

During the 48 days of my tenure as my intern, I had worked across various projects. I initially worked on calculating the velocity of tennis ball without the use of high-speed cameras. I had used Xethru sensor, which has an on-board ARM Cortex M4 MCU. It is a respiratory module which works on the principle of RADAR, which uses Ultra-Wide Band to detect the body movements and monitors respiration non-invasively. I got the distance of the moving object using Adaptive Clutter map algorithm, which filters the non-moving obstacles from the baseband data. From that, I could compute the velocity of the ball. Moreover, I got to learn about the intricacies faced in Serial communication using microcontrollers and got to work on various microcontrollers of Arduino such as Nano, Mega and Micro. I finally used MATLAB to observe the baseband data.

Then, I was entrusted with the task of compressing the data collected from IMU sensor. I had used Huffman compression technique to encode and decode the sensor data. The technique uses the frequency of characters and the encoding is done in 0s and 1s. I could obtain a compression ratio of around 60%. I had coded in Python as well as C language.

A few days later, I was told to analyse and improve the accuracy of UROSENS, a device to compute the urine level collected in the urine bag of the patients clamped to a Load cell. It measures the deflection caused by the bag and outputs the transduced voltage which is in turn converted into a level (in ml) and is displayed on monitor. It can be used to analyse the balance and timing of the filtration system of human body. I tested the device using load cells of different capacities of load. I used ADS1232 and HX 711, which are 24-bit Analog to Digital Convertors for Bridge sensors and analysed the performance of load cells. I had used PSoC, a combination of a microcontroller with digital programmable logic, high performance ADC, op-amps with Comparator mode, and standard communication and timing peripherals which has a 48-MHz ARM Cortex-M0 CPU. In this process, I was practically able to analyse the temperature effect, creep and sensitivity of load cells