PROGRESS REPORT

Internship Period: April 2024 - February 2025

Our internship period began in April 2024, and during this time, we were given numerous tasks that we completed. All the work accomplished during this period is mentioned in this report.

### **UNDERSTANDING AND IMPLEMENTING BASIC STM32 FUNCTIONALITIES THROUGH PROGRAMMING**

Our first task was to understand the fundamentals of the STM32 microcontroller and its programming. We began with basic code that included LED blinking and implemented the watchdog timer, DMA, interrupts, and GPIO functionalities. All this work was done through the STM32 Cube Programmer, STM32 Cube IDE, and STM32 Cube MX.

### **UNDERSTANDING STM32 SECURITY FEATURES**

After that, we were given a YouTube playlist to study STM32 security features to implement on a project. However, due to the unavailability of the original STM32 boards, no practical task was assigned.

### **HEX FILES EXTRACTION FROM VARIOUS MICROCONTROLLERS**

Our second task was to extract the hex file from the Arduino microcontroller board and upload it to another Arduino board. This task was accomplished through the AVRDUDESS software. Then, we performed the same task with the ESP32 microcontroller.

### **EXTRACTING THE HEX FILE FROM THE HM-ELEVATOR CIRCUIT AND UPLOADING IT TO A NEW PCB**

Our third task was to extract the hex file from an elevator circuit board and upload it to a new PCB microprocessor.

### **SAVING DATA TO STM32 MICROCONTROLLER'S FLASH MEMORY (SOLAR PLAS)**

After this task, we were included in the Solar Plasma Generator project. We were instructed to understand the STM32 code and circuit schematic for doing a new task. The task was to save the HMI inputs in the flash memory of the STM32 microcontroller to avoid frequently adjusting initial parameters upon restarting the system. The task was completed, but this functionality was replaced by using an SD card in the circuit.

### **UI DESIGN OF SOLAR PLAS HMI USING CANVA**

Then, a new and different role was assigned to both of us. The task was to prepare the UI design for Solar Plas HMI, which was made using Canva.

### **HMI DESIGNING USING NEXTION EDITOR**

Once the UI was finalized, we were assigned the task of preparing the HMI for the circuit, based on that UI, using Nextion Editor software. The HMI was fully recreated as a result of the necessary project adjustments.

### **SOLAR PLAS CIRCUIT DEBUGGING ALONG WITH AZAN**

Moving ahead, we were assigned to debug the replica of the Solar Plas circuit along with Azan, who replicated the Solar Plas circuit. Simultaneously, we worked on transmitting HMI readings to and from the STM32 microcontroller. The HMI designing and the sending and receiving of values to and from the microcontroller were completed, and the remaining circuit debugging task was under Azan's role.

### **CHASE UP ESL PROJECT INITIAL RESEARCH**

We were introduced to a new project, the Chaseup ESL project. Our primary objective was to conduct preliminary research into the implementation strategies and to generate a cost estimation for the project.

### **DATA COLLECTION FOR SOLAR PLAS WEBSITE**

For the Solar Plas website, we were assigned to give relevant data for creating web content to Miss Maryam.

The attached link provides access to the drive containing all files and documents pertaining to the internship.  
[NCL TASKS](https://drive.google.com/drive/folders/1ur2WIg-lStTw15VprCKJEhoW4HDg7JbE?usp=sharing)