EE445L Lab Report 7

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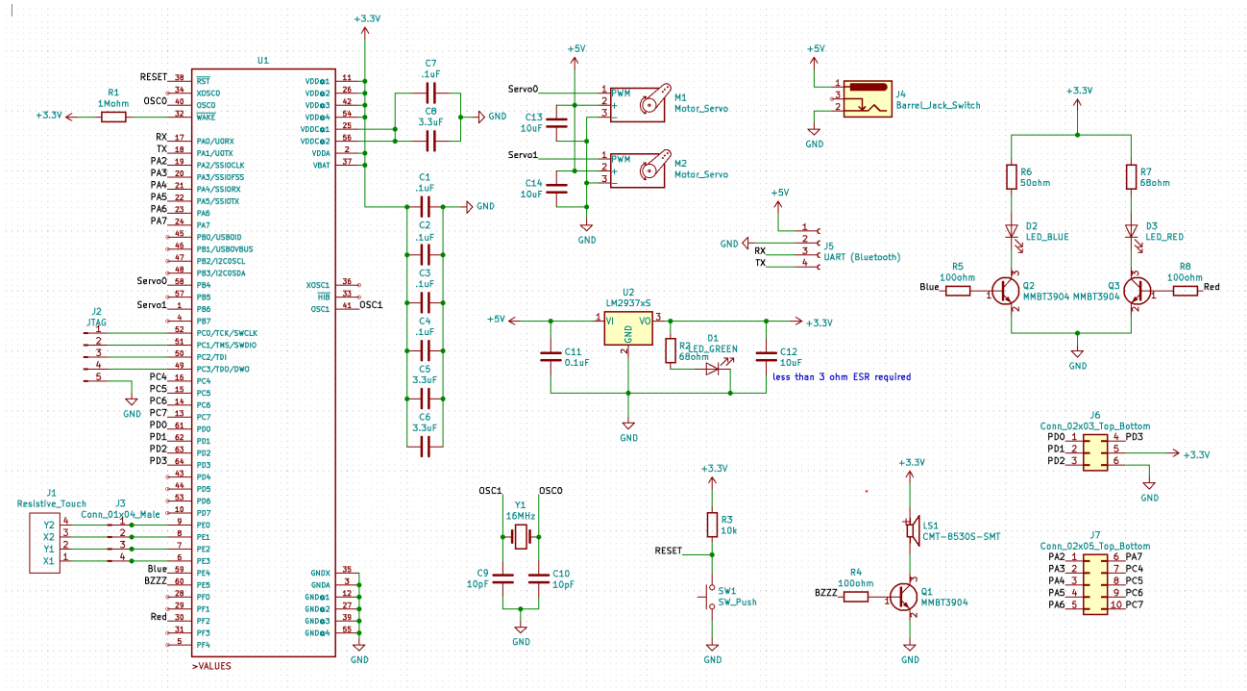
Github link: https://github.com/jspspike/balance
All our files are there. Stuff specific to this report is in the lab7 deliverables folder.

