Senior Design I

SmartRVac RV and Marine

AC connected performance monitor

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Customer/Sponsor: RV Intelligence
Point of Contact: Herb Gingold, herb@rviqproducts.com
Initial Project Document and Group Identification
Divide and Conquer

GroupC_Int_Spider2

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Project Narrative:

Traveling in an RV can be one of the best experiences in the world, especially traveling with family or loved ones. However, the fun can come screeching to a halt if the RV's AC system breaks down. For this project design, a device monitor will hook up to an RV's AC system and give real time diagnosis and alerts to notify the user that the AC is deteriorating or is in need of some checking. The RV AC monitoring device will give key performance statistics of the AC, overall health, and data on temperature, voltage, current consumption, and vibrations felt through the system. The data collected will then be stored in a cloud for storage and analyzed using big data tools. This way, families can be prepared and avoid having a troublesome malfunction during fun vacation trip.

While there is a huge product line for home AC monitoring systems, there is little attention given to RV systems. With this product, there is the hope to expand and serve customers who are interested in maintaining the health and preservation of their RVs with an easy to use mobile app to interface with the monitor.

Project Specifications and Requirements:

The device should not weight more than 1lb
The device should be 6in X 2in X 2in
The device should step down 12v to 5v
The device enclosure should be IP-69 (waterproof/weatherproof)
The device shall have a microcomputer and Bluetooth low energy.
The device shall measure voltage and current usage
The device shall sense the temperature, moisture, and vibrations
The device shall have 3 LEDS to indicate transmission, operation and if it connected to a phone.
The device shall operate below 95F(35C).
The device shall be easy to setup and minimal setup time
The device shall send notification to the phone when temperature, moisture, vibrations exceed the threshold.
The device shall be easy to pair with the mobile app
The mobile application shall be easy to use
The mobile application shall have a super and user mode
The mobile application shall receive data from the device and send to the server
The server should store and compute data to estimate the life of the AC unit
Generate easy to use user's manual, test procedures, and FAQs

Table 1 Engineering Specifications and Requirements

Project Constraints:

Test: To test the device it will require a RV AC unit which ranges from $200 to $1000 dollars depending of the BTU. This units are enclosed and once we start testing Freon level cannot be refill. Because of this it requires that we make and use a testing plan that maximize the testing unit. Will only be available for RV AC systems.

Parts: The customer has specified that most of the parts have been chosen. There are some parts left to research and those will need to be pick from specific vendors.

Time: we have about 28 weeks to work in the projects. With the project having hardware, mobile application, and server side it means the group have to work diligent and stay on track. Making a good milestone will help to meet the due dates for the components.

Block Diagram:

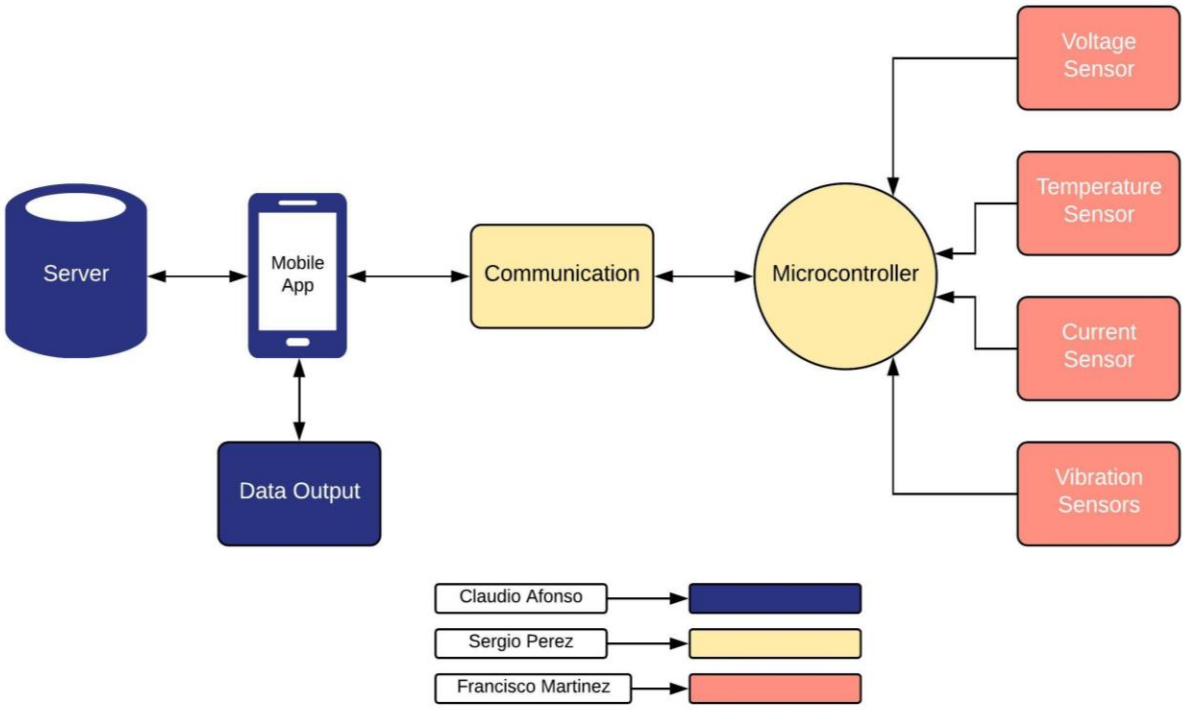

Figure 1 Block Diagram

Project Block Diagram Status (01/31/2019):

- All blocks are currently being researched on;
- The blocks need customers' approval;
- No prototypes have been completed for all blocks.

Project Budget:

Part Number	Description	Vendor	Price	Amount	Estimated Price
Cypress Cyble-012011	PSoC 4 BLE	Digikey	$11.97	1	$11.97
620-1482-2-ND	Current Sensor	Digikey	$0.59	1	$0.59
MCP9700T-E/TTTR-ND	Temperature Sensor	Digikey	$0.26	1	$0.26
MSP1006-ND	Vibration Sensor	Digikey	$3.96	1	$3.96
	Enclosure		TBD	1	TBD
AK1110AEU50TR-ND	Linear Regulator	Digikey	$0.38	1	$0.38
	PCB	PCBway	$100.00	1	$100.00
				Total	$117.16

Table 2 Project Budget

All parts and products will be processed by RV Intelligence and the final say will be by them in terms of what parts to use. Therefore, the parts listed in the budget are liable to change during the course of the semester.

Project Schedule:

Senior Design 1

Description	Duration	Dates
Group Formation	3 Day	1/8/19 - 1/11/19
Project Decision	2 Weeks	1/11/19 - 1/25/19
Divide and Conquer V1	4 Days	1/29/19 - 2/1/19
Researching	1 Week	2/1/19 - 2/7/19
Selecting Parts	3 Days	2/7/19 - 2/10/19
Designing Initial Prototype	2 Weeks	2/10/19- 2/24/19
Divide and Conquer V2	3 Days	2/11/19 - 2/14/19
Testing Initial Prototype	1 Week	2/24/19- 3/3/19
Approval	1 Day	3/4/19
60 pages draft	3 weeks	3/1/19 - 3/25/19
100 page draft	2 weeks	3/26/19 - 4/8/19
Final document	2 weeks	4/9/19 - 4/22/19

Table 3 Senior Design 1 Schedule

The above table is a tentative schedule for the duration of the Senior Design 1 class. It is intended to keep the team on track and ensure the progress towards the effective completion of the first part of the project. However, this schedule needs the customers' and sponsors' approval. Moreover, as shown on the table, some prototype must be complete at the end of Senior Design 1, which will point the team to the right direction when starting the Senior Design 2 class.

