ECE 342 FINAL PROJECT

CUSTOM POMODORO TIMER

“CUSTOMDORO”

Written By: Bolivar Beleno

Date: May 27, 2021

Instructor: Brandilyn Coker

Grading TA: Karthik Gopalakrishnan

1 System Overview

The purpose of this project is to design and implement a Pomodoro Timer for Junior Design II (ECE 342) Spring 2021 called "Customdoro". The Pomodoro technique relies on the temporary removal of distractions as television, game devices or cellphones creating a space for users to engage on a cycle of working and rest periods. Nevertheless, not paying attention to these devices is sometimes problematic as notifications usually captivate our attention. The Customdoro was created to help the user control the time spent distracted by seamlessly removing the number one distraction on our daily lives, the cellphone. Using the cellphone as key, the Customdoro engages on an operation cycle of twenty-five minutes of work and five minutes of rest and gives user feedback using a four-digit seven segment display and a buzzer. The Customdoro will buzz when the cellphone is removed or when the operation cycle is completed allowing the user to engage in another cycle or power it down via a slider switch. The system features adjustable 3-level brightness control, power delivery via battery and a sleek design so the user can carry it to the library (although this is heavily discouraged by the designer as the beeping sound can and will get the user in trouble if used on the common areas; please do not take it to the library).

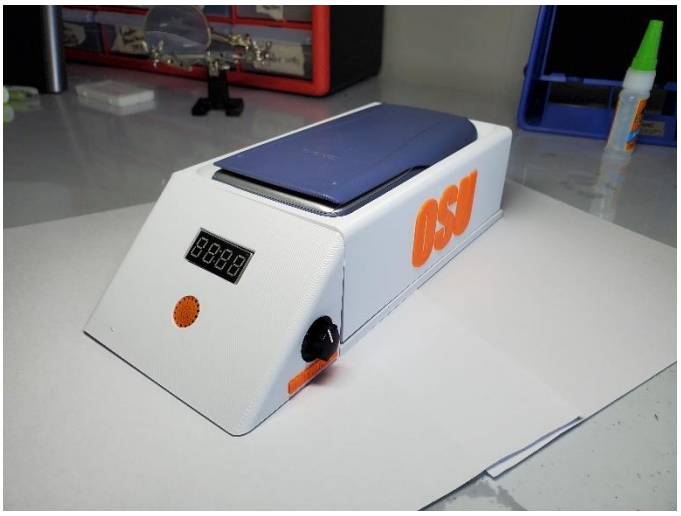

Figure 1: Final System

2 Electrical Specifications

The table of electrical specifications is presented below:

Input	$Voltage_{min}$ (V)	$Voltage_{max}$ (V)	$Current_{min}$ (mA)	$Current_{max}$ (mA)	Operating Temperature (˚F)
9V	7	11	0.25	0.5	32 to 100

Table 1: Operating Specifications

3 User Guide

1) Slide the slider switch at the back labeled “POWER” to the upper position.
2) Set the desired Mode with the slider switch labeled “MODE”.
   Upper position: Work-Rest Mode
   Lower position: Rest-Work Modr
3) Set cellphone on upper Customdoro surface.
4) Press the button labeled “START” at the left side of the Customdoro.
5) Wait for operation cycle to end.
6) Slide the slider switch at the back labeled “POWER” to the lower position.

4 Design Artifacts

The system receives five different input data and outputs three. Below the box diagrams describing system operation is shown:

