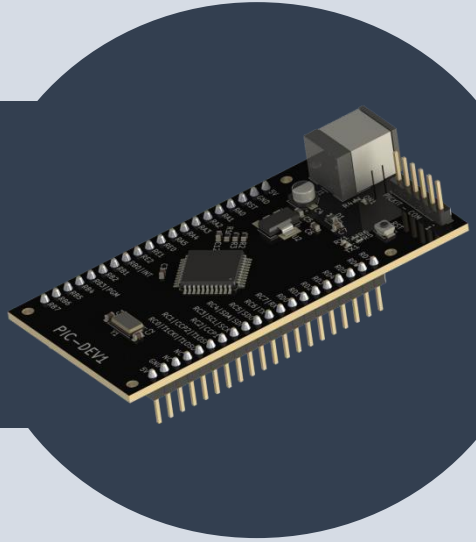
PORTFOLIO
Of
MADZIVA JEPHTA

OCCUPATION: EMBEDDED SYSTEMS DESIGNER | ENGINEER

PROJECT 1



PIC Development Board

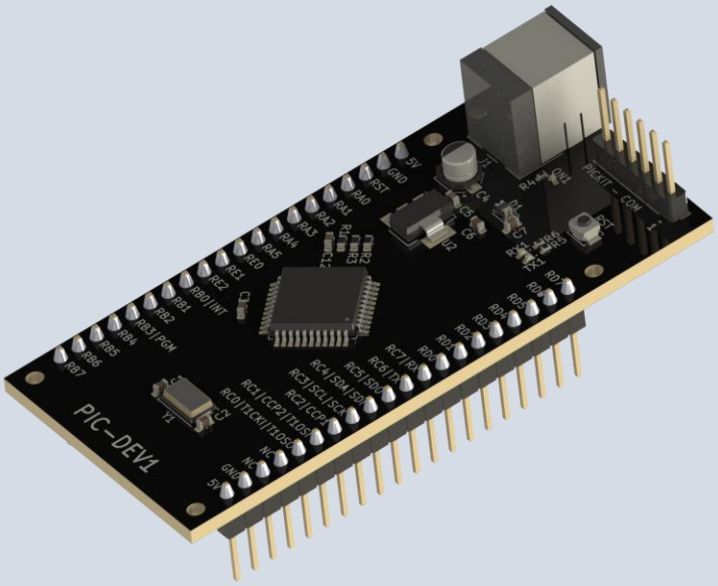
SUMMARY

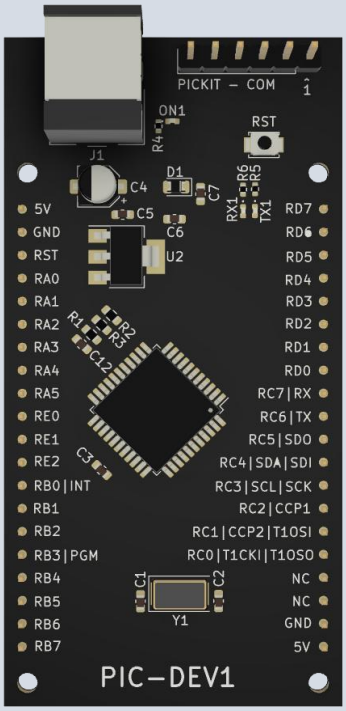
Based from my own struggles and those of my classmates in college, I always wondered if there was a way to make a pic16f877a micro-controller as easy to program as the ATMEGA series. That's when this general idea was created and after much research, I discovered that Microchip has 'boards' but they have lesser room for creativity as they already have peripherals added to the board, which might also be expensive for hobbyists and not as functional as an Arduino board in terms of DIY projects. With that, the desire for an Arduino-like development board was born.

The board has all power, external clock and programming connections already set-up and ready to go, giving its user a more plug and play experience. It doesn't however have an in-built programmer on board but all pins are already set up for an external programmer, the quite common PICKIT3. The pins are located on top-right side of the board. The peripheral pins are located at the bottom of the board.

All pins are labeled and easy to access due to the standard pin connectors commonly used on the Arduino, raspberry-pi and ESP boards. Three LED's are included, one for power and two for the UART's RX and TX pins. A reset momentary push button is also included for user's convenience. The board has a total of 40 pins that can be used for inputs and output connections, giving the user quite a variety of pins to use.

