EEL 4914 – SENIOR DESIGN 1

INITIAL PROJECT DOCUMENTATION

GROUP #8

Alexander Lapegna (CpE)	alapegna@gmail.com
Hanser Gonzales (CpE)	hanserg45@gmail.com
Simeon Richards (EE)	simeon_0619@knights.ucf.edu

WIRELESS CHARGING SMART LONGBOARD

Department of Electrical and Computer Engineering

University of Central Florida

Project Description

Skateboarding has been one of the most prominent methods of transportation for students at universities. This presents the opportunity to create something that will ease the users of having to use their legs to push themselves around on the board. Or, since the more sophisticated boards come with a remote that is used to control the speed, it appears to be a little more user friendly.

Our idea came out of the love for skateboarding. One that will allow the user to utilize their cell phone more instead of having to use another device, such as the remote. This design will allow the user to turn the board on and off using their cell phone, through an application. While riding, the user will engage the board by standing on a safety switch and monitor the speed using their smart-phone. This design will also enable the user to be able to track their speed in real time and make any adjustment needed from the phone.

If there is a clear path that will be travelled for a certain period of time, the user will be able to set the preferred speed while focusing on other things. In the case of an emergency, the user will disengage the board by releasing the footswitch that will be pressed for the duration of the ride.

Although this idea sounds a little complicated, we will have to limit some of the features of this project due to the timeframe we have to complete it. However, since it will be powered by battery, there has to be a way to charge and recharge that battery.

For this, we will be designing a solar powered, self-docking wireless charging station that will enable the user to step off the board and direct it to the charging port with absolutely no effort. This will be done via the app that the user will utilize to guide the board to the appropriate spot for charging.

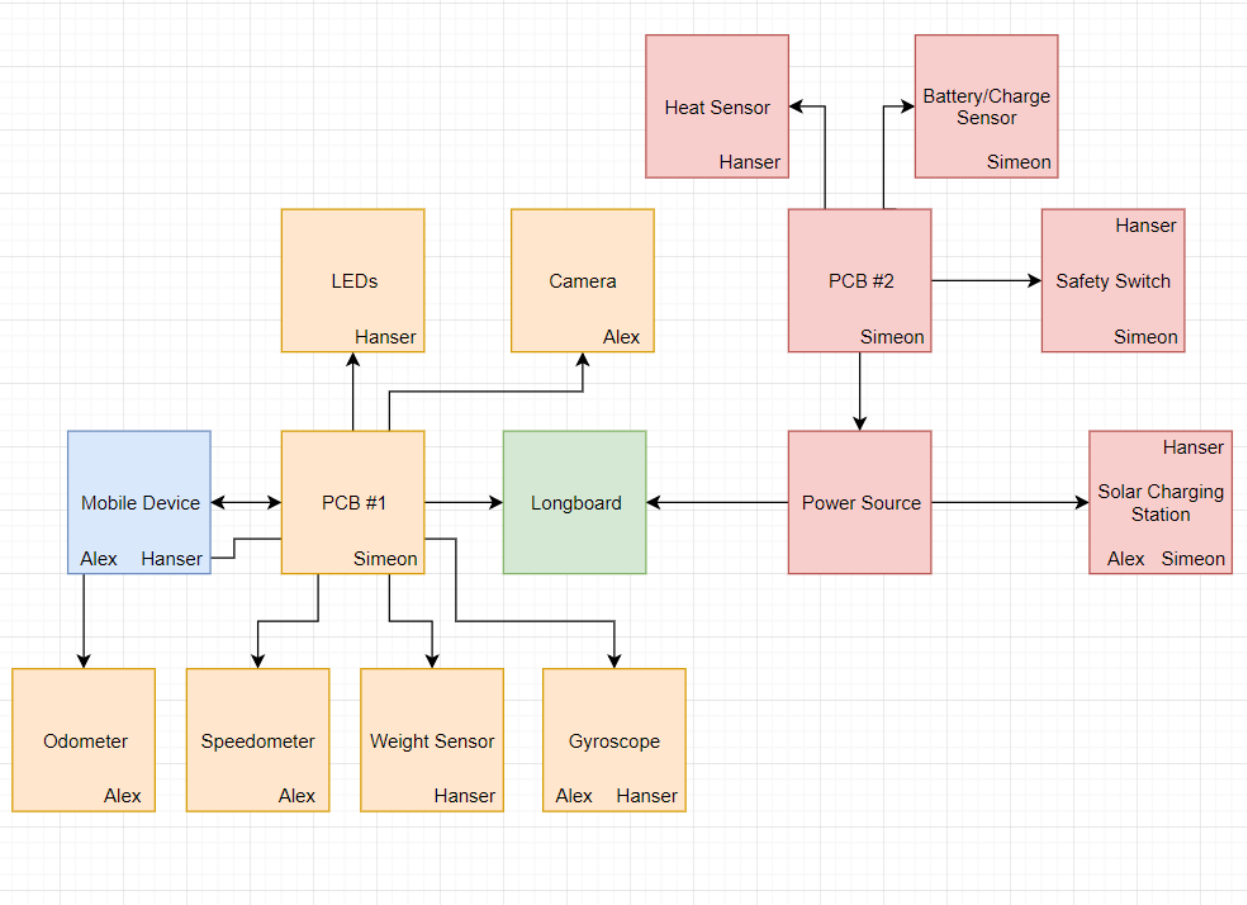
Once the board is docked, a temperature sensor will check the temperature of the battery and present that information through the app. If the battery is too hot, the charging will be delayed until the battery reaches a cooler temperature. Once the temperature is reached, the information will be displayed in the app, “CHARGING.”