4.1 Black Box Diagrams

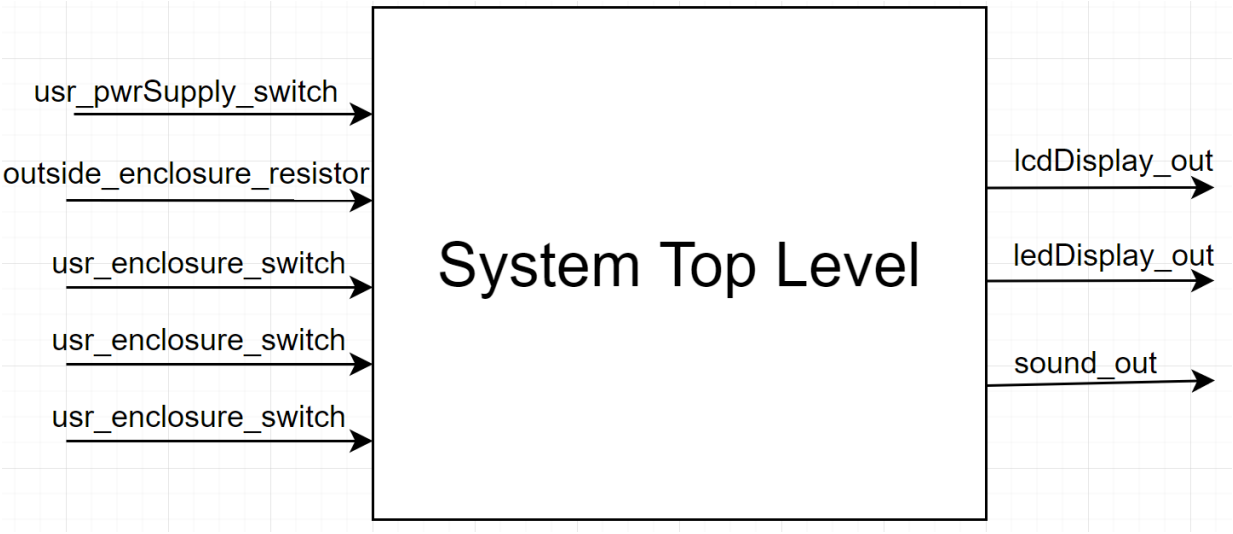

Figure 2: Black Box Diagram

4.2 Top-Level Diagram Blocks

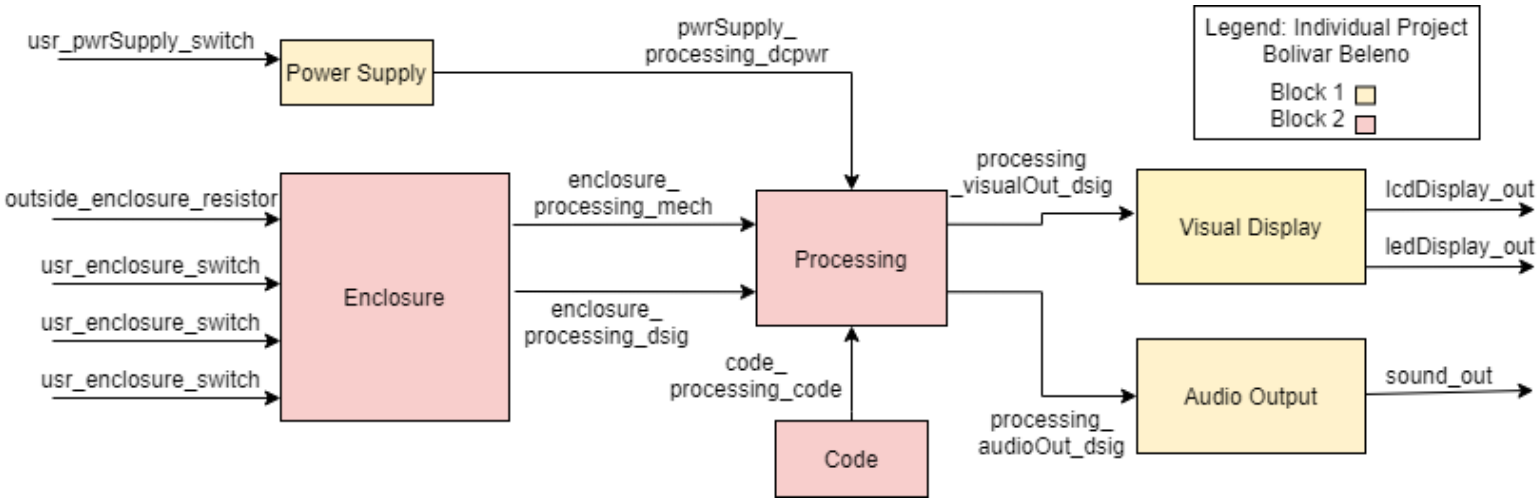

Figure 3: Top-level Block Diagram

4.3 Interface Definition

Interface Name	Interface Type	Specifics
pwrsupply_processing_dcpwr	DC Power	• V_{MAX}=12 V • V_{MIN}=7 V • I_{Max}=200 mA
enclosure_processing_mech	Static Mechanical Connections	• $Temp_{MAX}$ = 157 °C • $Area_{MAX}$: 100 cm^2
enclosure_processing_dsig	Digital Signal	• 5V Logic Level • Mechanical Connection to PCB
code_processing_code	Code	• Arduino IDE (C Language) • Configures: ADC
processing_visualOut_dsig	Digital Signal	• V_{MIN}=3.3V • V_{MAX}=5V • $Imax_{5V}$=80mA • I2C Protocol
processing_audioOut_dsig	Digital Signal	• Vmin (Peak-Peak) = 3V • Vmax (Peak-Peak) = 30V • Square Wave Input • No Input Offset • Output: 440 Hz

Table 2: Interface Definition

5 Bill of Materials

Quantity and reference designator of system components is shown below:

Reference Designator	Value	Description	Qty in Design
R1	10kΩ	Variable Resistor	1
R2	1kΩ	Resistor	1
R3	4.7kΩ	Resistor	1
P1	-	Push Button	1
T1	-	Slider Switch	2
AR	-	Arduino Uno	1
B1	9 V	Battery	1
LDR	-	Light Dependent Resistor	1
BZ	-	Passive Buzzer	1
SEG	-	7-Segment Display	1

Table 3: Bill of Materials

6 Electrical Schematic

Electrical Schematic is shown below:

