MINI PROJECT - II
6^{th} **Semester (CBGS)**
Project Report

Low Cost Real-time Meeting Room Occupancy Indicating System

Submitted in partial fulfillment of
the requirements of the term work for subject MINI PROJECT - II

Submitted by

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CERTIFICATE

This is to certify that this is a bonafide record of the project presented by the students whose names are given below during Semister V in partial fulfilment of the requirements of the degree of Bachelor of Engineering in Electronics Engineering.

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Date: **Date:**

Seal of the Institute

Abstract

The objective of this action research based project was to tackle a problem faced by corporate environments. The typical corporate office consists of several meeting rooms with employees requiring frequent access to these meeting rooms, but lack of real-time knowledge of its availability leads to inconvenient hassle. The proposed solution consists of a network of motion detection sensors (namely, the PIR sensor) spread out across all meeting rooms, updating the room occupancy status in real-time to a central base-station, a desktop computer, from which it can be relayed to the employees using a web server or a smartphone application.

Each sensor node is designed to be Low Cost, Wireless and Low Power for seamless integration and to avoid frequent battery replacement.

This will lead to optimal utilization of the meeting rooms.

Acknowledgement

We would like to take this opportunity to thank Aashish Nehete for his immense help in creating and designing the web-based GUI for this project. We are also grateful to Prof. Kaiser Katchi for his help in 3D printing the project enclosure. Special thanks to our institute, Sardar Patel Institute of Technology, for providing us with 3D printing services and a platform for us to showcase our project.

Chirag Shah
Srijal Poojari

Contents

Chapter 1

Hypothesis

If there was a real-time meeting room occupancy monitoring system then users could remotely check in real-time

- If the room is occupied or not
- If a room is booked but not occupied
- If a room is not booked and not occupied
- The mobile app can use the data to cancel bookings if the room is unoccupied

This will lead to optimal utilization of the meeting rooms.

Chapter 2

Introduction

In a typical corporate environment there exists multiple conference/meeting rooms. The site that we studied was the Fractal Analytic, Goregaon. The office has around 400 employees: 250 employees on 7th floor, 150 employees on 3rd floor. 7th floor has 10 meeting rooms and 3rd floor has 5 meeting rooms. Anyone can book any meeting room for any time (if the room is available) using a mobile app. This is an open office - hence if anyone wants to have a discussion then they need to go to a meeting room. Hence meeting rooms are always in demand.

The problem was that anyone could book a meeting room and then not use it. Or if someone wanted to have a meeting without prebooking the meeting room the he/she would have to go from room to room to check the availability of the rooms. The would create a lot of unnecessary hassle and would lead to unoptitmal utilization of the workspace.

To solve these problem we envisioned a solution which would involve placing sensors in every meeting room to monitor the occupancy of the room. This sensor will then relay the real time occupancy information of the room to a central device which will keep track of the occupancy status of all the meeting rooms. This data can then be showed on a web/mobile interface to check the real time occupancy status of the meeting room or the data can be integrated with the the mobile app to automatically book or cancel the meetings as per the occupancy of the rooms.

Chapter 3

Market Survey

The following products are available which provide similar fuctionality to our system

3.1 Workscape

3.2 OccupEye

Chapter 4

Project Objectives

- Learn the ROS framework
- Understand and implement SLAM algorithms for 3D mapping
- Understand the interfacing of different hardware components with ROS packages
- Combine the software and hardware components to create a stand-alone quadcoptor for 3D mapping

