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ELECTRONICS ENGINEER

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ENGINEERING PORTFOLIO

This document is a showcase of my experience so far. This includes my university study, but also stretches beyond this to include some of my projects as an Electronic Engineer and additional work carried out in my spare time.

Recently I started learning stm32 controller specifically stm32f103c8. I am working on developing baremetal stm peripherals like GPIO, ADC, SPI,I2c and UART and along the way also learning to develop drivers for different sensors.

Degree	University	Major subjects	Passing year	CGPA
BSc. Electrical Engineering	University of Lahore, Islamabad campus	Electronics, Embedded, PLC, FPGA	2020	3.4

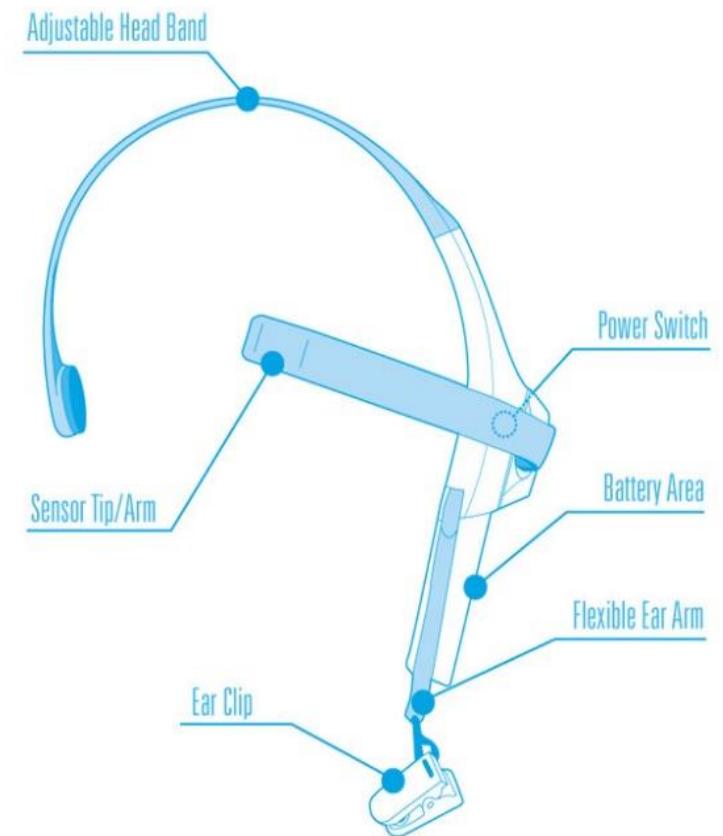
FYP: Eye Blink Controlled Vehicle

The final year project which I did was, I developed a vehicle which was controlled using eye blinks. The motivation behind this project was to facilitate patients which are paraplegic, this project specially aims for those patients who are paralyzed from their whole body and only their brain is functioning, this is to facilitate them to become little bit independent as they require 24hr assistance.

To detect Eye blinks, I used sensor from company Neurosky and sensor name was Neurosky mind wave. The device consists of a headset, an ear-clip and a sensor arm. The headset's reference and ground electrodes are on the ear clip and the EEG electrode is on the sensor arm, resting on the forehead above the eye.

Neurosky also provides library for MATLAB for EEG signals coming from sensor, so one can develop different stuff using it. The sensor is connected to laptop through Bluetooth. I developed the code for it in MATLAB to detect blink signals. Now the way our algorithm worked is. I gave it different threshold values. In MATLAB, I put a checker by testing different blink values. Different blink values were if person did light blink, medium blink and hard blink our algorithm revolved around it. And then these values were sent to Arduino using Bluetooth, and on basis of these values Arduino controlled the motor of the vehicle.

Command	Number of blinks and blink strength
Stop	Hard blink
Forward	Medium blink 2 times
left	Medium blink 3 times
right	Medium blink 4 times



Pulse Induction Metal Detector

I worked in an R&D center where, I was responsible for reverse engineering a pulse induction metal detector and improve its range and stability. After reverse engineering it, I designed it PCB on Eagle as shown in Fig (1). This detector was totally analog, after designing my own PCB and testing it, the stability and range of detector was similar to original. For improvement purposes what I did was added microcontroller attiny1617 removed all the timing ICs in this circuit to make it smaller and made firmware for it. The firmware consisted of producing 5 square waves with different timing, which needed to be controlled in real time using potentiometers, the potentiometers were used to control the frequency and duty cycle of waveforms (fig 2). Later I also added OLED display, when value of waveform is changed using potentiometer it showed on OLED, and I also made a menu for it so one can see what type of waveform occurs when metal comes near the detector's coil. The new board consisting of microcontroller, was not designed by me.