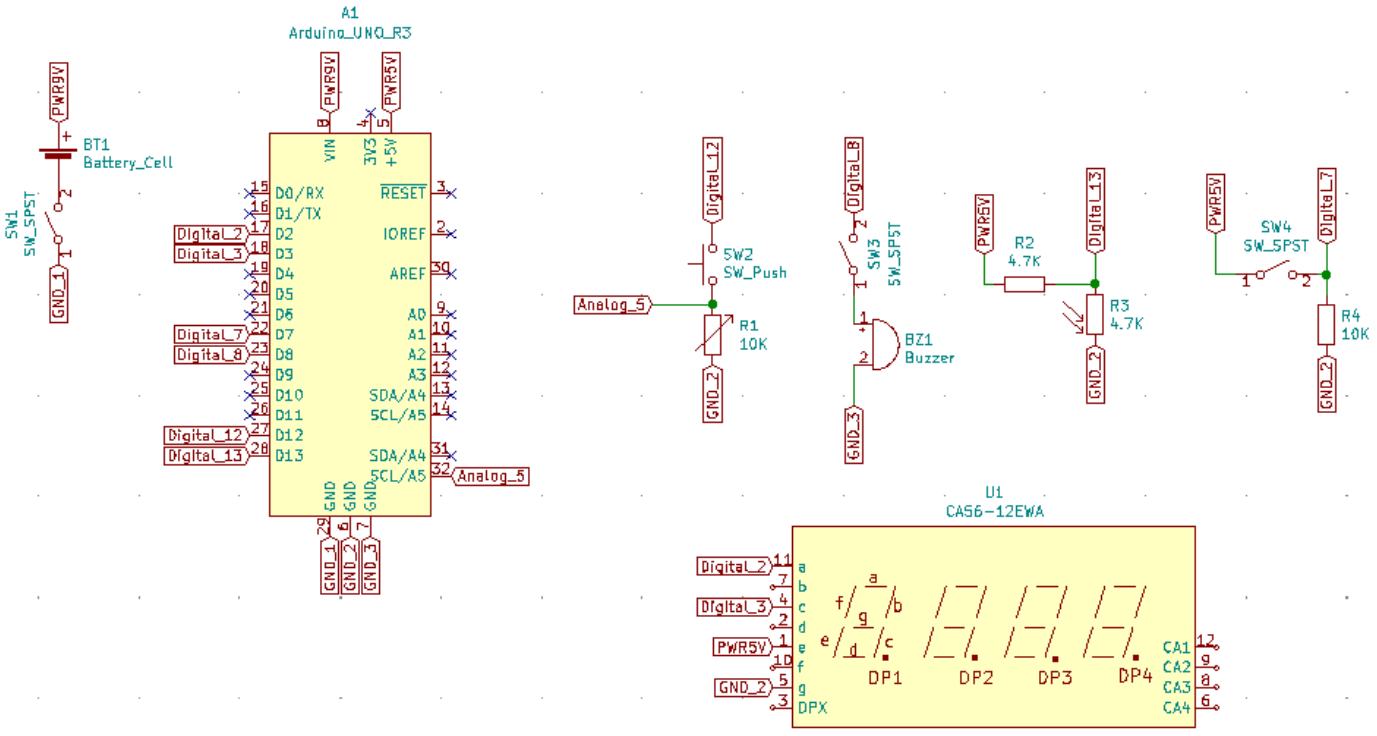

Figure 4: Circuit Schematic

7 Enclosure

Designing the enclosure was a main point in the process development, an innovative design was desired, but resource constraints defined what was possible. The chosen design was inspired by the chassis of a sedan (which can be fully appreciated on figure 14). It was printed on PLA as it was the most accessible material to use.

