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Deucei

Smart Security Dashboard Camera

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Group Number: 25

1.0 Project Description

With the recent 36 automotive break-ins on the UCF campus over the span of one night in spring 2017. The need for the 360 automotive is evident. Prior to this epidemic the focus was around wheel theft which happened at the beginning and ending of every semester. With no other real way to protect cars of students and faculty other than a beeping horn. The 360 Dashboard camera is more relative today. With the technology readily available to make this product, the cost of this product for most young professionals and working individuals will be affordable. Rearview cameras are mandated in all vehicles manufactured in the US by January 2018. This will bring the cost of cameras and lens way down. Therefore making the cameras cheaper for us to purchase. This will bring down the overall cost of the product to the end consumer.

The project goal is to create a product that can be bought and used as theft deterrent device. This product will be able to detect a disruption due to motion that is unwarranted to the vehicle. Video will start recording when an instance occurs. The video will stop 1-2 mins after the motion stops. Interviews have been conducted at numerous conferences and trade shows. One of the shows was SEMA (Specialty Equipment Manufacturers Association) in Las Vegas, Nevada. SEMA mention, “The Specialty-Equipment Industry Reaches Record $39.18 Billion in Sales for 2016—Up 8% From Previous Year.” A small portion of these sales are in security at roughly $2-$3 Billion. Another show that was attended and customers were interviewed was CES (Consumer Electronic Show). Interviews at both of these shows proved that potential customers and businesses were interested in this type of technology. Data shows the consumer market is ready for the connected car. The future cars will be more connected to the house and the individuals that drive them. Lots of development has been done in this field and will continue to be done.

When interviewing multiple customers and businesses we found out that they wanted security for their vehicles. They wanted GPS tracking, video, and notifications when something happens. Some were skeptical about paying a subscription fee for the service but others had no problem. Although individuals that were previous victims of car or house theft were much more interested.

The device will be light weight, in a discrete location, and have low to no false positives. This means the camera will only record in parking mode when absolutely needed. The Smart Security Dashboard Camera will have hardware and software involved. There will be 1 or 2 main PCB boards. There will be a mobile android phone app to control the camera and receive live video. There will be two software projects on this product, they include the software to run the device and the software to run the application on the smartphone. The Smart Dashboard Camera will have two 180 degree cameras. The option to add another camera to see out the rear window in

full view will be available for an extra cost. The Smart camera must work during a hit and run, vehicle theft, smash and grab, wheel theft, and other noticeable vandalism. We would like it to be sensitive but not so sensitive that a cat walking on the car will set it off. The camera will be inside the car protected from the elements. The camera will also send data to the cloud from the camera. That way if the thief takes the camera the video will still be captured.

1.1 Requirements Specifications

Requirements	Description
Accelerometer	● Must be built in to measure and detect acceleration forces when the vehicle is stationary ● Must be able to detect any unusual acceleration forces or vibrations when the user is inactive of his/her vehicle which will send a signal for the camera to record the instance ● This is used to detect any car theft or damage in the form of vibrations
Gyrometer	● Must be built in to measure and detect angular momentum when the vehicle is stationary ● Must be able to detect any unusual angular momentum when the user is inactive of his/her vehicle which will send a signal for the camera to record the instance ● Similar to the accelerometer, this is used to detect any car theft or damage in the form of angular momentum
2x Cameras	● Must be high resolution cameras with 180 degree FOV ● Must be able to record consistent footage whenever the camera is active ● Must be a 16 megapixel digital camera ● Must have a battery saver mode to use less voltage from the user's vehicle when it is inactive ● Must be able to save recording footage if the camera gets damaged ● Take pictures of instances of car theft or damage when given a signal
Android Application	● Sends a notification to the user, even when the smartphone is silent, if the recording camera detects any car theft or damage ● The notification must be specific enough to tell the user what is actually happening to their vehicle ● Must be easy to use and understand for the user ● Must use Bluetooth, Cellular, or Wi-Fi to interact with the recording camera and for the user to see the recording footage ● Must be able to store recording footage to the application

