Final Project Proposal

Year: 2018 **Semester:** Fall   **Project Name:** Garbage Collecting Boat
Creation Date: July 30, 2018   **Last Modified:** August 24, 2018

Team Members:
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1.0 Project Description:

The team proposes a garbage collecting boat that collects floating garbage on the water surface. For the scope of this project, we do not consider water flow. The mechanism used to collect garbage is to use an upsloping conveyor belt to filter out the trash and send to the storage space. Electricity stored in storage batteries would power the whole boat. Solar panels would be installed on the boat so that the solar power can be converted to electric energy and stored in the storage batteries. A computer would control the boat through wide-area cellular radio, and the Global Positioning System (GPS) would be available on the boat. When the garbage storage space inside the boat is full, or the boat is about to run out the power, the boat would send a warning signal to the computer and return to the starting point or a preset location.

The boat would have two operation modes: fixed route mode, and manual mode. In fixed route mode, the boat would follow a route set was defined in advance with the assistant of GPS system. In manual mode, the heading would be manipulated remotely by a person from the computer in real time. There would be a camera on the boat that sends the real-time image to the computer.

2.0 Roles and Responsibilities:

Team leader – Peiyuan Shen has had leadership experience, having led the team for ECE 362. In addition, she had significant research experience in software programming and algorithms. For this reason, Peiyuan will be the team leader, maintaining communication among team members, ensuring the team is progressing and assisting fellow team members in addressing significant issues.

Systems engineer – Tianjie Jia came up with the idea of the project and has a good understanding of the overall system. Tianjie has taken both Mechanical and Electrical courses at Purdue and has a wide knowledge of the interaction of both mechanical and electrical system. For this reason, Tianjie is responsible for not only the interaction between hardware and software but also the interaction between the electrical part and the mechanical part.

Hardware engineer(Electrical engineer) – Shuang Liu has substantial knowledge and experiences with circuit designs, signal processing, and various electrical components. Shuang

also took courses in semiconductor and embedded system including coding with embedded system. Shuang also has adequate experiences and knowledge of software programming such as Java and C. With Shuang being the hardware and electrical engineer, Shuang would be able to help and manage the team solving and addressing problems of prototype design, circuit design, signal processing, PCB layout, and other hardware and electrical/electronic challenges.

Software engineer – Qianli Ma has adequate knowledge of various programming languages and microcontroller usages. He has previous experience with robotics and radio controlled models. Qianli also has experience with raspberry pi and arduino that can be used in the prototyping stage along with linux knowledge that he acquired over the years. Qianli's code has adequate documentation as a habit which makes maintenance of the code easier for the team. Qianli will also maintain the team website.

2.1 Homework Assignment Responsibilities

Homework responsibilities are detailed in figure 1, below:

Design Component Homework		Professional Component Homework	
3-Software Overview	PS	9-Legal Analysis	QM
5-Electrical Overview	SL	10-Reliability and Safety Analysis	SL
7-Mechanical Overview	TJ	11-Ethical/Environmental Analysis	TJ
8-Software Formalization	QM	12-User Manual	PS

PS: Peiyuan Shen; SL: Shuang Liu; TJ: Tianjie Jia; QM: Qianli Ma.
Figure 1. Assignment Responsibilities

3.0 Estimated Budget

An estimated budget for Garbage Collecting Boat is provided in figure 2, below:

Mechanical	Estimated Cost
Conveyor Belt	$ 80.00
Motor Paddle Wheel	$ 40.00
Packaging Materials	$ 200.00
Electrical	
Project Circuit Board	$ 200.00
Electrical Components	$ 50.00
Camera	$ 20.00

SIM Card	$ 50.00
GPS Module	$ 20.00
Other	
Shipping Costs	$ 100.00
Total Budget	$ 760.00

Figure 2. Estimated Budget

Purdue is expected to provide a $450.00 allotment for project needs. Purdue also provides common electrical components and 3D printing that should cover part of the cost for packaging and electrical components. The project costs exceeding the allotment shall be split equally among the four team members.

4.0 Project Specific Success Criteria

Below are the criteria necessary to the success of our project
1. An ability to navigate the boat and steer the direction of the boat.
2. An ability to receive direction commands set by the user interface via Wi-Fi.
3. An ability to enter GPS coordinate points in the user interface and transmit commands to the boat.
4. An ability to pause the conveyor belt when the storage room is full.
5. An ability to monitor the battery life and storage room and send corresponding retreat signal to the user interface.