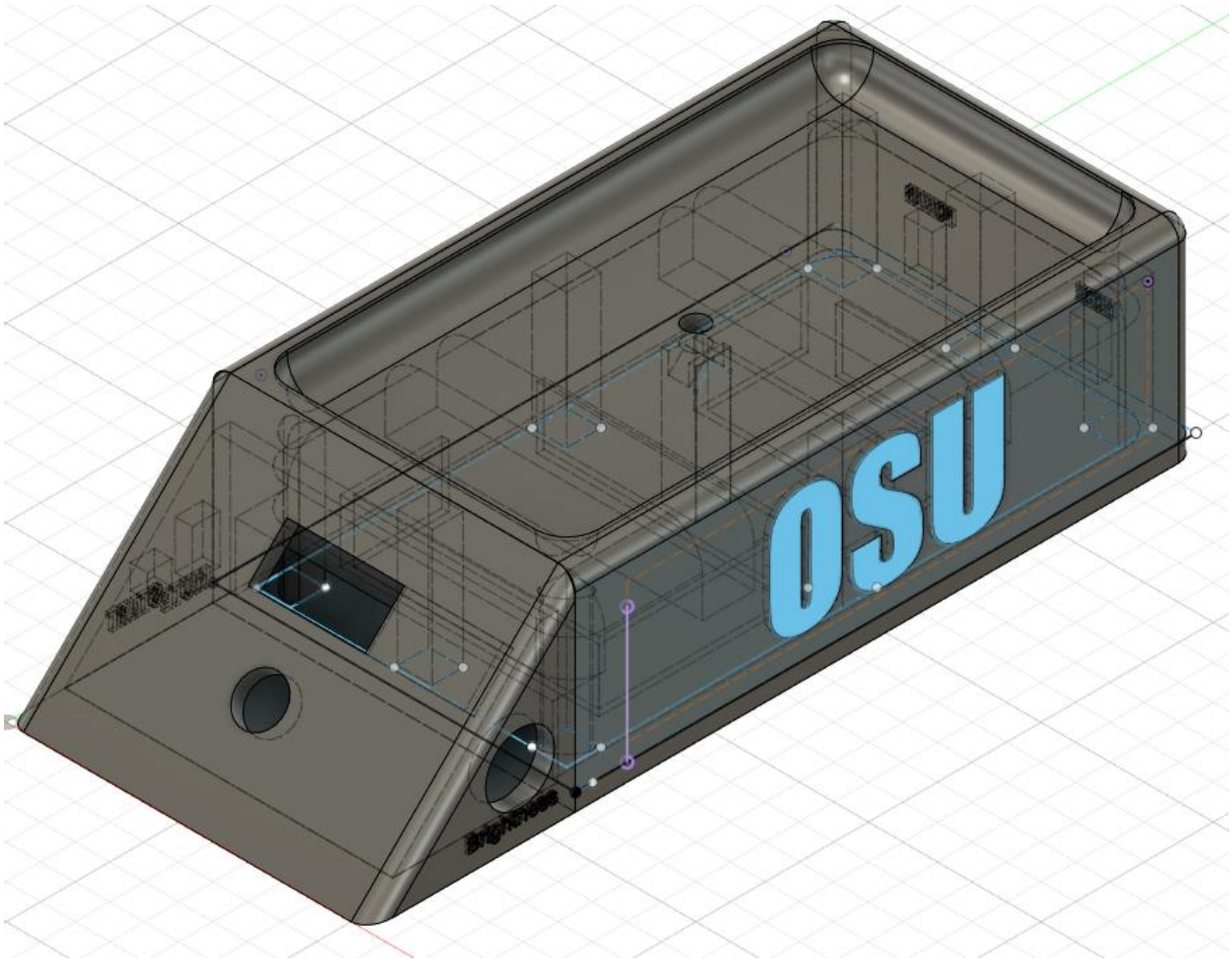

Figure 5: Final Enclosure Design

