Summer Internship

Implementing a Faults detection controller in a Charging Station.

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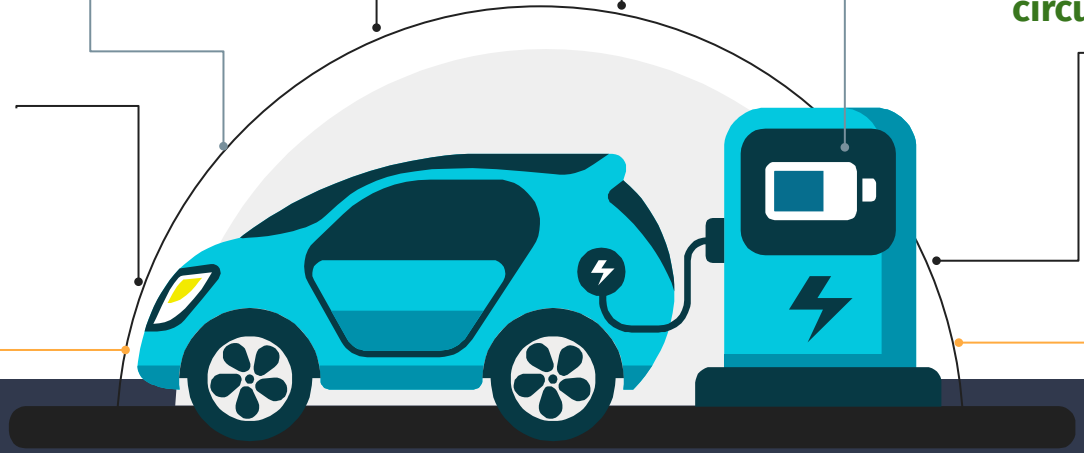
- Charging Station Communication model on Simulink.
- Interpretation

Objectives

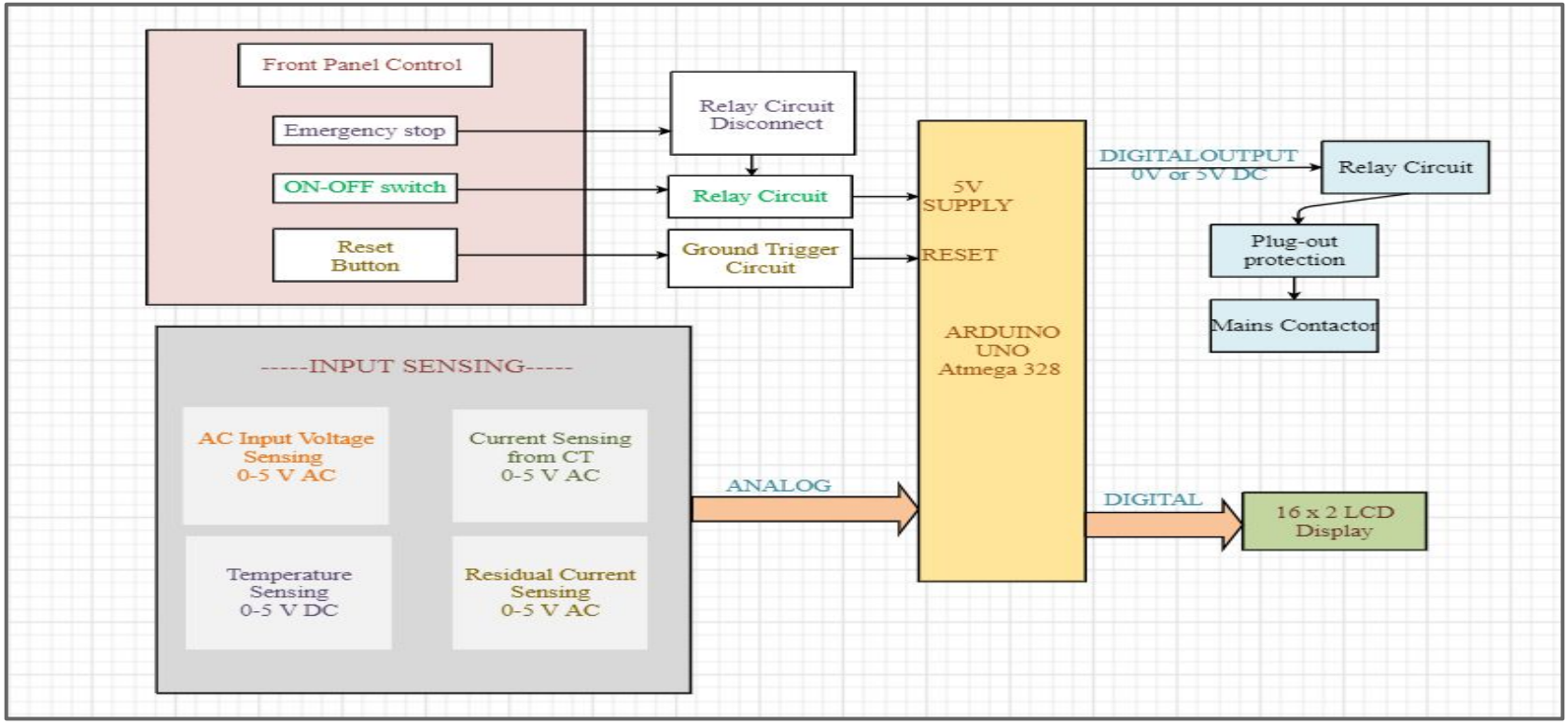
- To create a controller for all possible fault detection in a charging station.
- To study the communication circuit between the charging station and EV in Typhoon HIL.
- To implement the controller along with the communication circuit in a charging station in simulink.
- Finally to simulate a fully functional Fast level 2 AC Charging station with fault protection,communication circuits and display of various parameters such as Units consumed, Estimated time to charge and the final cost of units consumed.

