

Instructions to Operate Shushbot

- 1) Make sure ROS is installed on the workstation and Turtlebot. The workstation is a separate machine on the same network as the laptop included with Turtlebot.**
- 2) Check that ROS is installed correctly on both machines with the terminal by running:**

```
$ roscore
```

- 3) Make sure the workstation and Turtlebot are both on the same network.**

- 4) Find out the IP address for both machines using:**

```
$ ifconfig
```

- 5) Check ROS_MASTER_URI and ROS_HOSTNAME on both machines to ensure ROS communication channels can find each other using:**

```
$ echo $ROS_MASTER_URI
```

```
$ echo $ROS_HOSTNAME
```

When typed on the workstation:

```
$ echo $ROS_MASTER_URI
```

```
http://<IP_OF_TURTLEBOT>:11311
```

```
$ echo $ROS_HOSTNAME
```

```
<IP_OF_WORKSTATION>
```

When typed on the Turtlebot:

```
$ echo $ROS_MASTER_URI
```

```
http://localhost:11311
```

```
$ echo $ROS_HOSTNAME
```

```
<IP_OF_TURTLEBOT>
```

If the IP addresses do not match the ones found in step 4, proceed to step 6. If they do match, skip step 6 and go to step 7.

6) The new IP addresses have to be set up for both machines using the terminal.

Workstation (IP addresses without < >):

```
$ echo export ROS_MASTER_URI=http://<IP_OF_TURTLEBOT>:11311 >> ~/.bashrc
$ echo export ROS_HOSTNAME=<IP_OF_WORKSTATION> >> ~/.bashrc
$ source ~/.bashrc
```

Turtlebot (IP addresses without < >):

```
$ echo export ROS_MASTER_URI=http://localhost:11311 >> ~/.bashrc
$ echo export ROS_HOSTNAME=<IP_OF_TURTLEBOT> >> ~/.bashrc
$ source ~/.bashrc
```

Repeat step 5 to make sure they match.

7) Teleoping the Turtlebot can be accomplished three different ways.

a. The first method is to do it remotely from the workstation.

On Turtlebot, run:

```
$ roslaunch turtlebot_bringup minimal.launch
```

On Workstation, run:

```
$ roslaunch kobuki_keyop keyop.launch
```

b. The second method is done directly on the Turtlebot and uses the same commands as the first method except they are all typed into the Turtlebot.

c. The third method is to SSH into the Turtlebot machine from the workstation.

On Workstation, run (May need multiple SSH sessions):

```
$ ssh turtlebot@<IP_OF_TURTLEBOT>
Password is "stacyrobert15" – No Quotes
$ roslaunch turtlebot_bringup minimal.launch
$ roslaunch kobuki_keyop keyop.launch
or
$ roslaunch turtlebot_teleop keyboard_teleop.launch
```

8) Creating a map file of the environment.

On Turtlebot, run:

```
$ roslaunch turtlebot_bringup minimal.launch
```

```
$ roslaunch turtlebot_navigation gmapping_demo.launch
```

On Workstation, run

```
$ roslaunch turtlebot_rviz_launchers view_navigation.launch
```

```
$ roslaunch kobuki_keyop keyop.launch
```

Use teleoperation to navigate the Turtlebot around the entire area you wish to map.

When the entire area has been mapped, open a new terminal on the Turtlebot with ctrl+alt+t and type:

```
$ cd Desktop/Maps
```

```
$ ls
```

Name your new map the next highest number (n)

```
$ rosrn map_server map_saver -f my_mapn (where n is a number)
```

```
$ ls
```

The new map should be there as my_mapn.pgm and my_mapn.yaml, and next to it should be my_map(n-1).pgm and my_map(n-1).yaml etc...

9) Now that there is a new map file, the script to run Shushbot has to be edited to read this new map file.

If you were already inside the maps folder in the terminal on the Turtlebot, just enter the following command to get back to the desktop:

```
$ cd ..
```

Or, just open a new terminal window and navigate your way to the desktop again.

Once on the desktop of the Turtlebot, use your favorite editor to edit New_Script.sh

```
$ emacs New_Script.sh
```

Under where it says (around line 13)

Echo "Load Map"

```
Xterm -hold -e roslaunch turtlebot_navigation amcl_demo.launch  
map_file:=/home/turtlebot/Desktop/Maps/my_map(n-1).yaml *
```

Change my_map(n-1).yaml to my_mapn and save.

10) Now you are ready to activate Shushbot. Close all terminals on both the workstation and Turtlebot.

On Turtlebot, open a new terminal and navigate to the desktop.

```
$ cd Desktop
```

```
$ ./New_Script.sh
```

Wait until the entire script loads, should end up with about 4-5 blank xterm terminals open on the screen.

Ctrl-alt-t to open up a new terminal window.

```
$ rosrn turtle listener
```

This will activate the listener function of the Shushbot and it will start to move around trying to find sound.