

Coming up on the last week before design day we believe we are in a good position to have a fully housed working prototype for design day. As discussed in the first progress report our initial requirements given to use by Dr. Prem Chahal resulted in a trade-off triangle, seen in figure 1, where we could only meet two of the three corners with our budget constraints.

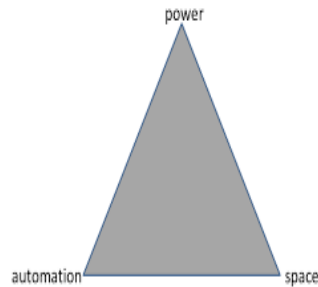


Figure 1

We proceeded with assembly of a final prototype that was similar to our mark 1 design that sacrificed power. Once we have the final prototype the design can be easily altered, by either Dr. Chahal or another design team, to meet the power output requirement as long as enough money is provided (we believe Dr. Chahal plans to use the prototype as a proof of concept to get the appropriate funding). This prototype consists of an array of LEDs (Figure 2) that covers the electromagnetic spectrum of 400 nm - 1100 nm using twenty-five peak wavelength points achieved using 25 LEDs.

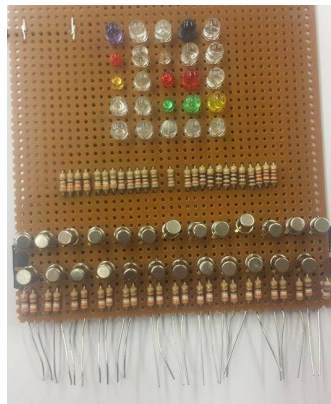


Figure 2

This array will be connected to a microcontroller that will control which LEDs are on and through pulse width modulation we will be able to control the intensity in order to cover the full spectrum. This circuitry will be housed in a rectangular box whose rendering is seen in figure 3.

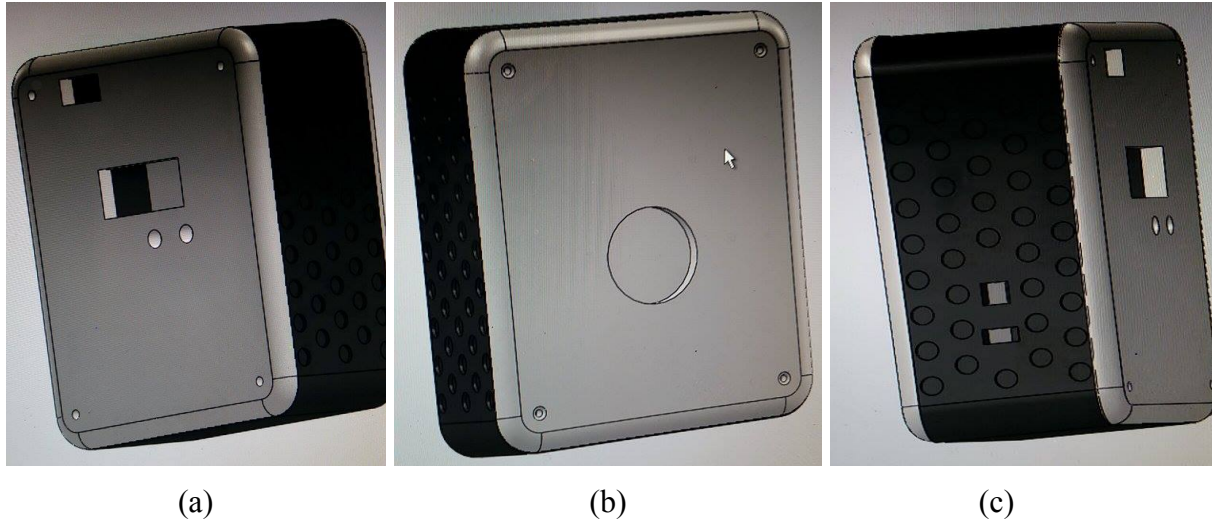


Figure 3 (a. Front view b. Back view c. Side view)

Dr. Chahal provided us with a solar cell and its calibration coefficients in order to calibrate the device to measure this particular solar cell to obtain optimal efficiency. The calibration coefficients are required to bump up the output of the LEDs accurately to compensate for their non-ideal behavior. Dr. Chahal also provided us with a second solar cell with the idea that we would mount it inside the device and monitor the voltage across it to ensure the array is operational so that if there are any issues during use the function of the array can quickly be weeded out as the cause.

In addition to programming in the calibration coefficients we also need to program a graphic user interface (GUI) that will allow the array to be controlled in such a way that the user only needs to put in their desired wavelength and intensity. We have an idea for our GUI and a basic outline set up we just need to fine tune it and implement it.

While we have the circuitry mostly wired and the basic functionality part of the programming done we still have to assemble the whole thing together. As shown in figure 3 the housing is designed, we are just waiting in line to get it 3-D printed. However once it is printed final assembly will not take long at all and we will be ready for design day.