Chapter 5

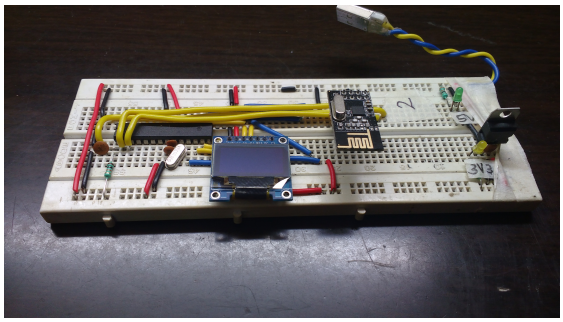
Work Done

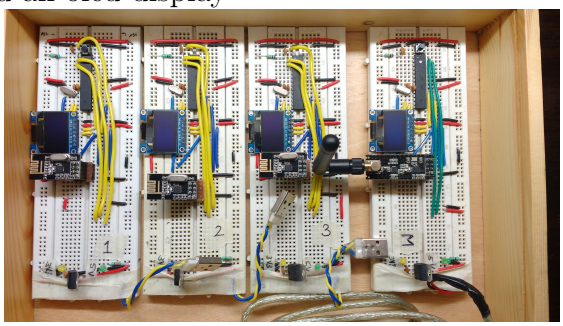
Chapter 6

Implementation and Build

6.1 Prototyping

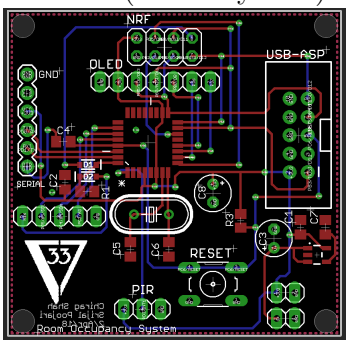
Designed the prototype of the circuit on breadboards which included the microcontroller, radio module and an oled display