	• The recording footage and user's data must be protected and encrypted
Hardwire Charger	• Must be built to charge the recording camera through the vehicle's battery
GPS tracker	• Must be built in to detect if the user's vehicle is moving out of place when the vehicle is inactive, either from car theft, or the vehicle is being towed • Can be used to help the user find their vehicle when they don't remember where it is

Table 1: List of the requirement specifications

1.2 House of Quality

Legend: ↑↑ - High ↑ - Medium ~ - Low		Failure Rate	Megapixels	Bandwidth	Foot Print	Cost	Idle Run Time	False Positive
		-	+	+	-	-	+	-
1) Reliability	+	↑↑				↑	↑	↑
2) Camera Resolution	+		↑↑	↑↑	~	↑	↑	
3) Cost	-	~	↑	↑	↑	↑	↑	
4) Install Ease	+				↑↑			
5) Bandwidth Transfer	-		↑	↑	~		↑	
Targets for Engineering Requirement		<1%	>16 MP	>3G	<6 Inch Diameter	<$299	>2 Weeks	<5%

↑ = positive correlation
↑↑ = strong positive correlation
↓ = negative correlation
↓↓ = strong negative correlation
+ = positive polarity
- = negative polarity

Failure rate: hardware failures such as shutdown, battery failure
False positive: percentage of false positive and negatives.