Requirements Doc

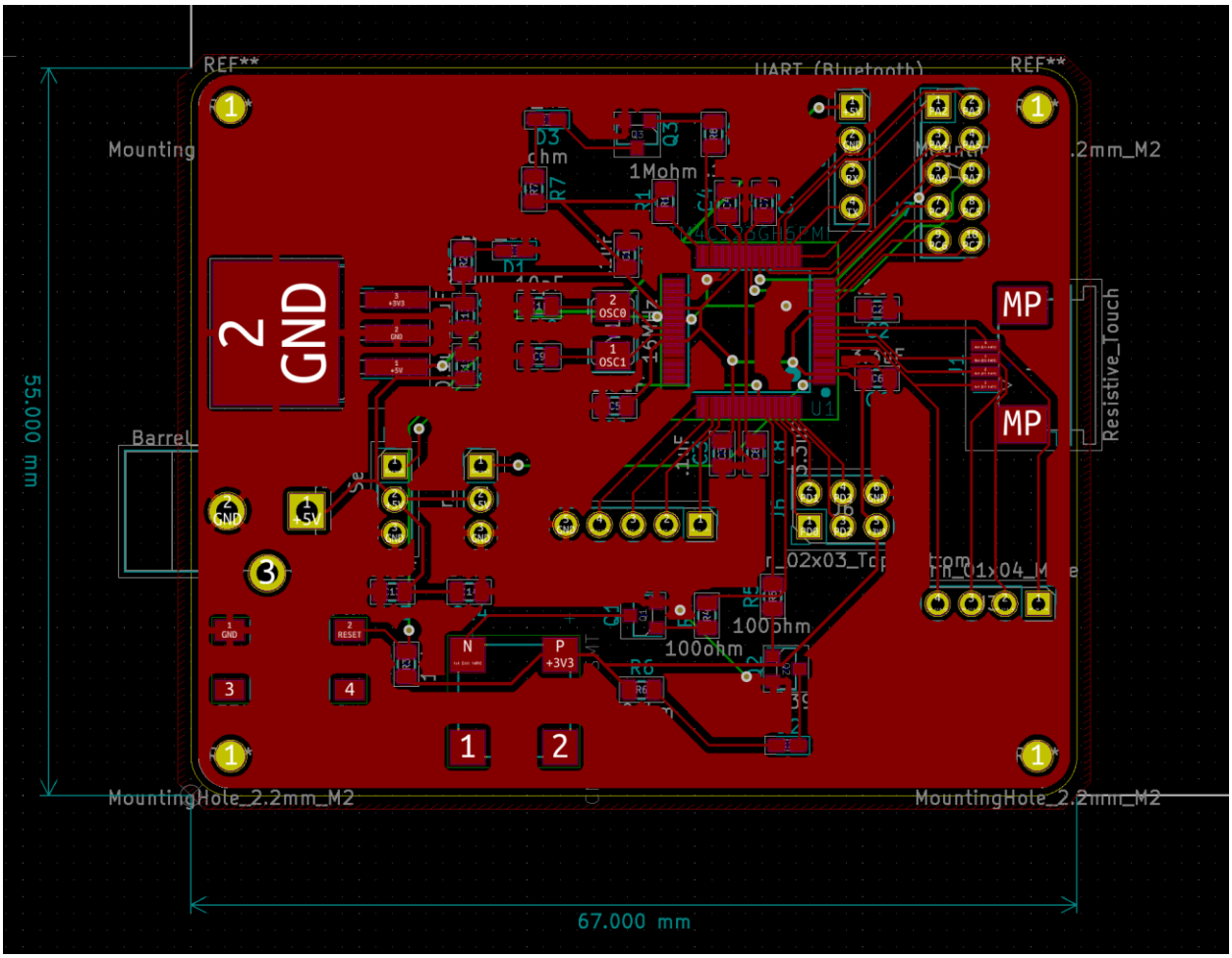
1. Overview
    a. Objectives
        i. We are doing this for the purpose of designing our own embedded system with the concepts that we have learned in class
    b. Roles
        i. Not sure yet
        ii. Also this…. EE445L students are the engineers and the TA is the client. Students are expected to make minor modifications to this document in order to clarify exactly what they plan to build. Students are allowed to divide responsibilities of the project however they wish, but, at the time of demonstration, both students are expected to understand all aspects of the design.
2. Function Description
    a. This system will balance a ball on a plate, allowing the user to move the ball using the plate center the ball as well as cause the ball to follow some patterns all by changing the plates orientation using servos. At first, we will just have buttons. One button when pressed will cause the ball to be centered, another when pressed can cause the ball to do a certain pattern. If this goal is reached, then we will try and control the plate remotely from our phones.
    b. We have three main goals as stated above. The user can move the ball, center the ball, and cause the ball to follow a predefined pattern. Quantitative measurements for all three goals could be how accurate the system is at moving to the position it is expected to go. For example, for centering the ball, we can see how far the ball ends up from the true center of the plate.
    c. There will be three switch inputs. The tm4c will interfaced with two servos and a resistive touch plate
3. Deliverables
    a. Lab 7 and Lab 11 stuff

Hardware Design

SCH


U1
RESET
OSC0
R1
1Mohm
+3.3V
RX
TX
PA2
PA3
PA4
PA5
PA6
PA7
Servo0
Servo1
PC4
PC5
PC6
PC7
PD0
PD1
PD2
PD3
Blue
BZZZ
Red
>VALUES
C7
.1uF
C8
3.3uF
C1
.1uF
C2
.1uF
C3
.1uF
C4
.1uF
C5
3.3uF
C6
3.3uF
GND
+5V
M1
Motor_Servo
M2
Motor_Servo
C13
10uF
C14
10uF
J4
Barrel_Jack_Switch
J5
UART (Bluetooth)
R6
50ohm
R7
68ohm
D2
LED_BLUE
D3
LED_RED
R5
100ohm
R8
100ohm
Q2
MMBT3904
Q3
MMBT3904
U2
LM2937xS
VI
VO
GND
C11
0.1uF
C12
10uF
less than 3 ohm ESR required
D1
LED_GREEN
R2
68ohm
J2
JTAG
J1
Resistive_Touch
J3
Conn_01x04_Male
Y2
X2
Y1
X1
OSC1
OSC0
Y1
16MHz
C9
10pF
C10
10pF
R3
10k
RESET
SW1
SW_Push
R4
100ohm
Q1
MMBT3904
LS1
CMT-8530S-SMT
J6
Conn_02x03_Top_Bottom
PD0
PD1
PD2
PD3
J7
Conn_02x05_Top_Bottom
PA2
PA3
PA4
PA5
PA6
PA7
PC4
PC5
PC6
PC7

PCB



We only have stuff on one side of the PCB

Measurement Data
PCB Components Estimated Cost: $29.01 (Located in the BOM file in the deliverables folder).
Cost of servos: minimum $20
Cost of Resistive Touch Screen: Not sure about our choice yet.