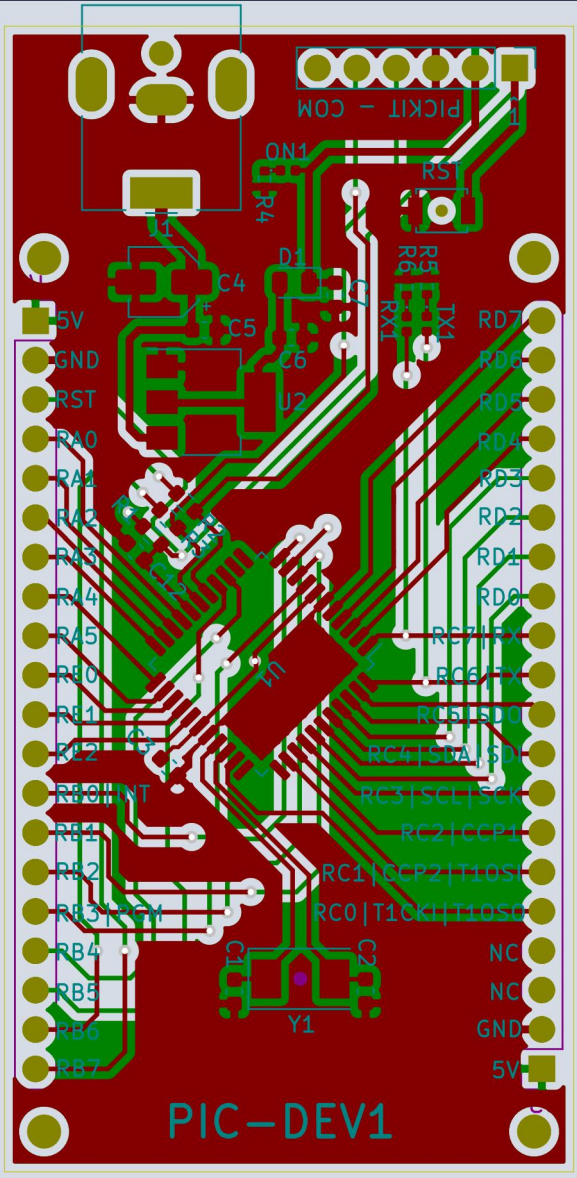
RENDERED IMAGES

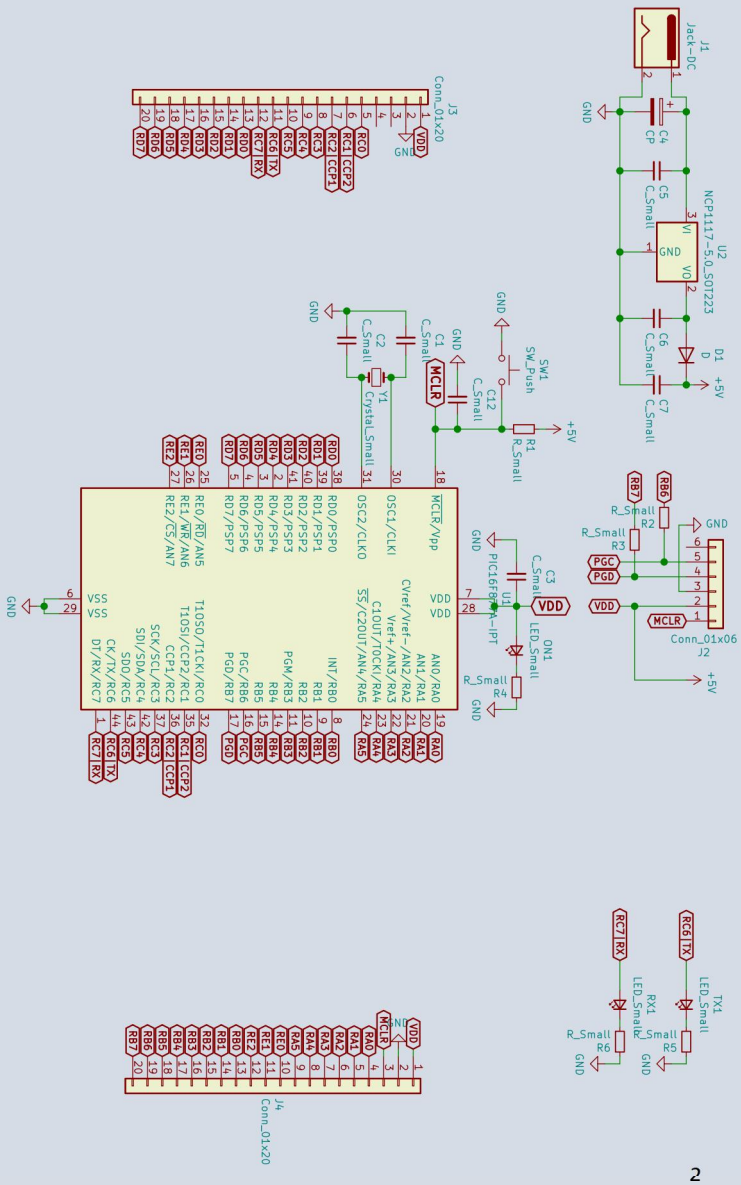




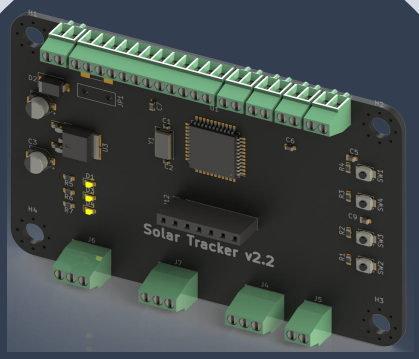
ISOMETRIC VIEW	TOP VIEW

PCB DESIGN	CIRCUIT SCHEMATIC





PROJECT 2



SOLAR TRACKER

SUMMARY

As the demand for renewable energy is rising more than ever before, the need for higher efficiency and optimization is high as well. This project was designed with those needs in mind. This project aims to tackle the need for optimization of energy generated by solar panels to higher levels.

This would be achieved by automatically rotating the panels and keep them at a perpendicular angle from the sun, therefore generating the highest voltage/current at each position no matter the time of day or season. The sun changes position based on the time of the day and changes routes based on the season