Fig: 2

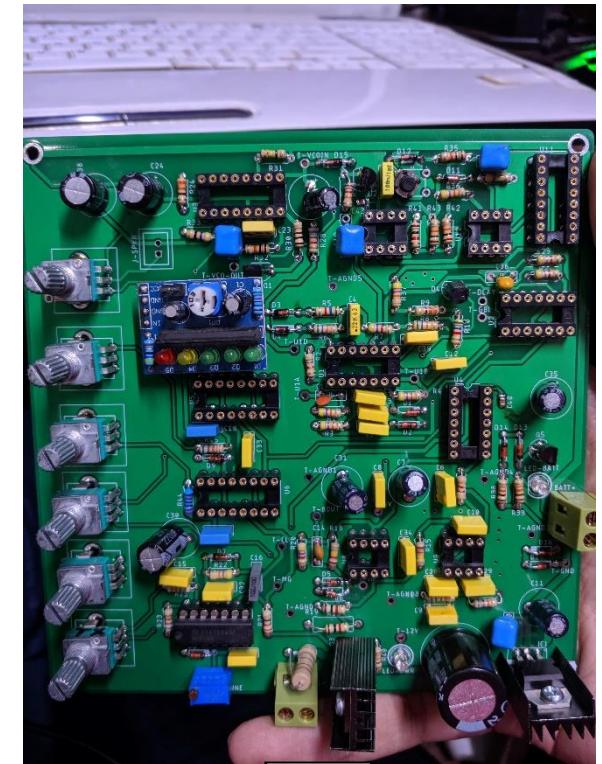


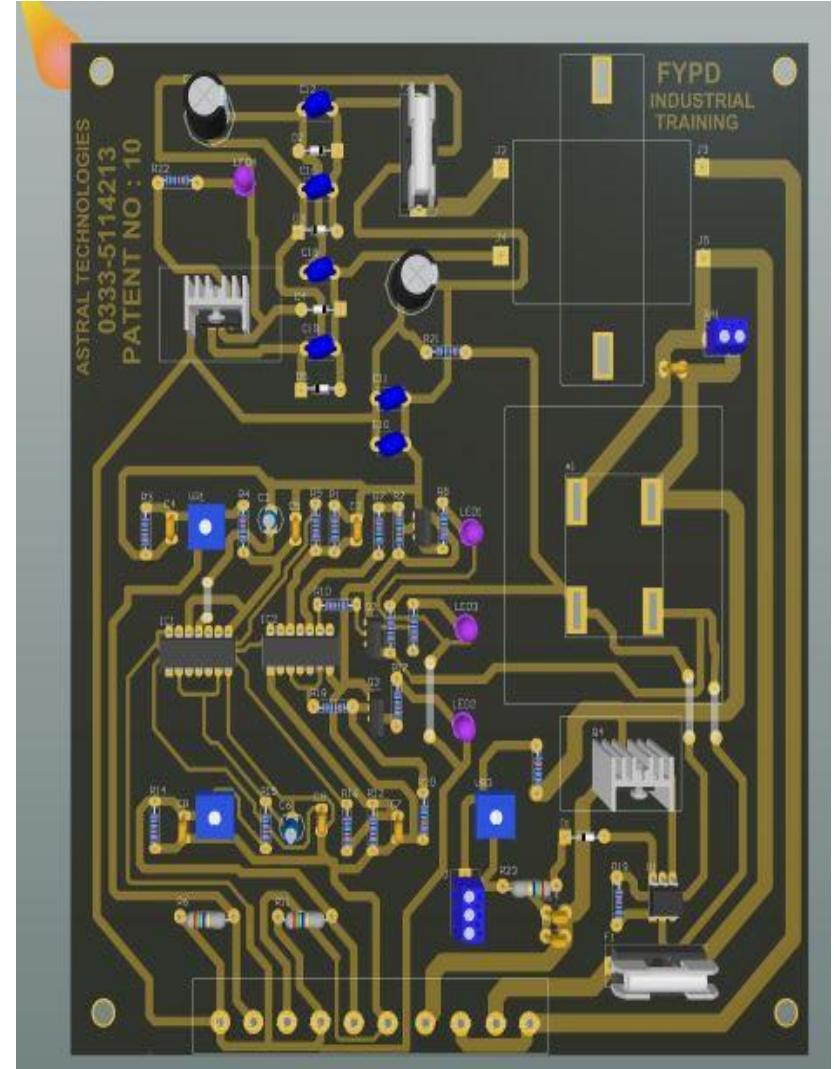
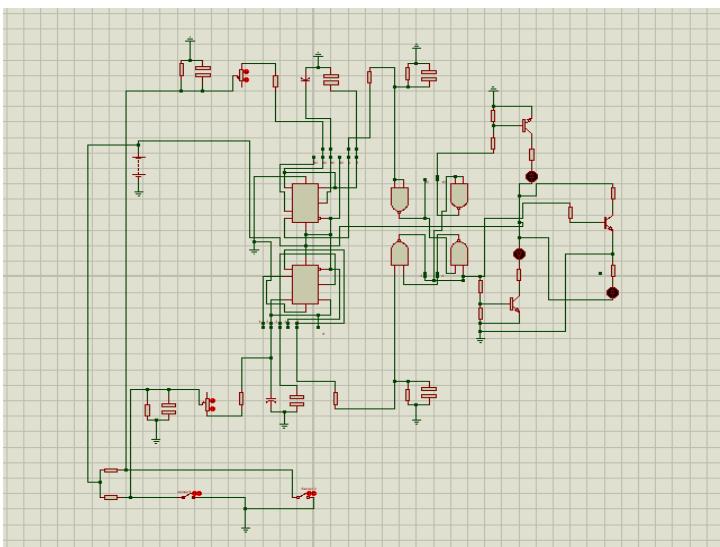
Fig: 1