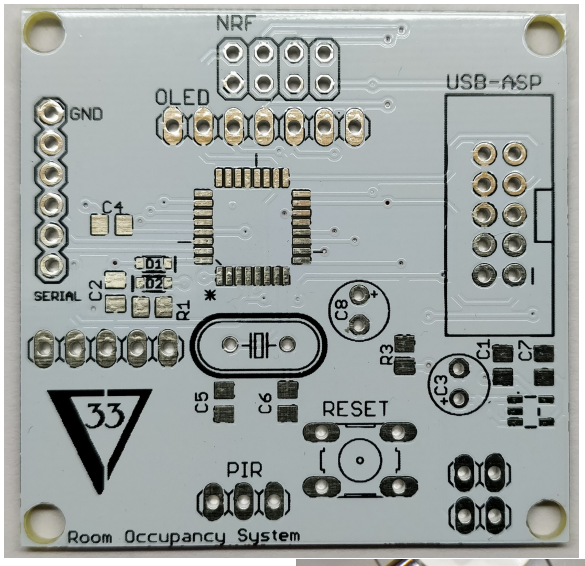


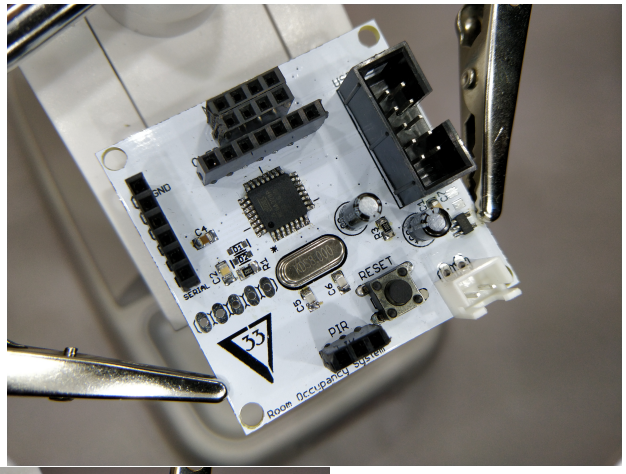


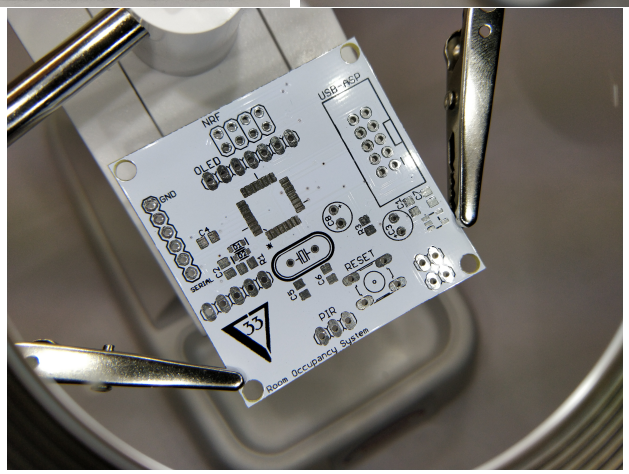
6.2 PCB Design

Designed the PCB of the circuit in Eagle and got it manufactured from a PCB prototyping service (PCBway.com)









6.3 Housing

6.4 Website

Chapter 7

Results

The following images show the result of mapping using handheld Kinect:

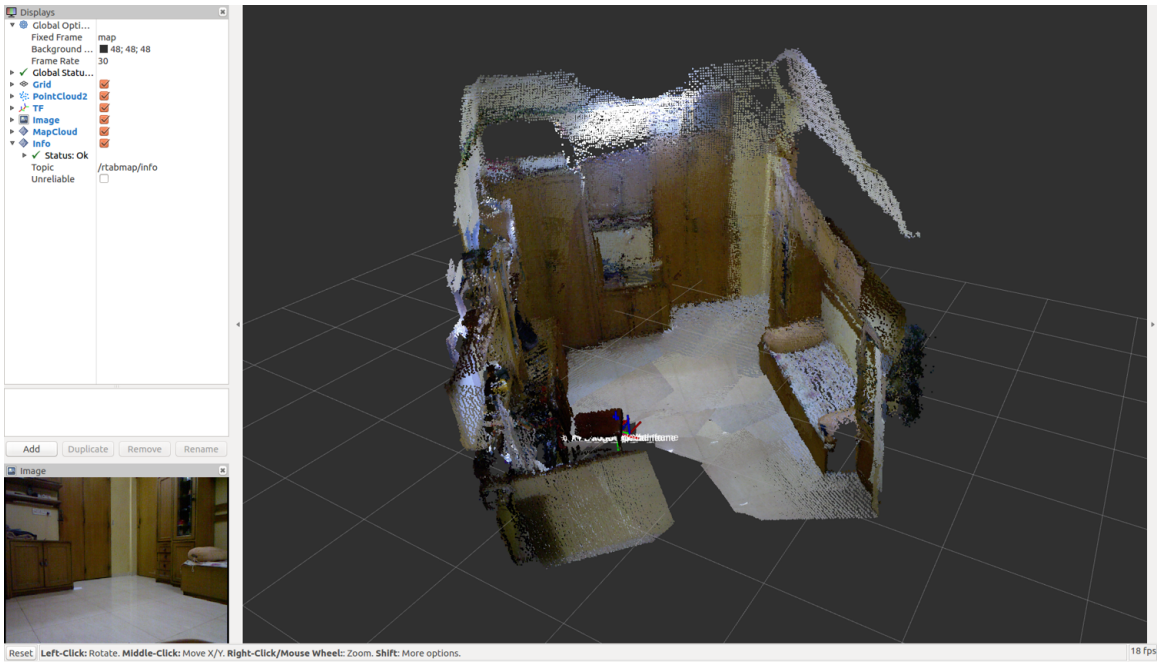


Figure 7.1: Wired mappping(PC)

The small section on the botoom left corener shows the RGB stream from the Kinect and the formed 3D map is displayed at the center.