Project Timeline

1. Reading research papers
2. Individual circuit designing on proteus
3. Combining all Individual circuits and arduino coding
4. HIL Model
5. Creation of Individual model in simulink
6. Merging all the individual circuits
7. Analysing the output of the proteus
8. Report and presentation



Block Diagram of Charger controller



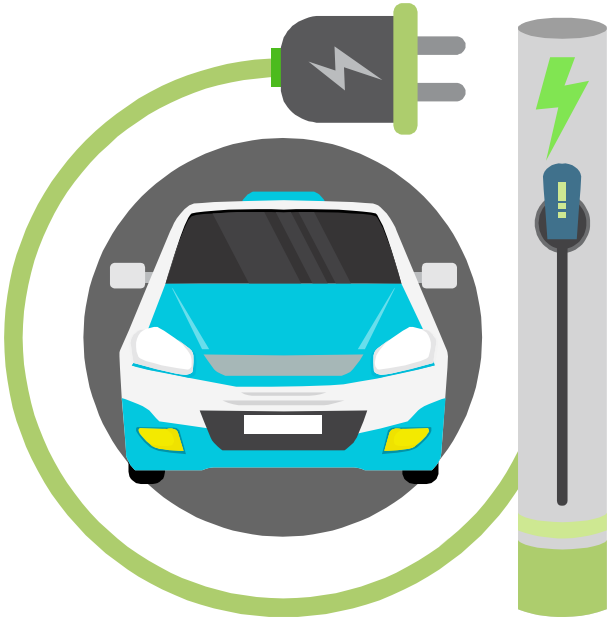
Input Sensing Block Insights

Current Sensing

Senses current using ACS712 hall sensor

Surge protection and AC Voltage Measurement

Controlling the voltage in a particular limit and reducing the voltage for measurement