in effect, this project would correctly and accurately direct the panels to make sure the perpendicular position is maintained and therefore maximum current is generated.

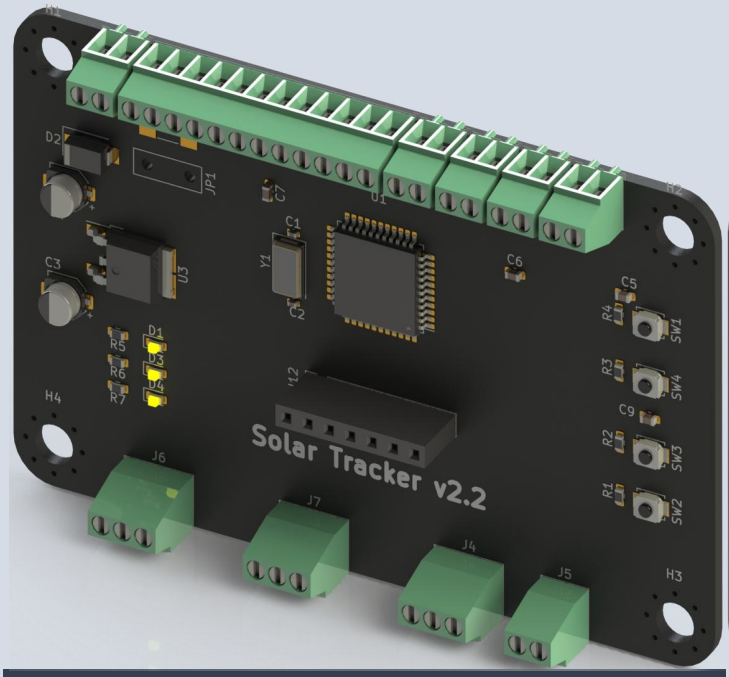
The project is controlled by a PIC16f877A micro controller which is programmed in embedded C. 3 buttons are also included that can be programmed to do different tasks depending on the programmer's choice. 8 digital pins are set for custom and extra external controls if the manufacturer would desire any.

A 12 port screw connector is mounted at the top which connects the four sensors responsible for sensing the position of the sun relative to the panels. 2 extra 3 port connectors are also included for other analog reading such as the temperature of the project and also the concentration of sunlight in the atmosphere e.t.c.

