Omar Elsewify Project Objectives

**Regarding MATLAB code aspect:**

* Set an initial set of assumptions to be made about the battery and the thermodynamics involved in order to simplify the coding process
* Develop a code to represent the Li-Ion battery as a set of nodes representing temperature
* Add in boundary conditions to the model to replicate positive and negative tabs on the battery
* Develop a model for the thermal dissipation over time and write code to represent the time dependent behavior of the battery
* Run a mesh convergence test in order to minimize the total computing required by the software.
* Convert nodal temperatures into graphic representation (i.e. colored heat distribution plots)
* Compare results from code to previous research done to check correlation
* Compare code results to experimental data previously collected
* Use ANSYS/Fluent to model the same geometry and consider the difference in results
* Ensure that the code is soft coded to allow for experimenting with different parameters later

**Regarding the Battery Thermal Management System aspect:**

* Change the voltage and current that the battery utilizes and examine the effect of changing these parameters with regards to heat generation
* Consider active cooling setups which utilize a range of cooling fluids (air, refrigerant, water)
* Consider passive cooling using heat pipes and phase changing materials and examine how each affects the thermal distribution in the battery.
* Consider different setups of cooling setups including combinations of two cooling kits
* Find an optimal operating setup which reduces the temperature gradient while also allowing for a high-power output
* Provide context for how the optimal setup will improve performance (i.e. effect on maximum power output, battery life and possibly charging/discharging speeds)
* Make a reasonable supported conclusion as to what optical cooling technique is that the car industry should consider moving forward.