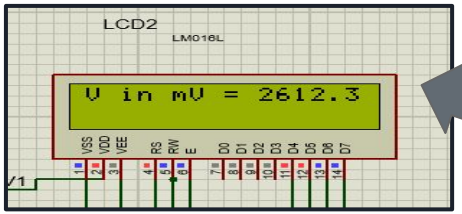
Temperature Sensing

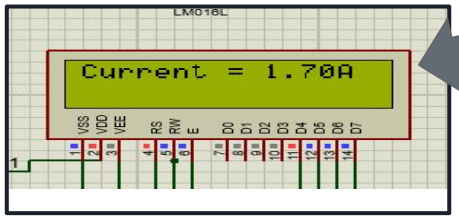
Temperature sensing using LM35

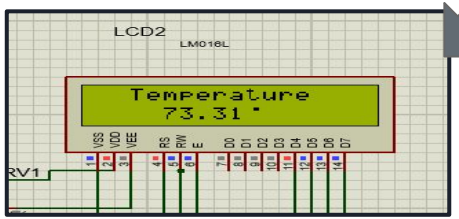
Residual Current

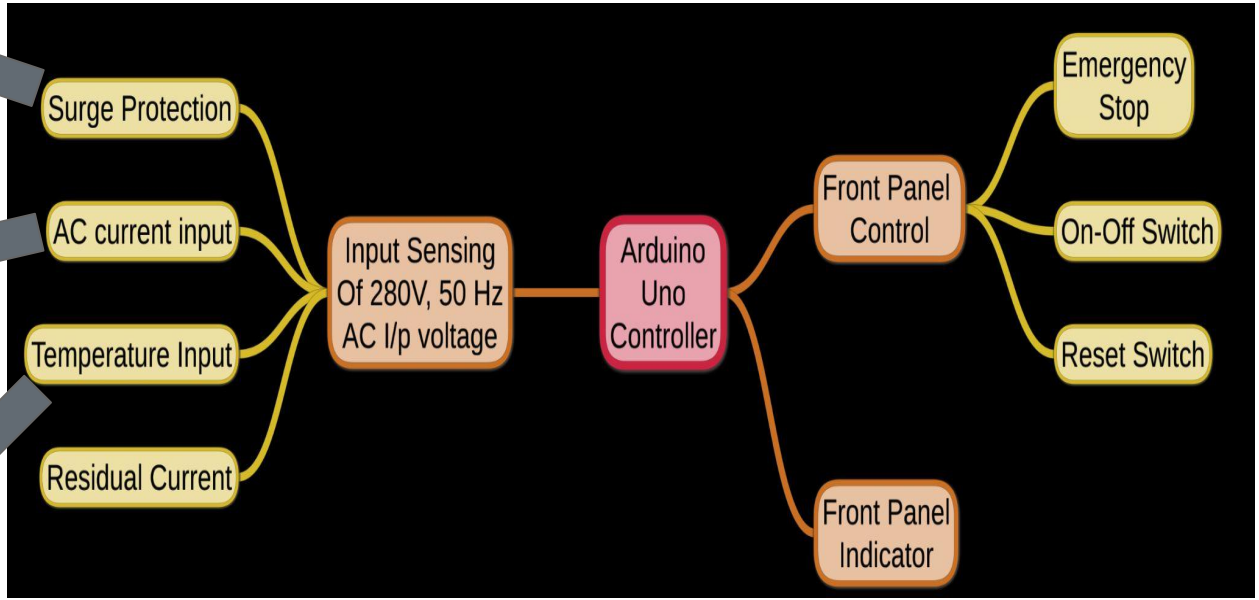
Sensing residual current by measuring change in magnetic flux