PROTOCOLS:

1. ADC/DAC.
2. I2C.

IMAGES



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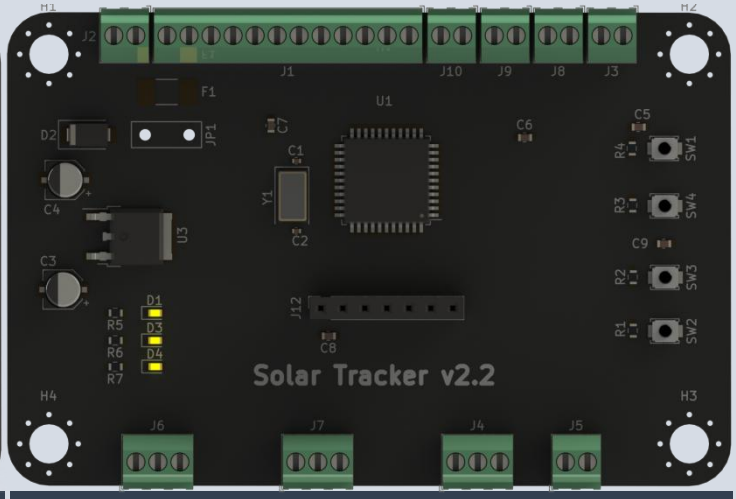
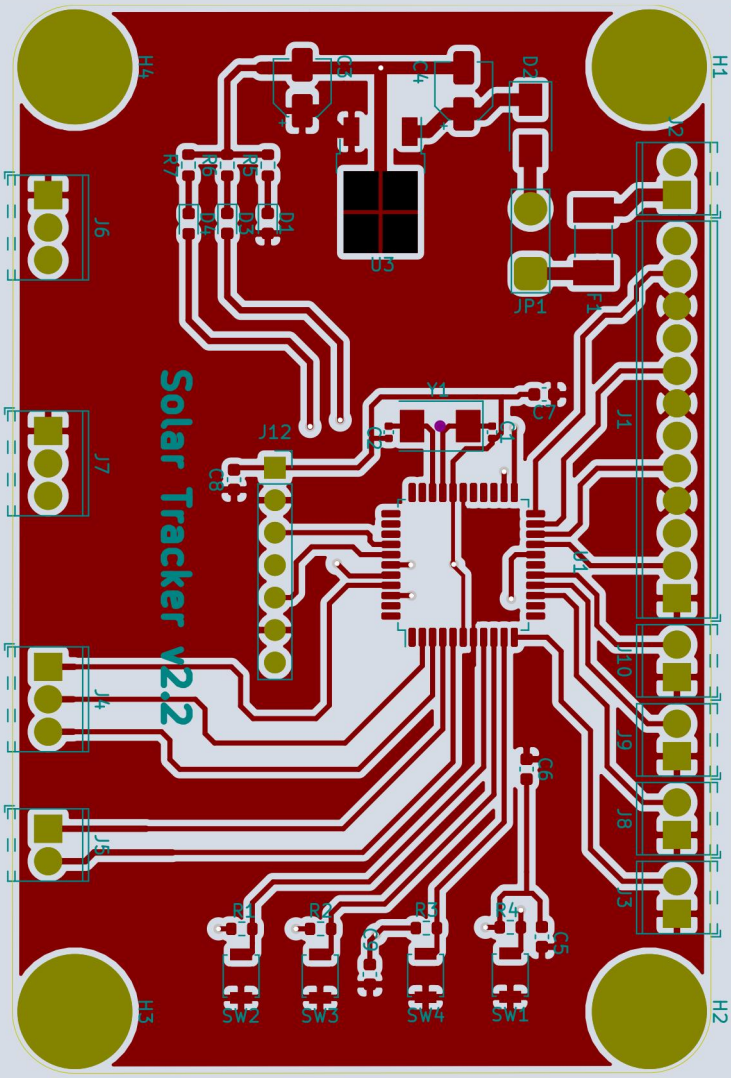
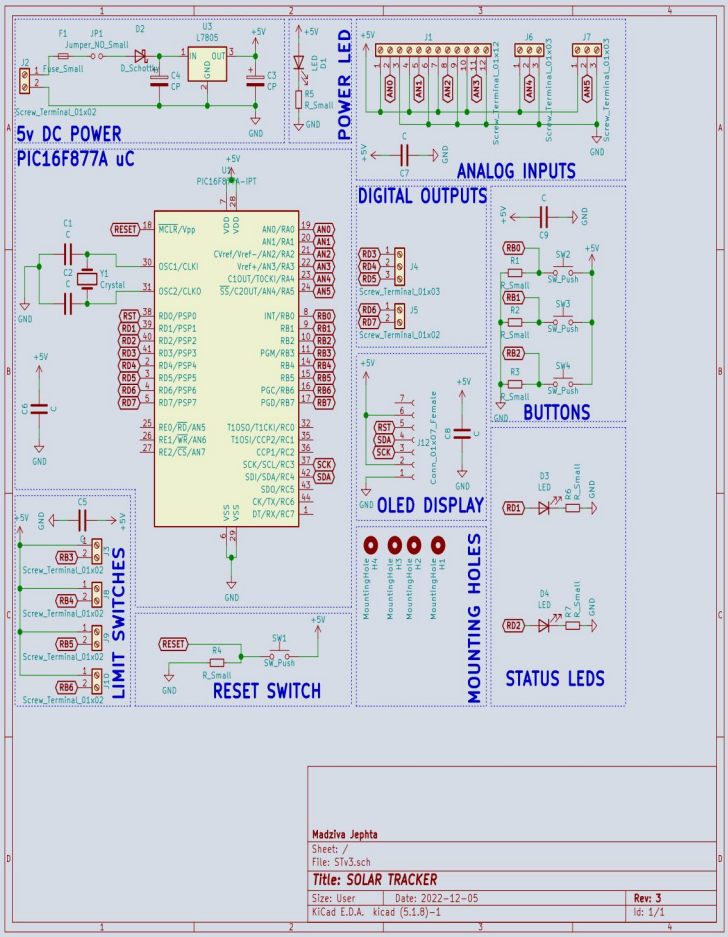