Figure 1: House of Quality

1.3 Hardware Diagram

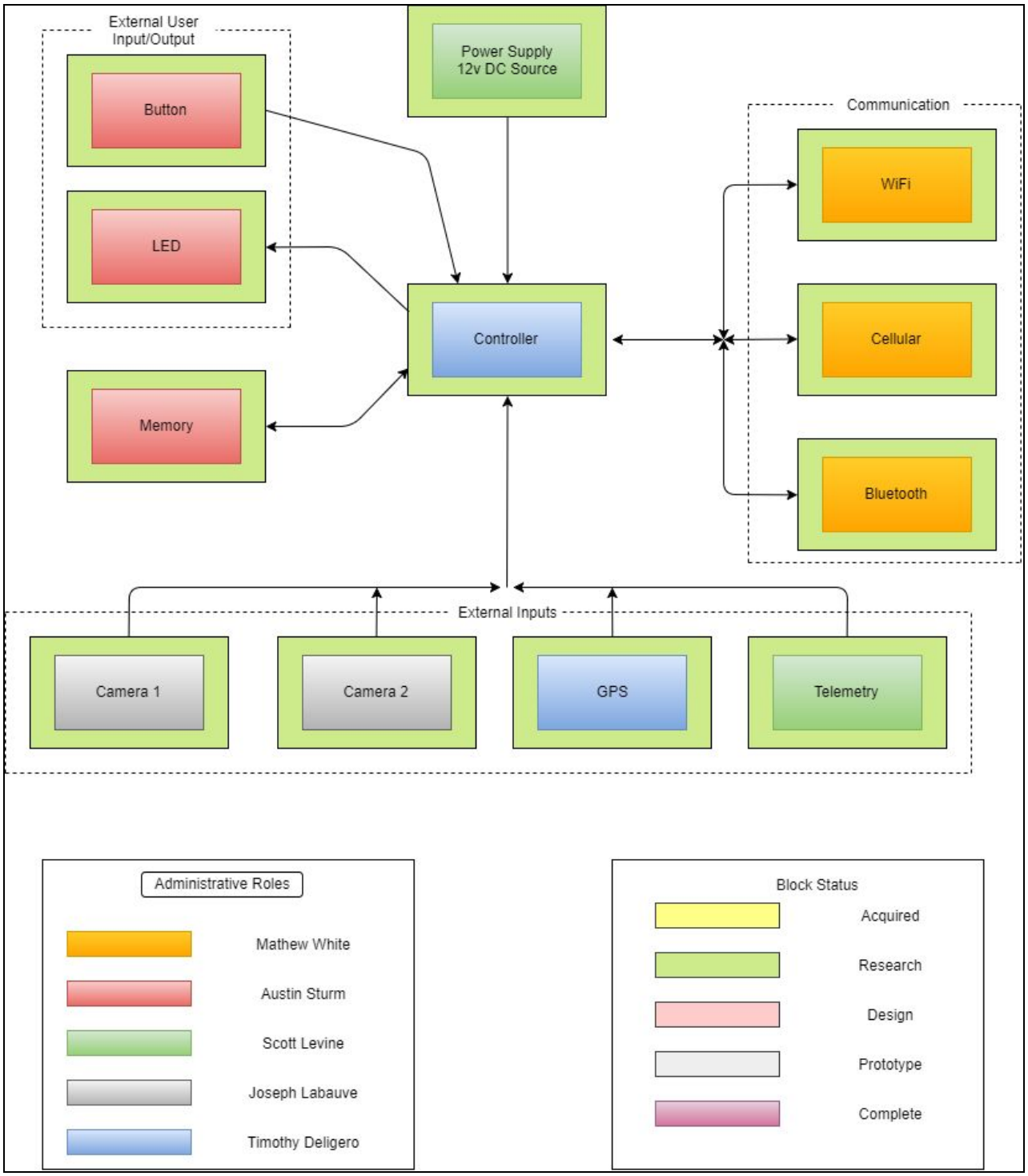

Figure 2: Hardware roles given to team members

1.4 Software Diagram

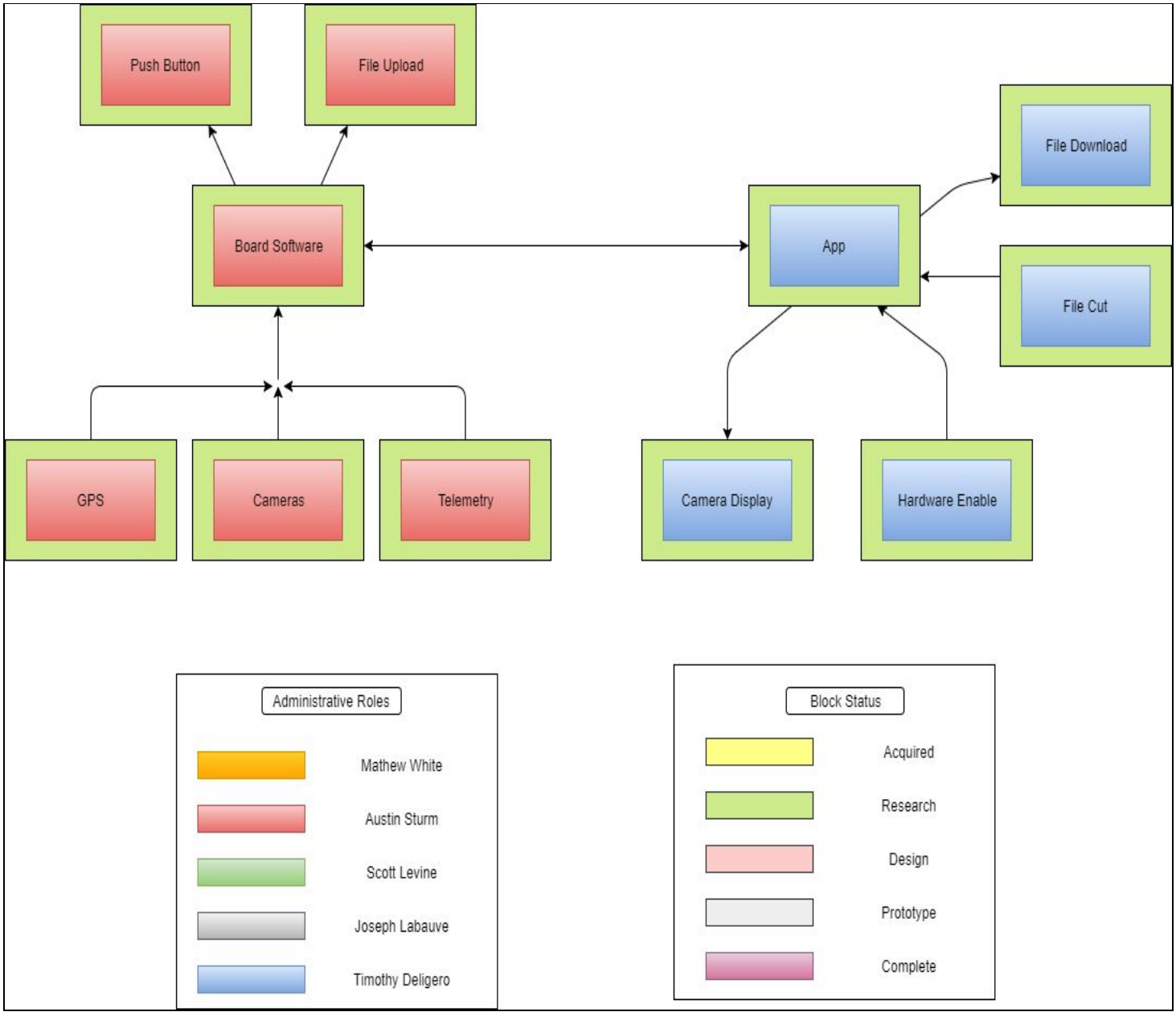

Figure 3: Software roles given to team members

Blue boxes - Depicts software interaction from device to mobile android application.
Red boxes - Depicts hardware components with inputs and outputs labeled.

1.5 Project Budgeting and Financing

The project budget is $1,500 for development of the 3 PCB boards with components, 3D printed cases, 3 power cords, product box for one complete looking market ready product and assisting components. The sponsor is the company Deucei. The project funds will be supplied by the owner of Deucei (Matthew White). Each unit will cost $100 to make and sell for $300 retail at low quantity (under 100 units). At higher quantities (over 1,000) the price per unit goes down to $65 to make each unit and the unit will sell for $250 retail. The year 1 projection is selling 2,500 units for a total revenue of $575,000. The cost of goods will be $175,000 with a gross margin of $400,000.

Data as a service table

Units in USD	YR 1	YR2	YR3
Data Unit Sales	2,500	5,250	13,500
Data Revenues	49,875	104,738	269,325
Data COGS	35,000	73,920	189,000
Data Operating $$	0	0	0
Data Salary Costs	0	0	0
Data Profits	14,875	30,818	80,235