Conveyor Belt Control PCB

I did this project, when I was working as a trainee engineer. Had client who was running a factory which was making syringes, one of the machines the circuit board burnt. So, I reversed that board made him a new PCB on same design and also added functionality to control the speed of the motor.

To test whether my design is working or not, I used proteus to run simulation so I can be sure

To design the PCB, I used Altium software. The PCB is single layer, because they wanted to keep the cost low. I also used to develop PCBs on board myself using old printing method, so clearances and everything is set according to that.

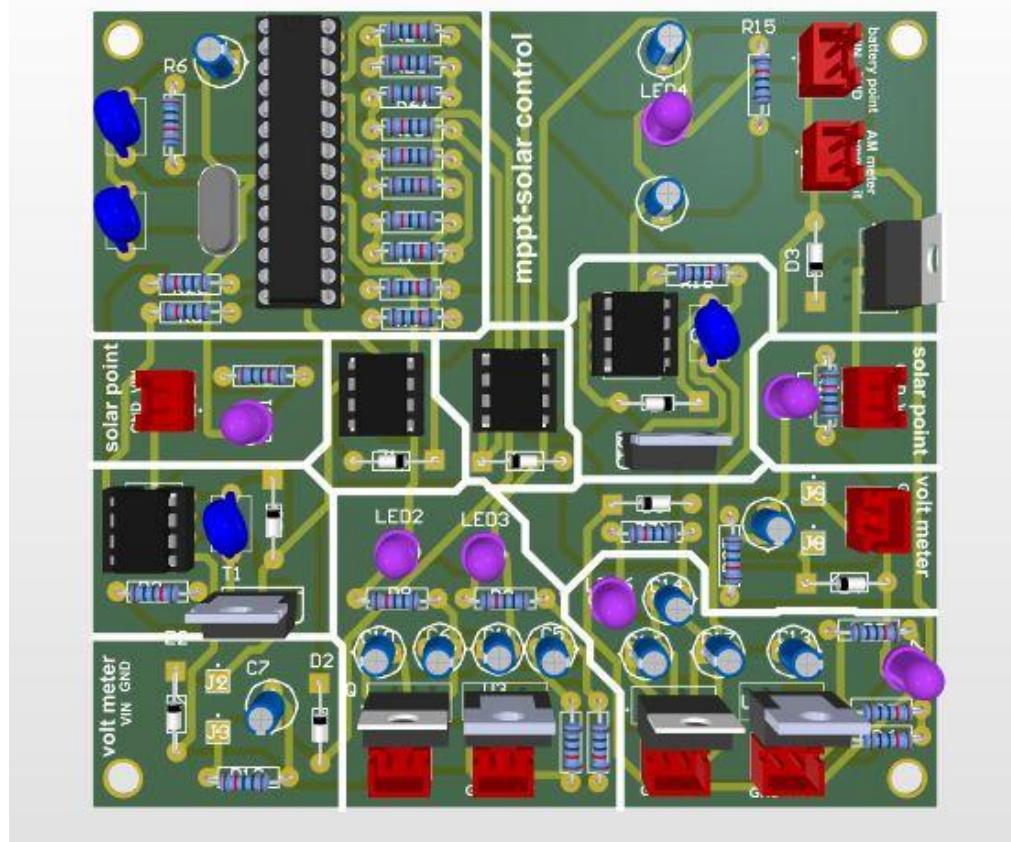


Solar Charge Controller

I designed this solar charge controller for a client. The requirements were to control 2 solar panels and charge the battery while also get reading of voltage on voltmeter.

I am using atmega328p and I also wrote the firmware for it

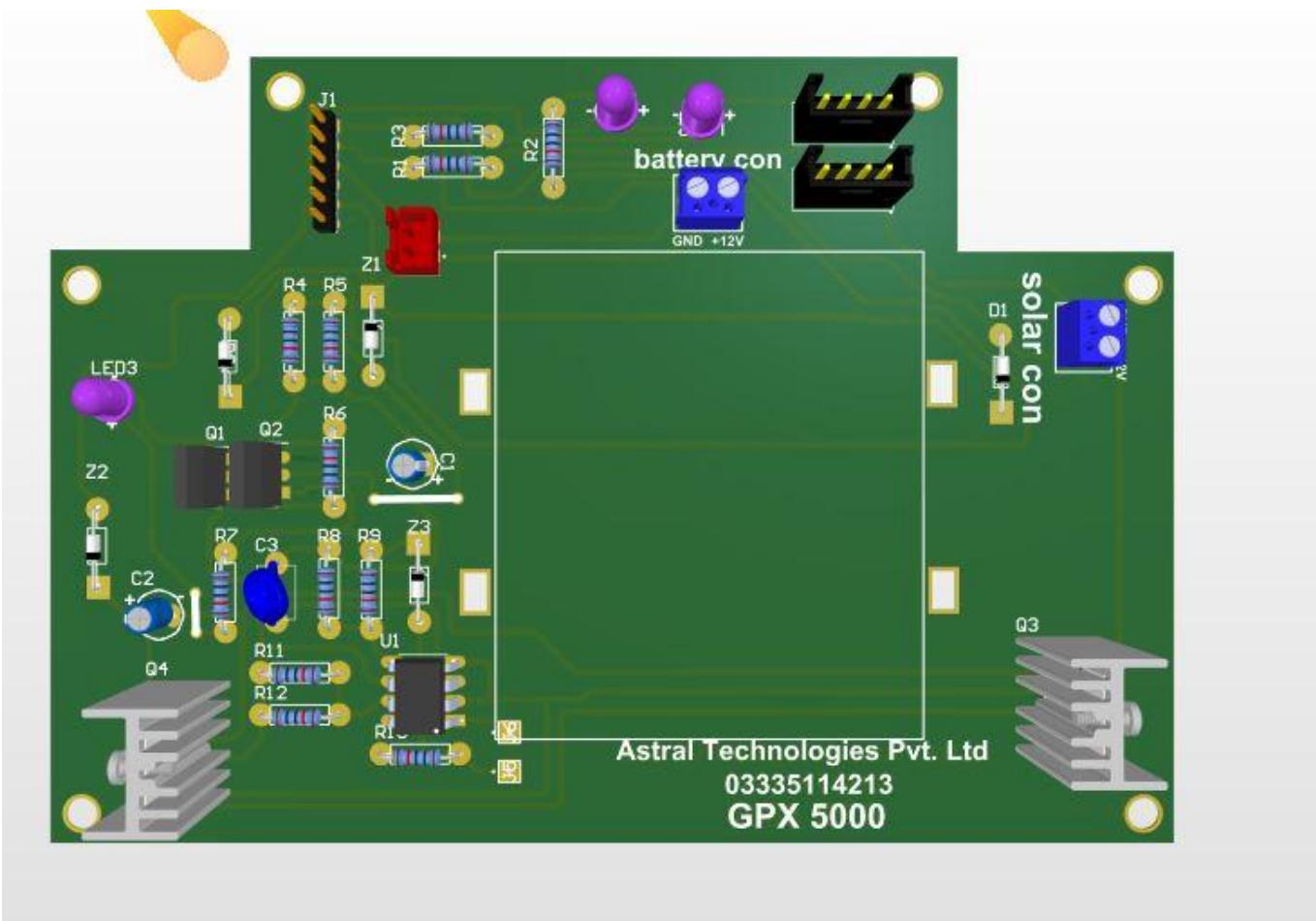
I designed this PCB on Altium software and it is 2-layer board.