TOP VIEW

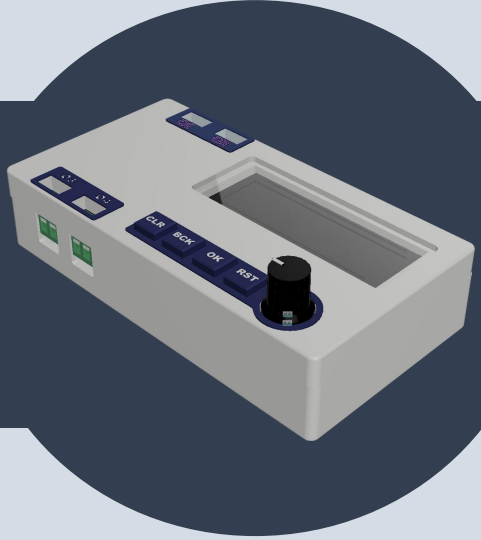
PCB DESIGN



CIRCUIT SCHEMATIC



PROJECT 3



HOME AUTOMATION v3

SUMMARY

After much news of houses catching on fire after a stove or iron were left on and people having waking before dawn to switch their geysers on, this concept was born. The idea was to give users remote and automated control over certain appliances and routines in the homes or offices with the push of a button.

The project is controlled by a pic16f877a micro controller with assistance from an RS3232 Real Time Clock module, four input/output ports, a buzzer, an LCD, four user input buttons and a rotary nob.

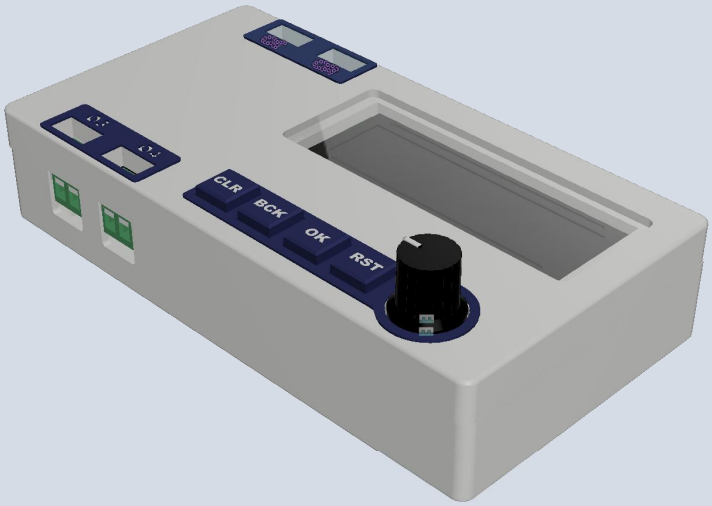
All the user needs to do is set the start and stop times similar to an alarm clock, set the port that should be activated and leave the product to do the rest. If you set your geyser to heat up between 3 am and 6am, it'll always switch the geyser on at 4am and off at 6am everyday until you change the times or remove the routine entirely.