**These estimates are per year. As more items are sold the profits from the data increases as well.

Table 2: Costs and profits of data as a service ($)

1.6 Project Milestones

Task	Start	End	Status	Responsibility
Ideas Paper	21-Aug	26-Aug	complete	Group 25
Group member task assignment	4-Sep	6-Sep	complete	Group 25
150 page project report				
Divide and conquer document	22-Aug	9-Sep	complete	Group 25
Table of Contents	4-Sep	10-Sep	in progress	Group 25

Updated Divide and Conquer	11-Sep	22-Sep	TBA	Group 25
60 Page Draft	23-Oct	1-Nov	in progress	Group 25
100 page draft	6-Nov	12-Nov	in progress	Group 25
Final Documentation	20-Nov	26-Nov	In progress	Group 25
Research, Cost Analysis, Design, Documentation				
Analysis/choosing of parts	4-Sep	18-Oct	in progress	TBA
Controller Software	1-Oct	TBA	researching	TBA
Financial Part Analysis	18-Oct	25-Oct	researching	TBA
PCB Design	15-Sep	15-Jan	researching	TBA
Power Supply Design	15-Sep	10-Nov	researching	TBA
Camera Choice	15-Sep	1-Nov	researching	TBA
Product Layout	18-Oct	25-Nov	researching	TBA
Development Plan	10-Dec	22-Mar	researching	TBA
Senior Design II				
Order and test parts	TBA	TBA	TBA	Group 25
Construct prototype	TBA	TBA	TBA	Group 25
Debugging and Adjusting	TBA	TBA	TBA	Group 25
Final testing	TBA	TBA	TBA	Group 25
Peer Presentation	TBA	TBA	TBA	Group 25
Final Report	TBA	TBA	TBA	Group 25
Final Project Presentation	TBA	TBA	TBA	Group 25

Table 3: Schedule of Project Milestones