Chapter 1, Introduction to Robotics
Chapter 2, Mechanical Design of Service Robot
Chapter 3, Working with Robot Simulation Using ROS and Gazebo
Service invocation

Node → Publication → Topic → Subscription → Node
<table>
<thead>
<tr>
<th>Package</th>
<th>Installed Version</th>
<th>Latest Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ros-indigo-kobuki-node</td>
<td>0.6.4-1onriley2014.0.6.4-1onriley2014</td>
<td></td>
<td>ROS nodelet for Kobuki. ROS wrapper for the Kobuki driver.</td>
</tr>
<tr>
<td>ros-indigo-kobuki-auto-docking</td>
<td>0.6.4-Onriley2014.0.6.4-Onriley2014</td>
<td></td>
<td>Automatic docking for Kobuki. Users owning a docking station for</td>
</tr>
<tr>
<td>ros-indigo-kobuki-keyop</td>
<td>0.6.1-Onriley2014.0.6.1-Onriley2014</td>
<td></td>
<td>Keyboard teleoperation for Kobuki. relay commands from a keyboard.</td>
</tr>
<tr>
<td>ros-indigo-kobuki-mg</td>
<td>0.6.1-Onriley2014.0.6.1-Onriley2014</td>
<td></td>
<td>Kobuki message and service types: custom messages and services.</td>
</tr>
<tr>
<td>ros-indigo-kobuki-dashboard</td>
<td>0.6.3-Onriley2014.0.6.3-Onriley2014</td>
<td></td>
<td>The Kobuki dashboard is a QTB based plugin for visualising data!</td>
</tr>
<tr>
<td>ros-indigo-kobuki-keyboard</td>
<td>0.6.3-Onriley2014.0.6.3-Onriley2014</td>
<td></td>
<td>Dock driving library for Kobuki. Users owning a docking station for</td>
</tr>
<tr>
<td>ros-indigo-kobuki-camera</td>
<td>0.6.3-Onriley2014.0.6.3-Onriley2014</td>
<td></td>
<td>Non-ROS software for Kobuki. Viki Kobuki’s mobile research base.</td>
</tr>
<tr>
<td>ros-indigo-kobuki-keyop-joy</td>
<td>0.6.1-Onriley2014.0.6.1-Onriley2014</td>
<td></td>
<td>ROS nodelet for Tike Kobuki.</td>
</tr>
<tr>
<td>ros-indigo-kobuki-camera-joy</td>
<td>0.6.1-Onriley2014.0.6.1-Onriley2014</td>
<td></td>
<td>Camera plugin for Tike Kobuki.</td>
</tr>
<tr>
<td>ros-indigo-kobuki-keyop-joy</td>
<td>0.6.1-Onriley2014.0.6.1-Onriley2014</td>
<td></td>
<td>Joy plugin for Tike Kobuki.</td>
</tr>
<tr>
<td>ros-indigo-kobuki-camera-joy</td>
<td>0.6.1-Onriley2014.0.6.1-Onriley2014</td>
<td></td>
<td>Camera plugin for Tike Kobuki and Joy plugin.</td>
</tr>
<tr>
<td>ros-indigo-kobuki-keyop-joy</td>
<td>0.6.1-Onriley2014.0.6.1-Onriley2014</td>
<td></td>
<td>Joy plugin for Tike Kobuki and Camera plugin.</td>
</tr>
</tbody>
</table>

No package is selected.
Chapter 4, Designing ChefBot Hardware

Motor 1 + Encoder -> Motor Driver
Motor 2 + Encoder

Ultrasonic sensor -> Embedded controller board

Kinect

PC

IMU

Speaker/Mic

Wi-Fi
Chapter 5, Working with Robotic Actuators and Wheel Encoders
```cpp
// sketch_octa1a

void setup()
{
    // put your setup code here, to run once:
}

void loop()
{
    // put your main code here, to run repeatedly:
}
```
void setup()
{
  Serial.begin(9600);
  Serial.println("Hello World");
  while (Serial.available())
  {
    // Handle incoming data
  }
}

void loop()
{
  // Put your main code here, to run repeatedly
}
```cpp
void setup()
{
  // put your setup code here, to run once
}

void loop()
{
  // put your main code here, to run repeatedly
}
```
Chapter 6, Working with Robotic Sensors