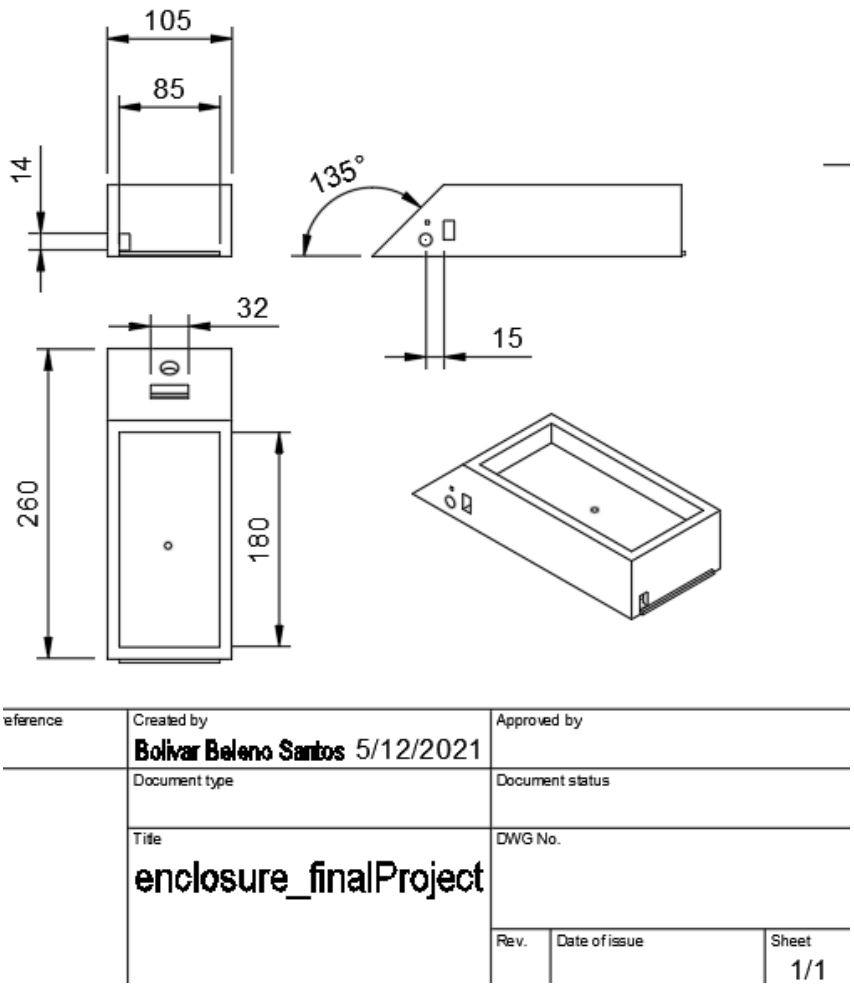

Figure 6: Orthographic Views