



# A robot to complete given orders: BLG456E Project Proposal

By *Yunus*:

*Yunus Güngör 150150701*

## Table of Contents

Background .....	2
Methods.....	2
Schedule & Outcomes.....	2
WP1.1: Moving.....	2
WP1.2: Getting Input .....	2
WP2.1: Enviroment Design .....	3
WP2.2: Door Detection.....	3
WP2.3: Finding the correct door.....	3
Conclusion .....	3
Reference List .....	3

## Introduction

The robot problem we are aiming to solve, is to navigation of a robot by human commands. Solving this problem will help humans to interact with robots easily and it's going to increase robot programming speed. Main aim is to create a strong human to robot interface is to eliminate the need for robot programming. However, understanding commands and executing them requires other types of problems to be solved. We are going to create a simple demo how that kind of system work. The main aim of this project is to interact with the robot by a console. Interaction will include a colour. Then robot will be using computer vision to process sensor data to detect a door with a given colour. Then will be moving towards that door.

# Background

Problem we are trying to solve requires one user input and moves the robot which is a turtlebot, to given location. However, location is not given as coordinates or any other format robot can understand. Main goal of solving this problem is to convert given user input to another format that robot can understand, and making robot move accordingly.

The robot is a turtlebot in a simulated environment. Environment also will be simulated. There are different coloured doors in this environment. And the turtlebot must find the one that matches with the given input. Given input can be human readable color like 'red' or can be a colour code. After receiving an input robot will find the door, and then if the colour matches the given colour robot will move and enter through the door. This project can be realized in real life with a few small stickers with data on it and can be used to navigate in buildings.

## Methods

We are going to move a turtlebot, into a door within a corridor with multiple doors. The colour of the door turtlebot chooses must match with the given colour from an user as input. Turtlebot, will detect doors in the room with sensors. Camera will be used to collect information from environment. After that information will be processed with OpenCV image processing library to find doors, and match colours. Robot's environment will be created in a virtual simulation. This simulation will be realized with ROS (Robotic Operation System) and ROS Modules. These modules include OpenCV for image processing and Turtlebot for simulating robot. Or an algorithm designed in Intelligent System Control Lab., Korea Institute of Science and Technology for detecting doors can be used [1].

To evaluate our success, we will test our system in a virtual environment. Robot should be able to move, detect doors, get input from user via a console, match colour of doors and then move towards the chosen door.

## Schedule & Outcomes

A summary of tasks and their delivery times can be found in Table 1. Below that the tasks are detailed.

Table 1: Main tasks and responsibilities				
Task	Responsible Person	Completion date	Amount of time expected (hours)	Share of marks for team member(%)
WP1.1: Moving	Yunus Güngör	30 Nov (interim demo)	4	20%
WP1.2: Getting Input	Yunus Güngör	30 Nov (interim demo)	3	20%
WP2.1: Enviroment Design	Yunus Güngör	26 Dec (final demo + rep)	4	20%
WP2.2: Door Detection	Yunus Güngör	26 Dec (final demo + rep)	15	20%
WP2.3: Finding the correct door	Yunus Güngör	26 Dec (final demo + rep)	15	20%

### **WP1.1: Moving**

Requires ROS setup.

**Completion will be determined by measure how correctly robot moves.**

### **WP1.2: Getting Input**

Requires ROS setup. Needs user input for color.

**Completion will be determined by ability to enter a colour, and sending that colour to robot in correct form.**

### ***WP2.1: Enviroment Design***

Requires ROS setup.

**Completion will be determined by ROS virtual environment sufficiency.**

### ***WP2.2: Door Detection***

Requires WP2.1 to be done.

**Completion will be determined by ability to recognize and distinguish doors**

### ***WP2.3: Finding the correct door***

Requires WP2.2, WP1.2 to be done. Needs user input for color

**Completion will be determined by ability to recognize different colourful doors**

## **Conclusion**

In conclusion, communication between robot and humans are very important for being able to command robot for a job, without programming it. This ability could boost robot's efficiency and ability to help. As a first step, we are going to build a basic indoor navigation tool for a robot called Turtlebot, and to evaluate our success we are going to test this tool in a simulated environment

## **Reference List**

[1] Lee, J. Doh, N. L. Chung, W. K. You B. Youm, Y. I., Door Detection Algorithm Of Mobile Robot In Hallway Using Pc-Camera. South Korea, Australia: International Associaton for Automation and Robotics in Construction, 2004.