At the end of this design, the user will be satisfied with the performance of the skateboard.

Project Requirements

1. PCB 1 - Communications
    a. This PCB will be used for the communication between the peripherals, smartphone and the skateboard. Since this is the initial planning stage, we are not yet sure whether mobile communications will be done via Wi-Fi or Bluetooth.
2. PCB 2 - Battery
    a. This PCB will be used for the battery charging phase of the design. This will also be finalized after further research and documentation.
3. Microprocessor
    a. An Arduino or MSP processor will be used but this is yet to be decided until we finalize what peripherals we will have and what will work best with/for them.
4. Power Supply
    a. Main source of power for both PCBs.
5. Battery
    a. For this project, a 36 volts 10S3P lithium battery will be used that will be able to deliver 12 - 19 miles per charge.
6. Communication
    a. All communication will be done through a mobile app wirelessly. We are yet to confirm whether it will be compatible to iOS, Android or both.
7. Sensors
    a. Sensors will be used to provide real time information to through the app and will be displayed on screen.
    b. These sensors include: temperature sensor, speedometer, weight sensor, odometer. gyroscope, LEDs and a camera.
8. Vision
    a. A camera mounted to the front of the board will be used along with the OpenCV library to detect objects and using the other sensors, be used to slow the board down to prevent potential collisions.
9. Motor/Motor Hub
    a. N5055, 270KV, 1400W motor will be used for this project.
    b. This motor will be able to deliver speed up to 27 mph, with strong linear acceleration and braking.
10. Charging
    a. The charging port will be powered by solar panel and will be able to provide wireless charge.

Block Diagram



Project Milestone

INITIAL PROJECT MILESTONE			
SPRING 2019 - SENIOR DESIGN I			
TASK	DURATION	DATES	GROUP MEMBER
Project selection	2 weeks	1/21 - 2/1	Completed
Divide and conquer document (10 pages)	2 weeks	2/1 - 2/15	In progress
Meeting with Professor	1 day	02/5 - 2/5	ALL
Research and Documentation	6 weeks	2/15 - 3/29	ALL
Table of content	6 weeks	2/15 - 3/29	ALL
Hardware	6 weeks	4/1 - 5/17	SIMEON
Batteries/Power distribution	4 weeks	4/1 - 4/26	
Solar Panel	4 weeks	4/1 - 4/26	
PCB design	4 weeks	4/1 - 4/26	
PCB 1	6 weeks	4/1 - 5/17	
PCB 2	6 weeks	4/1 - 5/17	
Software	6 weeks	2/15 - 3/29	ALEX/HANSER
Mobile Application	6 weeks	2/15 - 3/29	
Processor	6 weeks	2/15 - 3/29	

Communication	8 weeks	2/15 - 3/29	ALEX/HANSER
Odometer		2/15 - 2/22	
Speedometer		2/15 - 2/22	
Weight Sensor		2/15 - 2/22	
Gyroscope		2/15 - 2/22	
LEDS		2/15 - 2/22	
Camera		2/15 - 2/22	
Physical	4 weeks	3/29 - 4//25	ALL
Board		3/29 - 4/5	
Housing		3/29 - 4/5	
Prototype		4/8 - 4/19	
60-page draft		3/15 - 3/29	
Updates/Corrections		3/29 - 4/12	
Final Report		4/12 - 4/22	
Presentation		4/25/2019	

SUMMER 2019 - SENIOR DESIGN II			
TASK	DURATION	DATES	GROUP MEMBER
Order parts	3 weeks	4/25 - 5/17	ALL
Parts confirmation	1 week	5/17 - 5/24	ALL
PCB Design and assembly	2 weeks	5/17 - 5/31	ALL
Troubleshooting/Testing		pending	ALL
Prototype enhancement		pending	ALL
Peer presentation		pending	ALL
Final document		pending	ALL
Final Presentation		August 2019	ALL

Project Budget

Budget & Financing			
Item Description	**Price/Unit**	**Amount**	**Estimated Price**
Longboard	$45-70	1	$60
Speedometer / Odometer	$80	1	$80
Temperature Sensor	$4.95	2	$10
Load Sensor (50kg)	$11	3	$33
Battery Charge Sensor	$10	1	$10
RGB LED Strip Light	$15	1	$15
Accelerometer (with Gyroscope)	$10	1	$10
Pressure (Force-Sensitive) Switch	$9	2	$18
Solar Panel (s)	$95	1	$95
Battery	$140	1	$140
Solar charge controller	$25	1	$25
Voltage Regulator	$40	1	$40
PCB Fabrication	$50	2	$100
Bluetooth Module	$15	1	$15
Camera	$30-50	1	$40
Motor	$140	2	$140
Total			$840