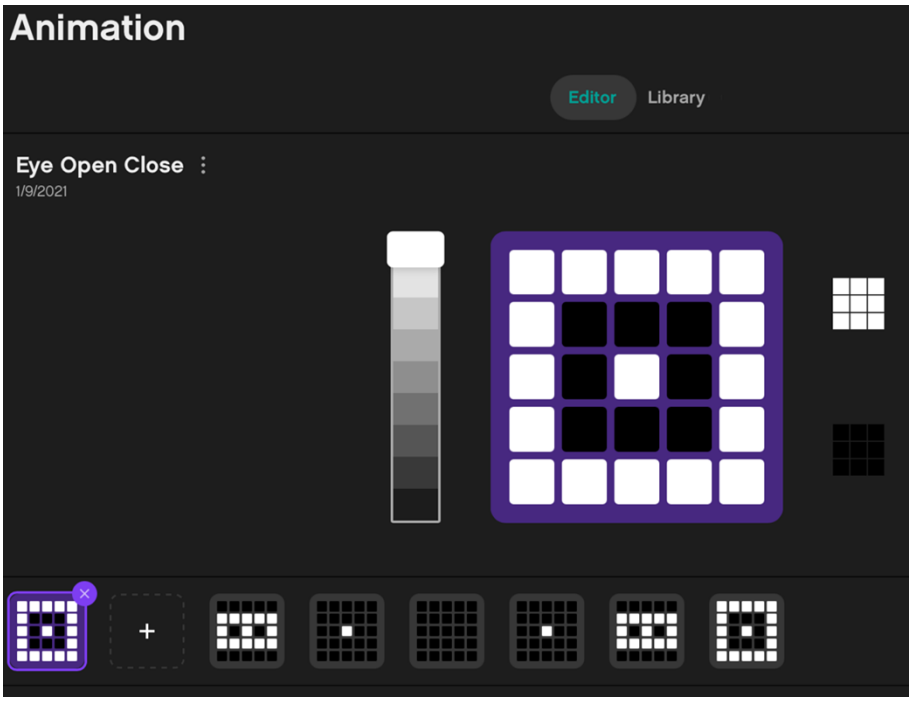


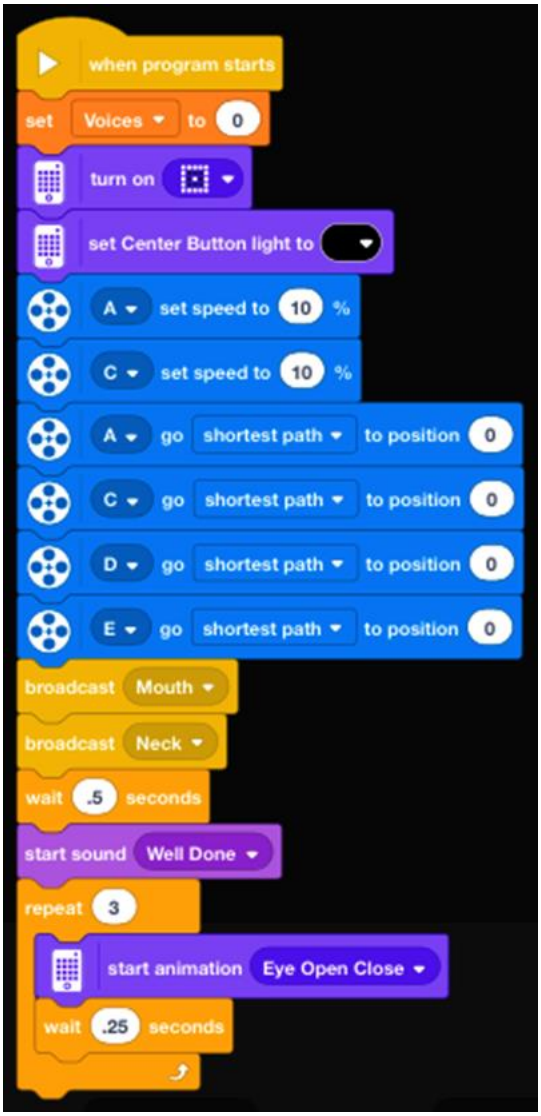




when program starts


✓ Eye Open Close
Plankton Eye Close 2
Animation Editor
Animation Library

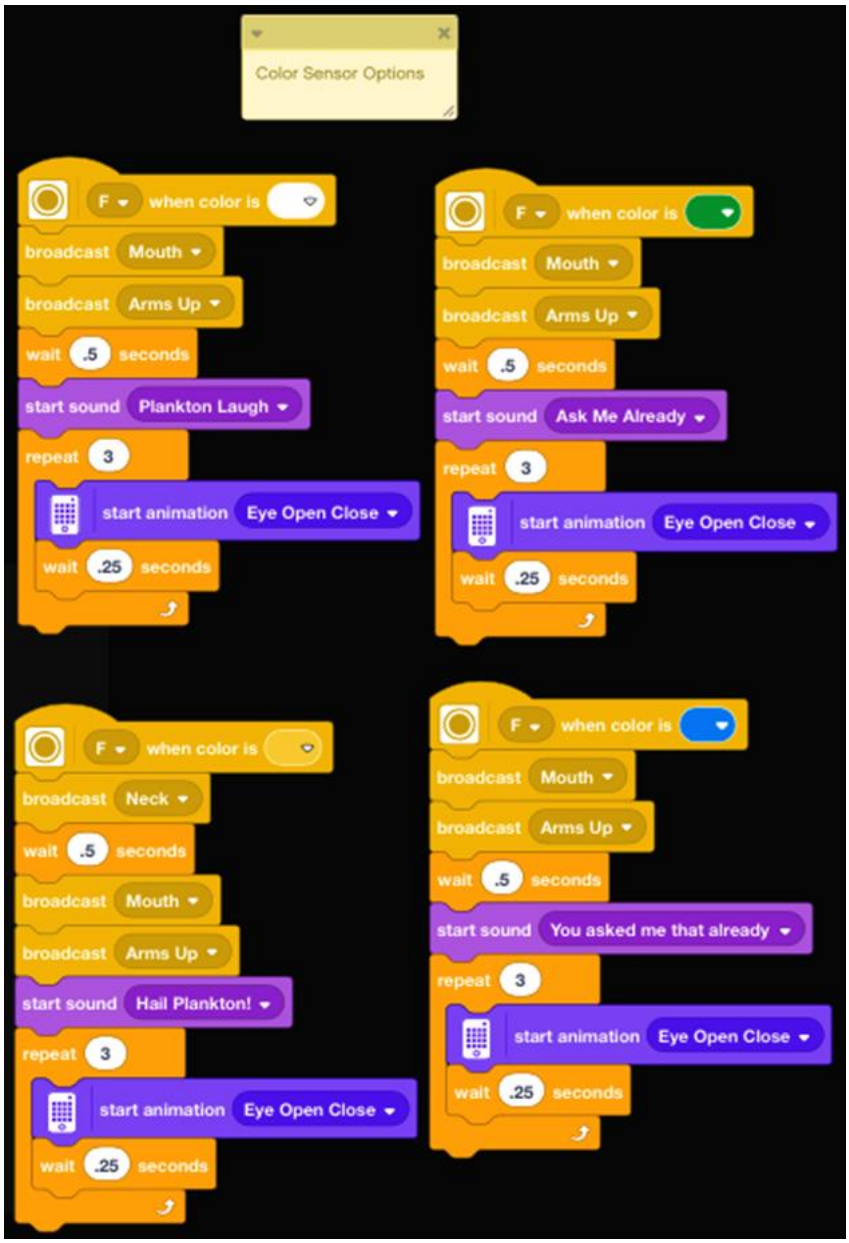

Animation
Editor
Library
Eye Open Close
1/9/2021

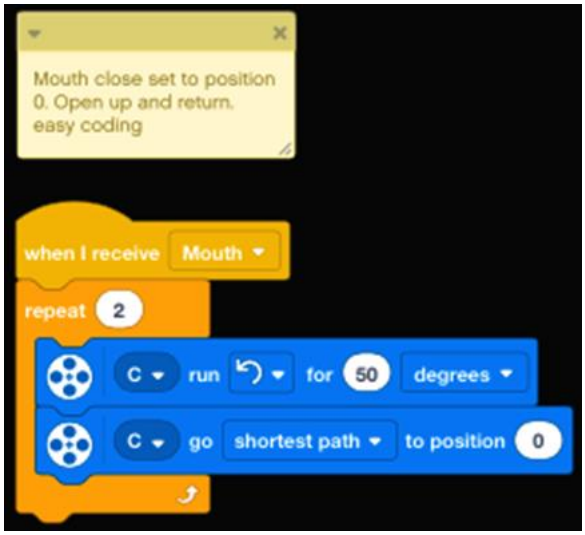

when program starts
set Voices to 0
turn on
set Center Button light to
A set speed to 10 %
C set speed to 10 %
A go shortest path to position 0
C go shortest path to position 0
D go shortest path to position 0
E go shortest path to position 0
broadcast Mouth
broadcast Neck
wait .5 seconds
start sound Well Done
repeat 3
start animation Eye Open Close
wait .25 seconds

