

Department of Electrical Engineering and Computer Science
EECE 401 Senior Design I
Fall 2021
Solution Design Report
Group: Aerospace I

Section 1: Individual Design

Design 1 (Essien Taylor): Farm Security Car

Design Description:

As many farms have livestock that are preyed upon by predators in the areas surrounding the farm. Often these farmers purchase guard dogs to protect their livestock. However, these dogs are expensive and not always reliable. Using a solar powered car to patrol the perimeter of the farm will allow for cheaper and more consistent defense of the farm.

Design 2 (DeAndra Gayle): On-Campus Food Delivery

Design Description:

College is undoubtedly one of the busiest times in a student's life. They may be pulling all-nighters in the library, or even just rushing from one place to another to make it to class on time. This leaves little time for simple things like eating lunch or dinner. Using a solar powered car to pick up and deliver snacks, lunch or dinner for students would be beneficial to both their health and studies. The figure below, Figure 2, is an example of what the car would look like:



Figure 1: On-Campus Food Delivery

Design 3 (Dymier Steele): Emergency First Responder

Design Description:

Natural disasters and fires occur globally leaving millions of people affected by the damage it creates. Of those millions, many are not fortunate enough to safely evacuate. With the help of solar powered AI rough terrain vehicles we can decrease the risk of losing a life to save another.

Using AI, neural networks, open- and closed- loops, and autonomous algorithms the emergency first responder vehicle could go in a potentially dangerous situation with casualties or injured patrons and alert rescue teams (firefighters, paramedics, etc.) of the exact location of those in need of help and a safe path for entry and evacuation. This could be used in the public sector or private sector with its application being viable in all 195 countries across the globe.

Design 4 (Tyler Borderon): Security Surveillance

College campuses tend to be large areas that have a plethora of different people passing through each day. That being said, campus security and campus safety is an extremely important part of campus life, and therefore must be at its best to ensure the safety of all students and faculty. Using a solar powered car equipped with a 360-degree live-feed camera, campus security can easily maintain thorough surveillance of the campus 24 hours a day, as it would charge as it functions throughout the day, and then use its reserved power through the night. This would also discourage any crime that could possibly take place.

Section 2: Top Two Designs

Pros and Cons of Top 2 Solution Designs

The top two designs, On-Campus food delivery and the Farm security car, both designs had tremendous upsides but ultimately when the pros and cons were weighed out and we took into account for level of design difficulty, cost efficiency, and viability for the time constraints we have we decided to go with the On-Campus food delivery car.

Section 3: Final Design

Decision Matrix

In order to decide which of the top two designs would be implemented, a decision matrix was used. The two were ranked by the group on the criteria of cost, environmental impact, and implementation time on a scale from 0 to 5 (5 being the most positive 0 being the most negative). Below are the rankings determined by the group. Based on the scores, the On-Campus food delivery system will be implemented as the top solution design.

	On-Campus Delivery	Farm Security
Cost:	4	3
Implementation time:	2	1

Environmental Impact:	4	3
Total:	10	7

Top Solution Design

Our top design is the solar powered vehicle that functions as a delivery service for college students on campus. This vehicle is intended to pick up a student's order and deliver it to them at a different location semi-autonomously. The On-Campus Food Delivery is known for its delivery plate, semi-autonomous functional movement, and connection to wifi or bluetooth. An image of the top design is listed above in *Figure 1*.

The main components of the vehicle are the semi-autonomous vehicle, and solar powered battery charging station. The main components require a telemetry recording system which in a specific coding language is needed.