



# SUNSTANG NEWSLETTER

CONQUERING THE ROAD ONE SOLAR CELL AT A TIME.

*'New year. New mindset. New focus.'*

QUOTE OF THE MONTH

## HIGH-POWER UPDATES

The High-Power team has been hard at working on design the MPPT from scratch. The MPPT, or maximum power point tracker, is an electronic DC to DC converter that optimizes the match between solar array and the battery pack. They used the knowledge learned in their electronic courses as well as design courses, such as ECE3399 to make buck and boost converters needed in the MPPT.

The team also used their programming knowledge to code the microcontroller which resulted in a successful working prototype with an efficiency of 85%. The team is now working to make it more efficient by choosing components that are more efficient to hit a goal of 95% efficiency. The next step for the team is to order the necessary parts and test the updated design.

## STRUCTURES AND SUNSTANG 2021

The Structures team has gone back to working on Sunstang 2021 in light of the new lockdown restrictions. Their starting point was ensuring everyone was on the same page with regards to remembering where exactly they had left off on the design of the new vehicle at the end of Summer 2020.

They have been creating an accurate prediction of the overall weight based on estimations from the previous vehicle and comparing these with the targets set by the maximum load target of 320 kg which is what the wheels can handle.

The team has also been working on finalizing the shape for our aeroshell and developing a model in CATIA which is a new software to the team. Validation of the aerobody designs has been performed in ANSYS which is also a new software being implemented this year.

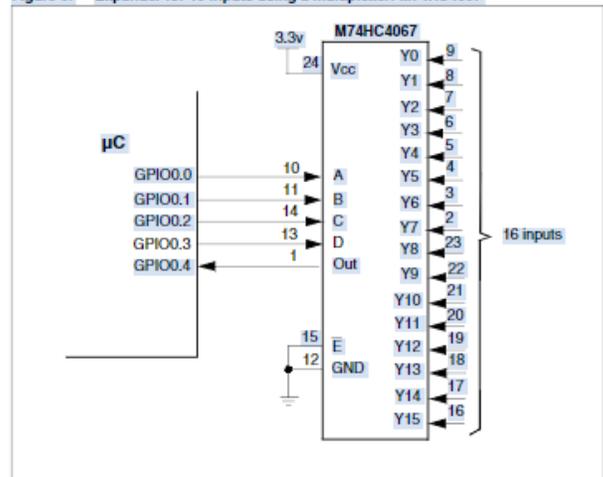
Finally, the team is developing an understanding of the hybrid chassis design, which is a combination of a roll cage (metal) and a structural chassis (composite), and has been working on validating Sunstang's first attempt at designing a hybrid chassis which was created in the summer.

## LOW-POWER PROJECTS

**Increasing the number of input pins:** The team has also implemented additional hardware into their Printed Circuit Boards (PCBs) to reduce the amount of pins being used by the stm32 micro-controller. This allows for easier programming since the state of certain driver inputs such as signaling or driver modes can be determined by checking the input of one pin and the address of four pins (ABCD) instead of 10 different pins at a time.

**Driver controls block diagram:** The driver control unit is expected to consist of two stm32 micro-controllers with various peripherals and an LCD screen to display the required information to the driver. The whole system will be connected to one CANbus line (separate from the battery monitoring system line) to communicate between the three individual components over long distances.

Figure 6. Expander for 16 inputs using a multiplexer: M74HC4067



Pictured: 16 input expander using a multiplexer