Charging Station Protection & Controller Schematic



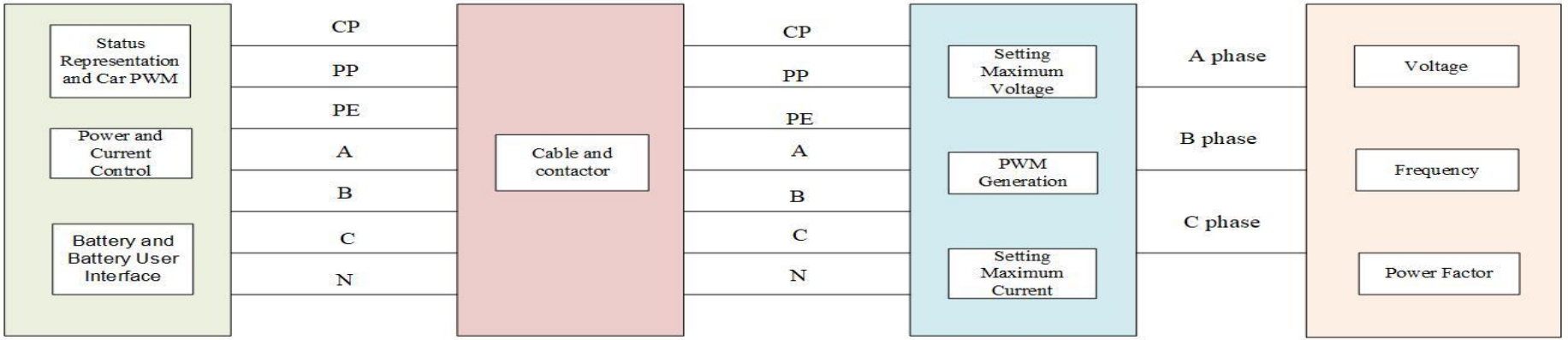






HIL Model of EV Charging Station

Block Diagram of a Charging Station



CP-Control Pilot

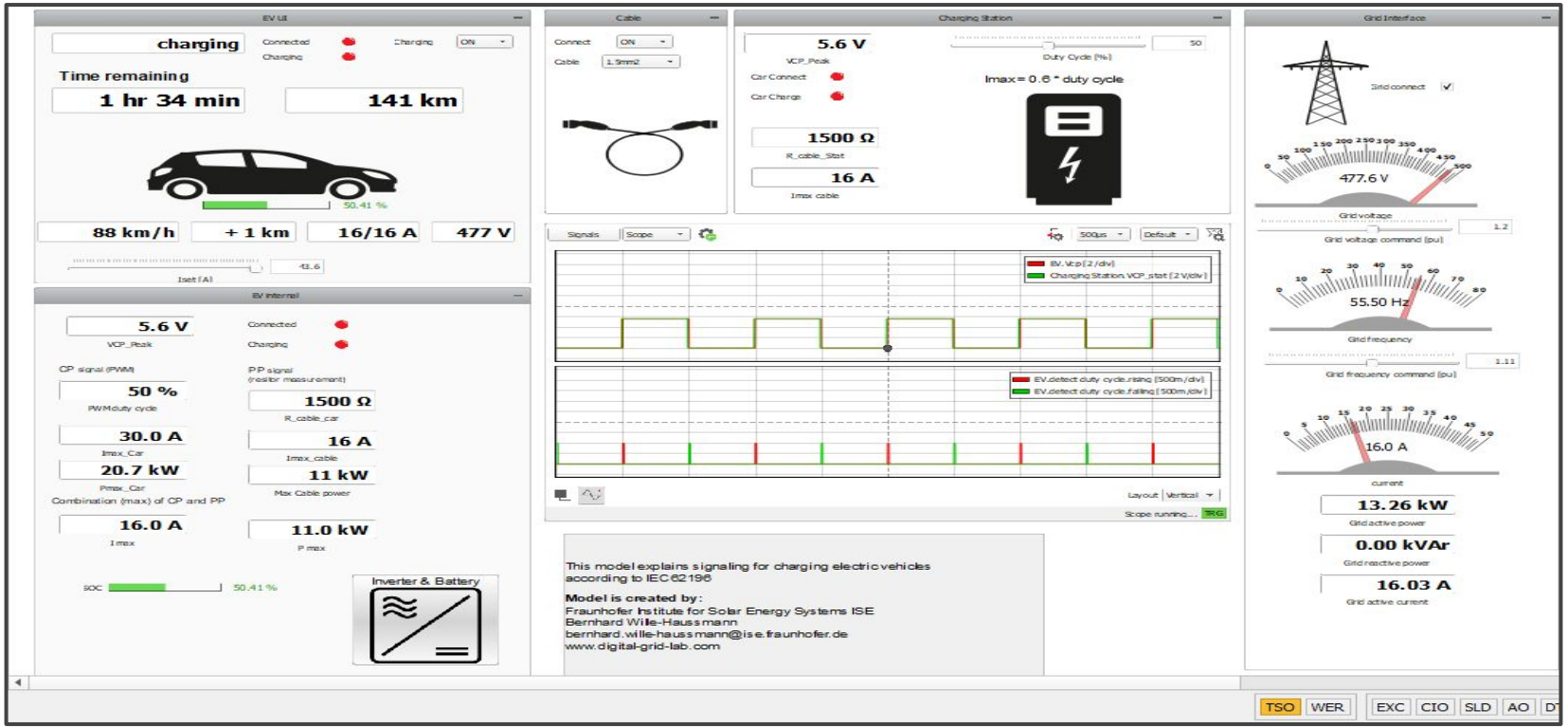
PP-Proximity Pilot

PE-Protective Earth

Status Representation of Communication of EV and Station

Base status	Charging status	Resistance, CP-PE	Resistance, R2	Voltage, CP-PE
Status A	Standby	Open, or ∞ Ω	-	+12 V
Status B	Vehicle detected	2740 Ω	-	+9±1 V
Status C	Ready for Charging	882 Ω	1300 Ω	+6±1 V
Status D	With Ventilation	246 Ω	270 Ω	+3±1 V
Status E	No Power (shut off)	-	-	0 V
Status F	Error	-	-	−12 V

Output of Charging Station on Typhoon HIL



Interpretation

- Charger controller requires input sensing and front panel control with indicator connected with arduino. If any fault such as overcurrent fault occurs it is detected by respective part of the controller circuit and measures are taken to prevent damage to EVSE and Electrical Vehicle.

- For the charging station, we can mainly set the duty cycle and observe the status decided by Vcp. The cable allows us to connect the EV and to select a cross section of the applied cable. These include the detected DC, maximum current, and the detected status. The scope in the middle shows the Vcp on the EV side, including the detected edges from duty cycle detection.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THANK YOU