

FINAL YEAR PROJECT

Chotu

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Introduction:

The project is based on the idea of Social Robotics. We have used Robot Operating System (ROS) and TurtleBot. The basic idea of the project is to add some “skills” to the TurtleBot and make it socially interactive. ROS is a collection of frameworks for the robot software development. It serves as a meta-operating system by providing services such as hardware abstraction, low-level device control, message-passing between processes, and package management. ROS is now an industry standard for the research in the fields of Robotics and AI. It has vast applications in both commercial and research.

TurtleBot is a small, low cost, open source robot for personal robotics development. It has enough horsepower to create exciting applications. It is one of the best-selling open source personal robot. It comes with a Kobuki base that has two motors for moving around. It also has 3 bumper sensors, 3 cliff sensors, and wheel drop sensors. Asus Xtion Pro Live serves as the eyes of the robot. A laptop serves as the processing unit for the robot. Different external APIs including (OpenCV, PCL) are used to program various functionalities in the Robot.

High Level Design:

1. Rationale and sources of your project idea
Write here...
2. Logical structure
Write here...
3. Background
Write here [you can also show your math equations here]...
4. Hardware / Software tradeoffs
Write here...
5. Relationship with available past projects or standards e.g. IEEE, ANSI, ISO and etc.
Write here...
6. Patents, copyright and trademarks
Write here...

Software / Hardware Design:

1. Overview
Write here...
2. Program Details
 - a. Overview
Write here [Insert flowcharts, transition diagrams, use cases and etc. 8"x4.5"]...
 - b. User interface
[Insert output screens.8"x4.5"]
 - c. Errors
Write here...
 - d. Trails and tests
Write here ...[Insert sample output screens, graphs, tables and etc.8"x4.5"]
3. Hardware Details
 - a. Overview
Write here [Insert block diagrams. 8"x4.5"]...
 - b. User interface hardware
Write here [You can also insert pictures. 8"x4.5"]...
 - c. Things that did not work
Write here...
 - d. Trails and tests
Write here [Insert hardware layout pictures, graphs, tables and etc.8"x4.5"]...

Results:

Write your results here e.g. speed of execution, usability, accuracy, safety, evidence and etc.

Conclusions:

Write your conclusions here e.g. results vs. expectations, conformance to existing designs, market value, user expectations and etc.

Appendix:

Appendix 1: Equations

Appendix 2: Code

Appendix 3: Schematic of your hardware

Appendix 4: Software/parts list

Appendix 5: Work distribution

Imran Hemani is responsible for the vision of the TurtleBot. His research focus is on object detection and recognition, face detection and recognition, and color recognition.

Nabeel Zahid Rajput and Safer-e-Hussain are responsible for robot motion and navigation. They are working on the motors control, sensors data manipulation, behavior control, and slamming. Nabeel is also working on voice recognition to make robot recognize voice commands.

Appendix 6: Project timeline

16th September	Assembling TurtleBot
17th September	ROS Installation
18th September	Configuration of ROS
5-13 October	Mid-Term 1 Break
18th October	Begin the Research on ROS
25th October	Create First Dummy Package
30th October	Created First Simple Package
02nd November	ROS IDE Configuration
03rd November	Started the Research on OpenNI
15th November	Problems faced integrating OpenNI with ROS Hydro
November	Mid-Term 2 Break
January	Final Exam Break
20th January	Switched Back to Groovy
21st January	Reconfigured ROS & IDE
22nd January	Restarted the research on OpenNI
30th January	Calibrated the Device (Asus Xtion Pro Live)
10th February	Moved the Robot using Depth data from the Asus Xtion Pro
March	Mid-Term 1 Break
22nd March	Use bump sensor with the depth
April	IranOpen & Mid-Term 2 Break
After Mid-Term 2	Implementing SLAM - learning the unknown map
End of April	Implementing Face Detection with OpenCV
Beginning of May	Implementing Voice Recognition using Microsoft Speech API

References:

Books:

Inspirations for code and designs:

Papers:

Datasheets:

Vendor:

Background sites:

Acknowledgements:

We would like to thank....