Battery Pack

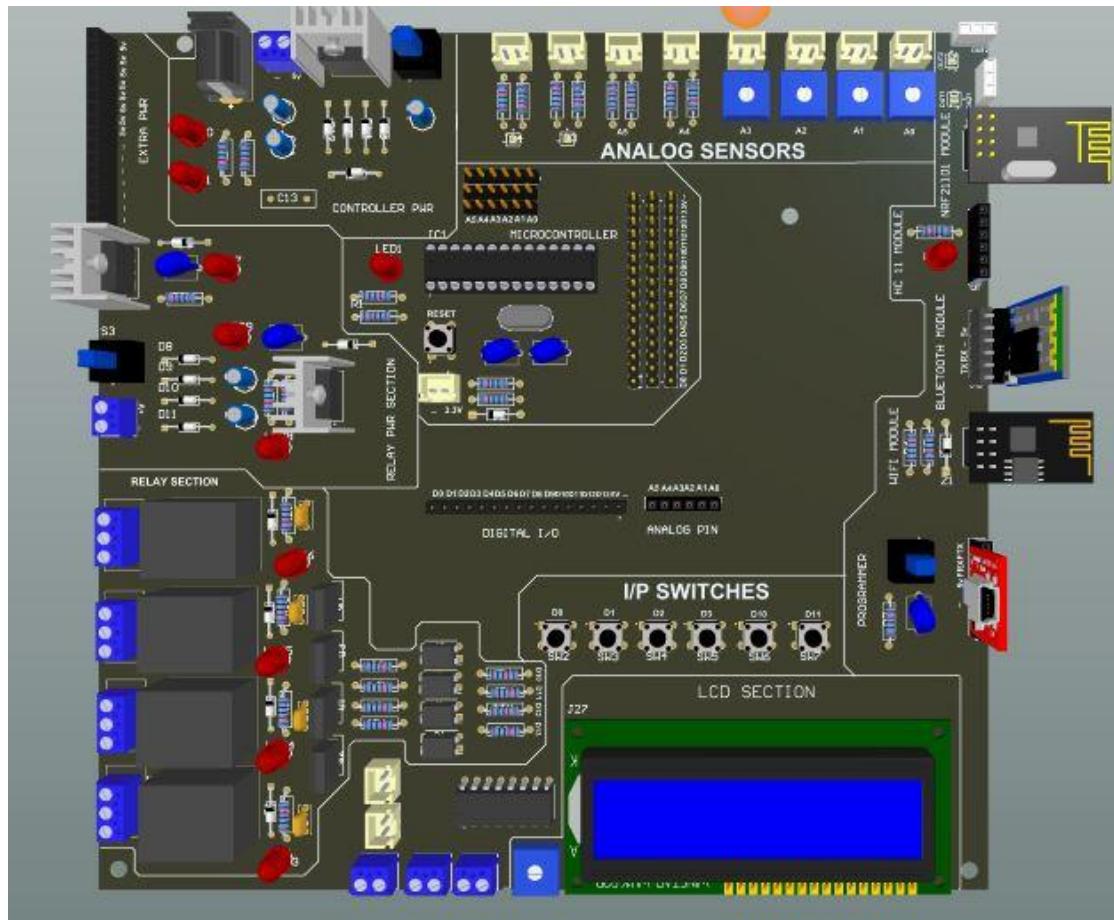
I designed this PCB for client whose battery pack For metal detector burned. He wanted shape of PCB to be similar to the original once.

I designed this PCB on Altium software and it is 1-layer board.



General Training board

The purpose of this board was to have everything on it using which one can get into embedded system easily.



IOT water monitoring and motor control

The purpose of this board was to have ever I made this project to use in my house. Controller which I used is esp8266 and it is connected using blynk app. As I have two tanks one is connected with bore and another tank is on the roof which provides water in the house. So I used two esp8266 and both communicate with each other through WiFi

Functions:

- 1)Added float switches on 4 different level to monitor water in tank
- 2)Added flow sensor to sense when water is coming from bore so motor can be turned on automatically
- 3)Another function how long one want the motor to be turned on, I can also set time
- 4)If the water goes below 20per in tank the motor turns on

