



MOTUS CONTROL

# Progress Report for Smart Room Control System

## **Project Team:**

Moha Alharbi  
Saad Alkhalifah  
Ryadh Almuaili  
Adrian Fettes  
Yuhui Jin

## **Contact Person:**

Moha Alharbi  
malharbi@sfu.ca

## **Submitted to:**

Dr. Andrew Rawicz  
Mr. Steve Whitmore  
School of Engineering Science  
Simon Fraser University

## **Issued Date:**

March 28, 2016

## **Revision:**

1.0

## 1. Introduction

*MOTUSCONTROL* is aiming to implement a smart system that will control electrical devices within the room based on hand-gesture recognition. The proof-of-concept model is currently in the final stages of construction and integration. This document reports the current development status of the subsystem components of our product. Additionally, the document outlines both budgeting and scheduling of the product.

## 2. Schedule

Figure 1 shows the original schedule of our project. The first prototype was scheduled to be built and tested by the end of this month. This schedule has been slightly compromised due to some development issues. We have successfully completed most of the subsystem components of the product. All individual subsystems of the product had been tested and met our expectation. We will be able to integrate the prototype in few days and starting the testing and debugging process.

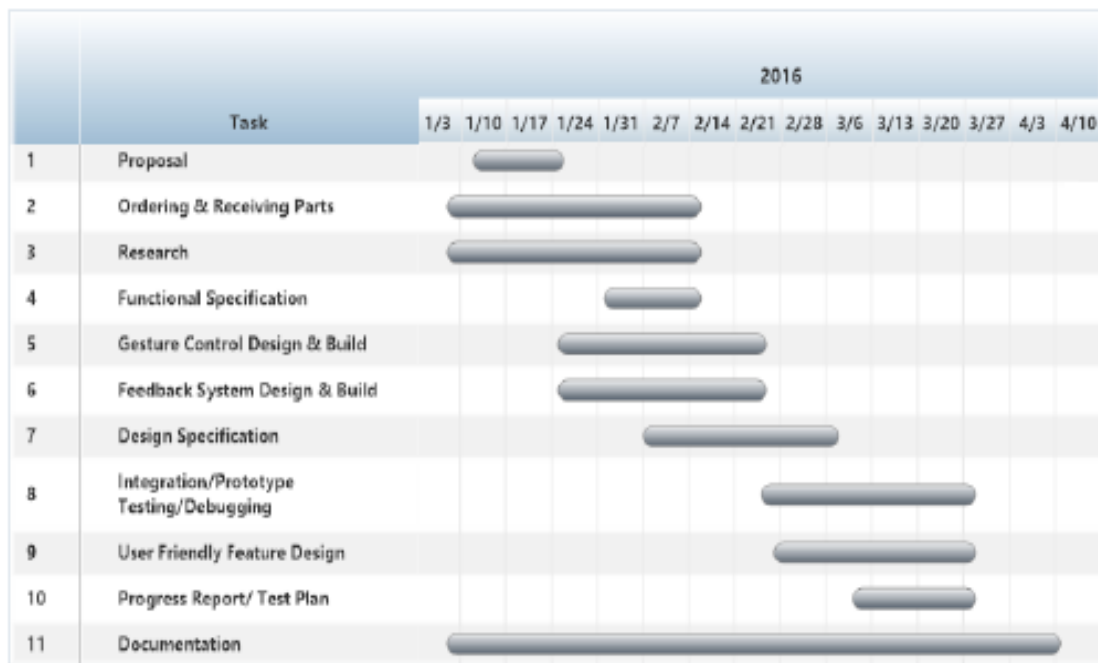


Figure 1: Gantt Chart of Original Schedule

### 3. Financial

Our group has funded \$327 from the Engineering Science Student Endowment Fund (ESSEF) and our expected cost is around \$446.64. However, the team has successfully managed to minimize the expected cost by purchasing low-priced parts. In addition, some members already own an Arduino Uno Board; therefore, this has helped the team utilizing the available resources to reduce the cost. Table 1 shows the budget of our proof-of-concept model.

Table 1: Project budgets

Equipment	Estimated cost
Arduino Uno Board	CAD \$33
Arduino Yun Board	CAD \$90
Sensor, PIR Motion	CAD \$13
Triple Axis Accelerator & Gyro Breakout – MPU6050 * 2	CAD \$40 * 2
Arduino GSM Shield	CAD \$105
Logitech C270 Webcam	CAD \$50
Flame Sensor	CAD \$1.2
Contingency (20%)	CAD \$74.44
<b>Total Cost</b>	<b>CAD \$446.64</b>

### 4. Progresses and Redemption

#### 4.1 Main and Peripherals controller

##### 4.1.1 Progress

Main and peripherals controllers have been successfully built and integrated. At this stage, the main controller is able to receive data from the wearable sensor via Bluetooth and pass the received data to the peripherals controller. The peripherals controller is able to switch on/off the device corresponding to the signal received. Work is still required in sending the sensor data to the server via Wi-Fi to update our smartphone application.

##### 4.1.2 Redemption

We were already able to fetch arbitrary data from server via our smartphone application. We do not expect any problems to arise when integrating our main controller with the server. We estimate that this process will take no longer than four hours to be successfully completed.

## **4.2 Hand Gesture Controller**

### **4.2.1 Progress**

The Motion Processing Unit, or MPU has been successfully connected to our Arduino. At this stage, we are able to read acceleration and angular data from the chip, and based on that data turn on and off LEDs. We are currently testing various motions with which to control our lights, to find the most versatile and stable one. We can currently recognize up to six different gestures, however we wish to have at least nine. We are making steady progress however, and should have a full range of motions prepared within the next two weeks.

### **4.2.2 Redemption**

We have already completed enough work for a demo-able product, however for full integration we need to complete further brainstorming to think of more motions to control the sensor. In the case, which we are unable to come up with any, we can provide a partial demo with our current range.

## **4.3 Software System**

### **4.3.1 Progress**

Phone app was successfully implemented using App Inventor 2. At this stage, it is capable to allow user to enter the credentials and then using the app to control Arduino control board to turn on and off LED lights via the third party server. The third party server meets our expectations and is capable of transmitting data between phone application and control boards. Work is still required in gathering sensor data and sending sensor data to the phone application.

### **4.3.2 Redemption**

During the testing process, a time delay related bug had been discovered. Sometimes, it would take more than one seconds delay in between sending commands from the phone application and controlling the LED lights. We will look into the code and try to fix it in the next few days.

## **Conclusion**

We have implemented the majority of our subsystems, with some small tasks in progress. The software package of the *Smart Room Control System* is expected to be completed in few days. We are approximately one week behind schedule; however, we feel confident that our proof-of-concept model will be completed before the scheduled demo date, April 20, 2016.