Notifications can be received through an app to your smartphone as to when and what was active. You can also set these timers from your phone using the same app, allowing you to control your appliances remotely.

PROTOCOLS:

1. UART.
2. I2C.
3. BLT.

IMAGES



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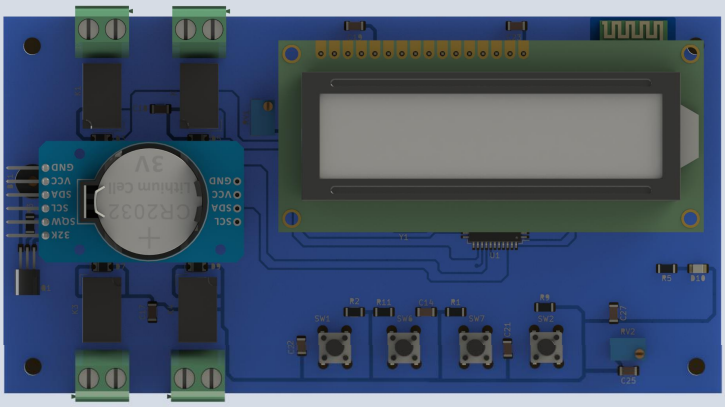
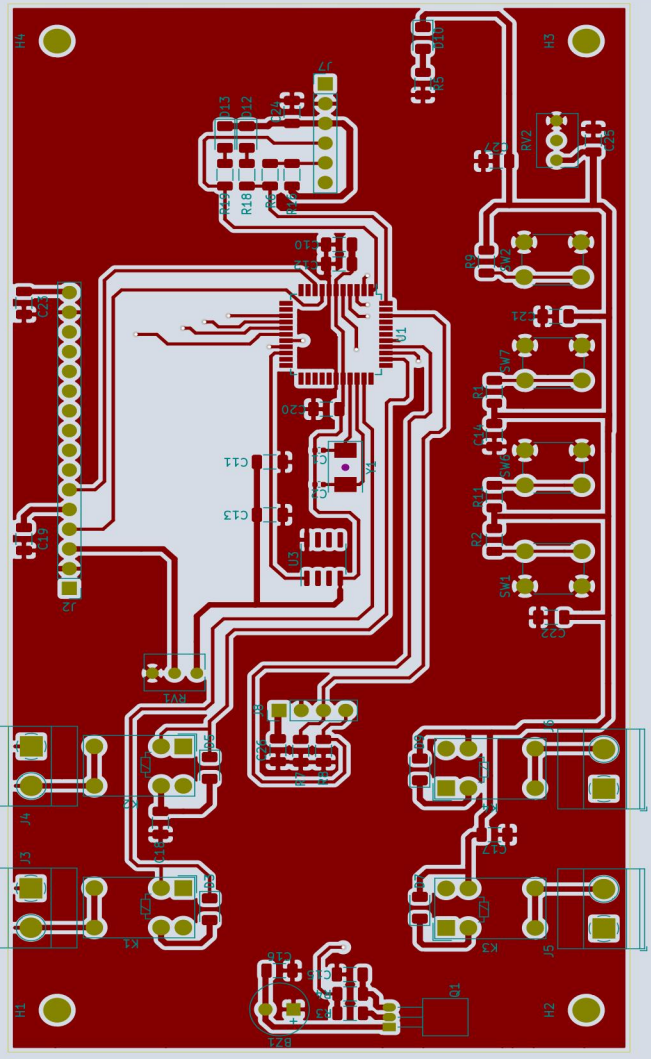


TOP VIEW

PCB DESIGN



CIRCUIT SCHEMATIC