Senior Design 2

Description	Duration	Dates
Designing Final Prototype	3 Weeks	8/26/19 - 9/15/19
Testing Final Prototype	1 Week	9/16/19 - 9/22/19
Approval	1 Day	9/23/19
Develop Embedded code	6 weeks	9/1/19 - 10/13/19
Develop Mobile Application	6 weeks	9/1/19 - 10/13/19
Develop Server API and Database	4 weeks	9/8/19 - 10/6/19
Testing Software	3 Days	10/14/19 - 10/16/19
Testing Hardware	3 Days	10/14/19 - 10/16/19
Interfacing with Sensors	1 Week	10/17/19 - 10/23/19
Assembling Parts	2 Weeks	10/24/19 - 11/5/19
RV AC Test Procedures	1 Week	11/6/19 - 11/12/19
Presentation	1 Week	TBD

Table 4 Senior Design 2 Schedule

The above table is a tentative schedule for the duration of the Senior Design 2 class. It is intended to keep the team on track and ensure the progress towards the effective completion of second part of the project. However, this schedule should be more realistic at the end of Senior Design 1. As the table demonstrates, the project must be built and fully functional and the end of the Senior Design 2 class.

House of Quality

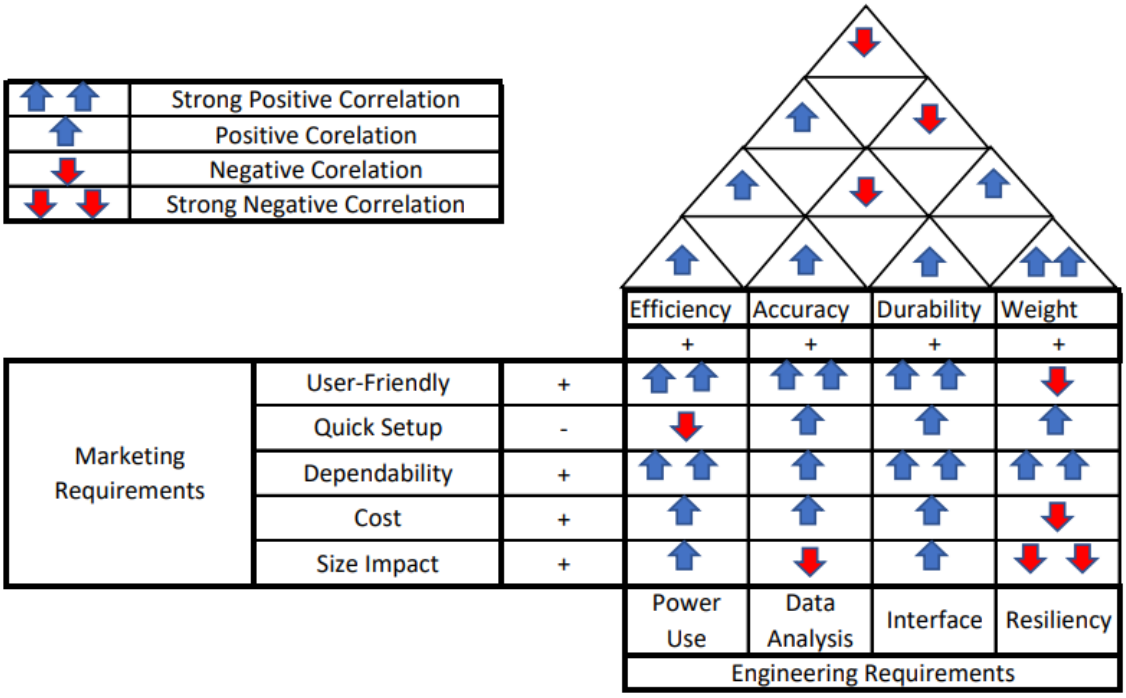

Figure 2 House of Quality

Sponsorship:

The project is been fully funded by RV Intelligence. The point of contact is the owner, Herb Gingold. He can be contact by phone: 407-832-0501, by email: herb@rviqproducts.com or by mail: 1595 Sunshine Tree Blvd. Longwood, FL 32779.

Figure 3 RV Intelligence