Memorandum – Solar Powered Car #23-024



**To:** **Professor Mil’shtein, Professor Palma**



**From:** **Jameson Tucker, Thomas Cecelya, Keegan Smith, Casey Merola, Matthew DeSantis**

**Cc:**  **Jeffrey Snell**



**Date:** **February 24, 2023**



**Re:** **Research - Week 3**

This week, the group continued our preliminary research into the mechanics of the system, which includes the hub motors, batteries, and circuitry, and began to determine the feasibility of the project. The required power was estimated to be about 20kW per driving wheel with 2 driving wheels, and 400Nm of torque per wheel was determined to be an acceptable amount. A hub motor was found matching those specifications, but it operates at 72V, and a motor must be found that operates at a maximum of 48V to better suit the battery power available. At this point, it is determined that a 48V AGM battery would be acceptable as a power source, and flexible monocrystalline or thin film solar panels would be acceptable to charge the system.



The group met with Professor Mil’shtein and Jeffrey Snell on February 23, 2023, and discussed our research findings so far. It was determined that a 72V system would not work, and the group should adjust their findings to a maximum of a 48V system. This involves a more careful selection of motors, as the output power is lower for lower voltage systems. The group also discussed that the purpose of the solar system is recharging, and high power is not necessary from the panels. The group was guided towards an approximate size of 1m2 for the solar panels and recommended that they are thin film.



Next week, the electrical team is to focus their research on the voltage that the solar panels can provide, and the number of panels needed. The electrical team must also research the size, terminal voltage, capacity of the battery system, and continue research on a proper hub motor. The mechanical team should finalize the numerical calculations for power, force, and torque.

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| **Past Week’s Activities** | **Status** | **Name** | **Hours** |
| Research Hub Motors | In Progress | Casey Merola | 4 total |
| Research Solar Panels | In Progress | Matt DeSantis | 4 total |
| Research Circuitry | In Progress | Tom Cecelya | 4 total |
| Research Existing Designs | Completed | All | 1 hour each |
| Wrote Mechanical Equations | Revising | Jameson Tucker, Keegan Smith | 2 total |

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| **Next Week’s Activities** | **Name** | **Hours** |
| Review and refine power calculations to ensure they are consistent with existing EV designs | Mechanical Group | 1 hour each |
| Characterize candidate hub motors, batteries, solar panels, and solar charge controllers capable of operating on a 24 V system | Electrical Group | 1 hour each |

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| **Meeting Day/Time** | **In Attendance:** | **Length** |
| February 23, 2023, at 6:00pm | Professor Mil’shtein, Jeffrey Snell, Thomas Cecelya, Keegan Smith, Casey Merola, Matthew DeSantis, Jameson Tucker | 1 hour |