[Diagram of robotic sensor connections and timing diagram]

/dev/ttyACM0

Distance= 2848
Distance= 330
Distance= 2830
Distance= 11
Distance= 11
Distance= 11
Distance= 11
Distance= 11
Distance= 11
Distance= 11
Distance= 12
Distance= 14
Distance= 29
Distance= 14
Distance= 13
Distance= 13

[Console output showing distances]
Distance = 12
Distance = 2903
Distance = 5
Distance = 9
Distance = 7
Distance = 6
Chapter 7, Programming Vision Sensors Using Python and ROS
Chapter 8, Working with Speech Recognition and Synthesis using Python and ROS

speech
signal

Lexicon
Language Model

Feature Extraction
Acoustic Model
Search Algorithm
Detected Words
Chapter 9, Applying Artificial Intelligence to ChefBot Using Python

```
lentin@lentin-Aspire-4755:~/Desktop/Chapter-9_code$ ./chatbot.py sample.aihm
Loading sample.aihm... done (0.02 seconds)
Enter input > HOW ARE YOU
I AM FINE
Enter input >

PARSE ERROR: Unexpected </category> tag (line 104, column 8)
PARSE ERROR: Unexpected </category> tag (line 144, column 8)
Loading update_mccormick.aihm... done (0.01 seconds)
PARSE ERROR: Unexpected text inside <random> element (line 4311, column 262)
PARSE ERROR: Unexpected text inside <random> element (line 4848, column 172)
PARSE ERROR: Unexpected text inside <random> element (line 8844, column 351)
Loading default.aihm... done (0.72 seconds)
Enter input > HOW ARE YOU
I am fine, thank you.
Enter input >
```

```
Loading personality.aihm... done (0.01 seconds)
Loading bot.aihm... done (0.27 seconds)
Loading biography.aihm... done (0.05 seconds)
PARSE ERROR: Unexpected </category> tag (line 104, column 8)
PARSE ERROR: Unexpected </category> tag (line 144, column 8)
Loading update_mccormick.aihm... done (0.01 seconds)
PARSE ERROR: Unexpected text inside <random> element (line 4311, column 262)
PARSE ERROR: Unexpected text inside <random> element (line 4848, column 172)
PARSE ERROR: Unexpected text inside <random> element (line 8844, column 351)
Loading default.aihm... done (0.73 seconds)
Saving brain to standard.brn... done (0.41 seconds)
Enter input > HOW ARE YOU
My logic and cognitive functions are normal.
Enter input >
```
Chapter 10, Integration of ChefBot Hardware and Interfacing it into ROS Using Python

Top View
- Base plate Support
- Wheel

Bottom View
- Base Plate
- DC Gear Motor
- Caster wheel
- Motor Encoder

Middle plate
- Base plate Female connector
- Middle plate Female connector

Assembled up to Middle plate
Tiva C Launchpad

Navigation stack

Robot
Serial Data In
Serial Data Out

Launchpad
Node

left_wheel_speed
right_wheel_speed

pid_velocity

twist_to_motors

Chefbot

Wireless Router

Remote PC

Motor Driver

Encoder 1
Encoder 2

Ultrasonic Sensor

Motor VN720P30

Battery

Sensing

Terminals

e.g. IP: 192.168.1.106

e.g. IP: 192.168.1.101
```
robot@robot-desktop:$ rosrun chefbot bringup launchpad_node.py
Initializing Launchpad class
[INFO] [WallTime: 1424097603.219564] Starting with serial port: /dev/ttyACM0, baud rate: 115200
[INFO] [WallTime: 1424097603.228825] Started serial communication
robot@robot-desktop:$ rostopic list
/battery_level
/imu/data
/left_wheel_speed
/right_wheel_speed
/rosout
/rosout_agg
/serial
/ultrasonic_distance
```

```
data: 16266, in: e 1 -1
```
```
data: 16267, in: u 10
```
```
data: 16268, in: s 0.00 0.00
```
INFO [1422618733.585497153]: Created local_planner_dwa_local_planner/DWAPlanner ROS
INFO [1422618733.604762096]: Sim period is set to 0.10
INFO [1422618733.708493148]: odom received!
Chapter 11, Designing a GUI for a Robot using Qt and Python
Chapter 12, The Calibration and Testing of ChefBot
IR with speckle pattern

IR with projector covered