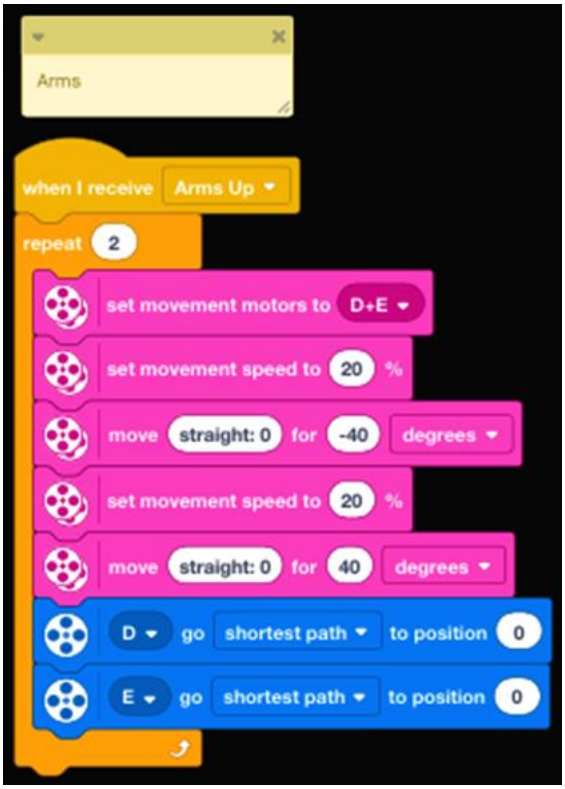
Duplicate

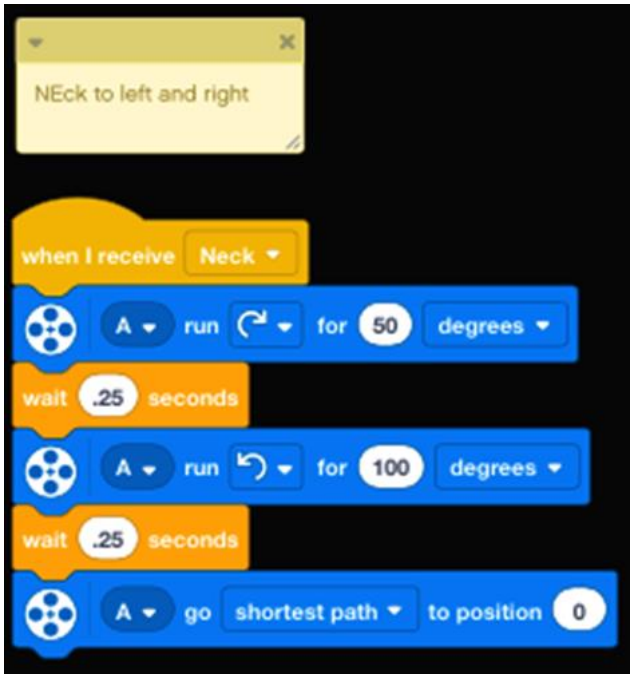
Add Comment

Delete Block

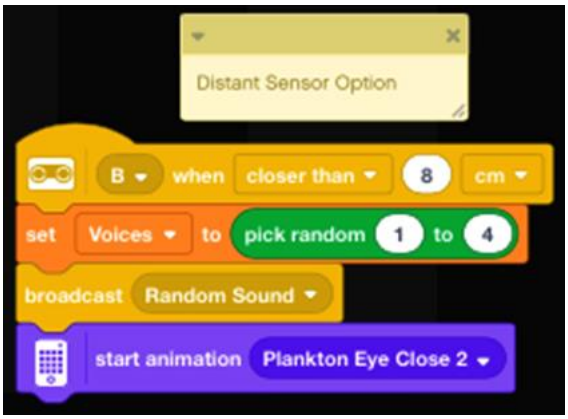
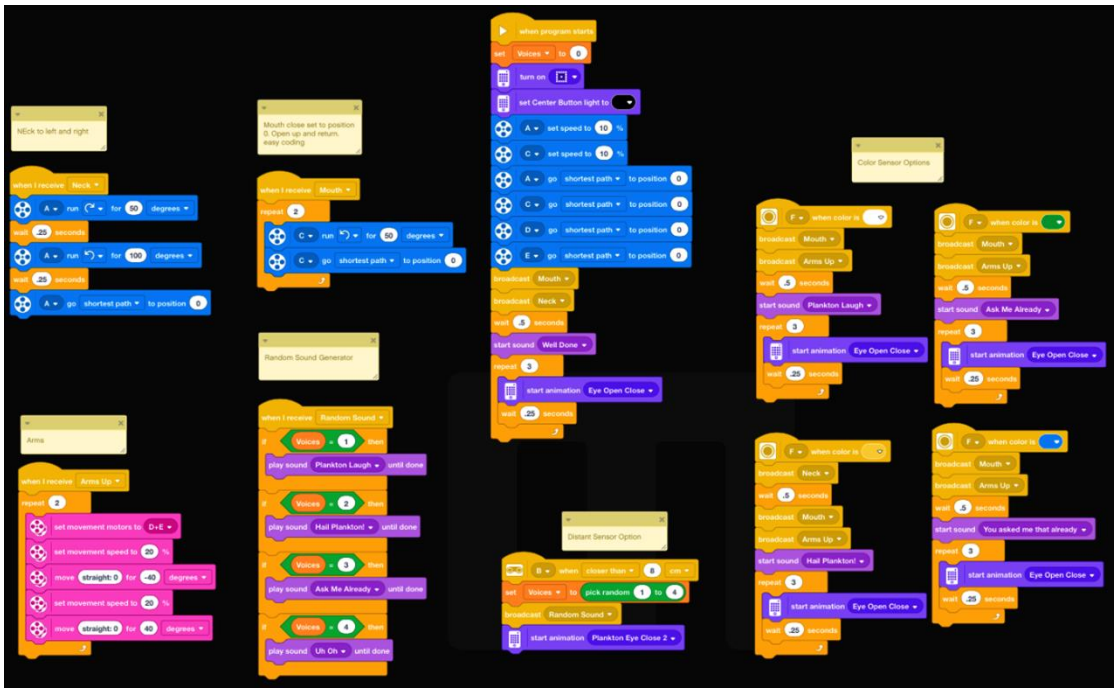

Color Sensor Options
F when color is
broadcast Mouth
broadcast Arms Up
wait .5 seconds
start sound Plankton Laugh
repeat 3
start animation Eye Open Close
wait .25 seconds
F when color is
broadcast Mouth
broadcast Arms Up
wait .5 seconds
start sound Ask Me Already
repeat 3
start animation Eye Open Close
wait .25 seconds
F when color is
broadcast Neck
wait .5 seconds
broadcast Mouth
broadcast Arms Up
start sound Hail Plankton!
repeat 3
start animation Eye Open Close
wait .25 seconds
F when color is
broadcast Mouth
broadcast Arms Up
wait .5 seconds
start sound You asked me that already
repeat 3
start animation Eye Open Close
wait .25 seconds


Mouth close set to position 0. Open up and return. easy coding
when I receive Mouth
repeat 2
C run for 50 degrees
C go shortest path to position 0


Arms
when I receive Arms Up
repeat 2
set movement motors to D+E
set movement speed to 20 %
move straight: 0 for -40 degrees
set movement speed to 20 %
move straight: 0 for 40 degrees
D go shortest path to position 0
E go shortest path to position 0


NEck to left and right
when I receive Neck
A run for 50 degrees
wait .25 seconds
A run for 100 degrees
wait .25 seconds
A go shortest path to position 0

Random Sound Generator
when I receive Random Sound
if Voices = 1 then
play sound Plankton Laugh until done
if Voices = 2 then
play sound Hail Plankton! until done
if Voices = 3 then
play sound Ask Me Already until done
if Voices = 4 then
play sound Uh Oh until done


Distant Sensor Option
B when closer than 8 cm
set Voices to pick random 1 to 4
broadcast Random Sound
start animation Plankton Eye Close 2