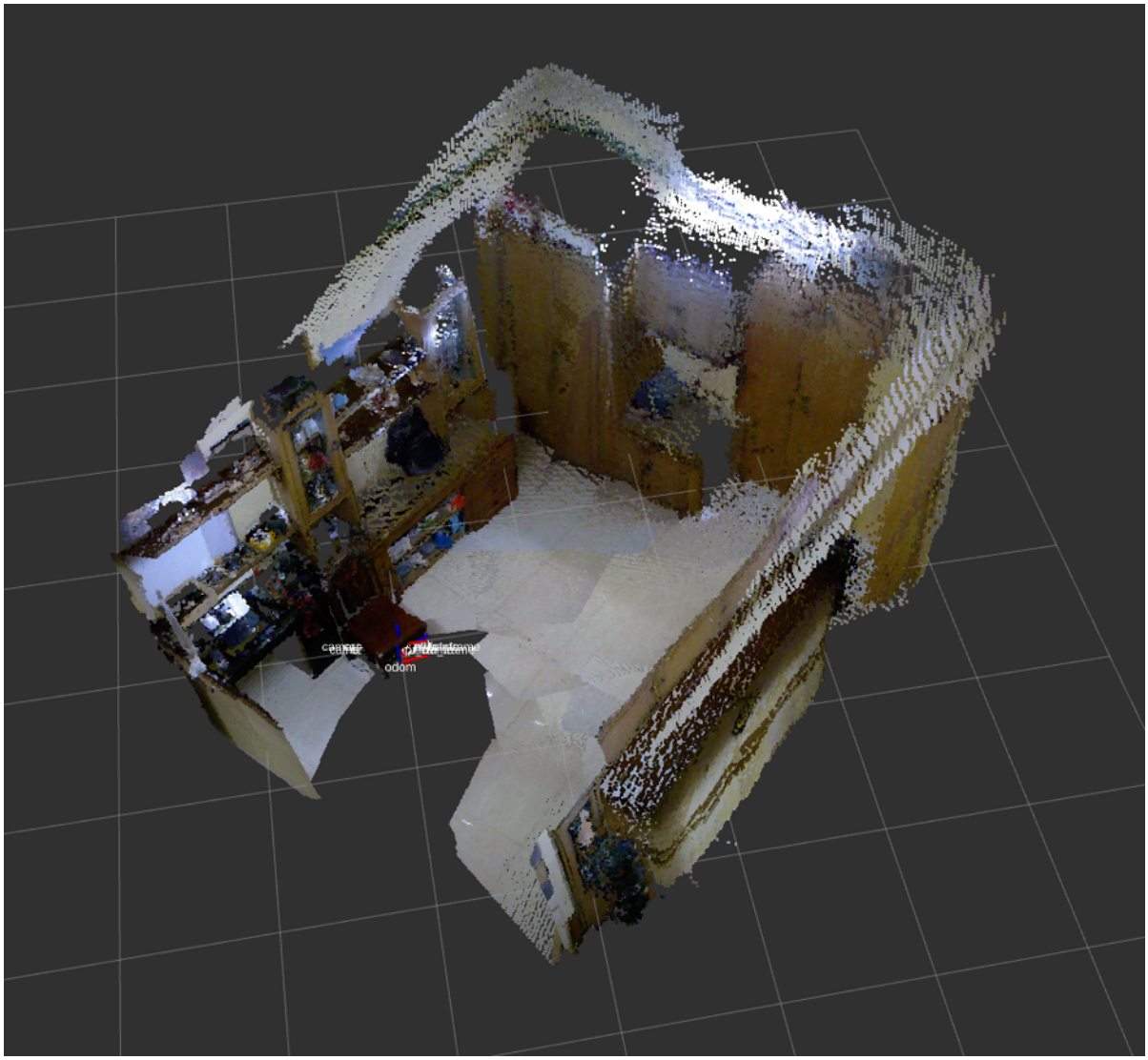


Figure 7.2: Wired mappping(PC)-complete

The complete formed map of the room is shown above. This can be interacted with and also be saved and loaded for later use. For example, continuing an earlier formed map to join new areas to it.

Chapter 8

Next Steps

Chapter 9

Conclusion

Hence we conclude

Bibliography

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