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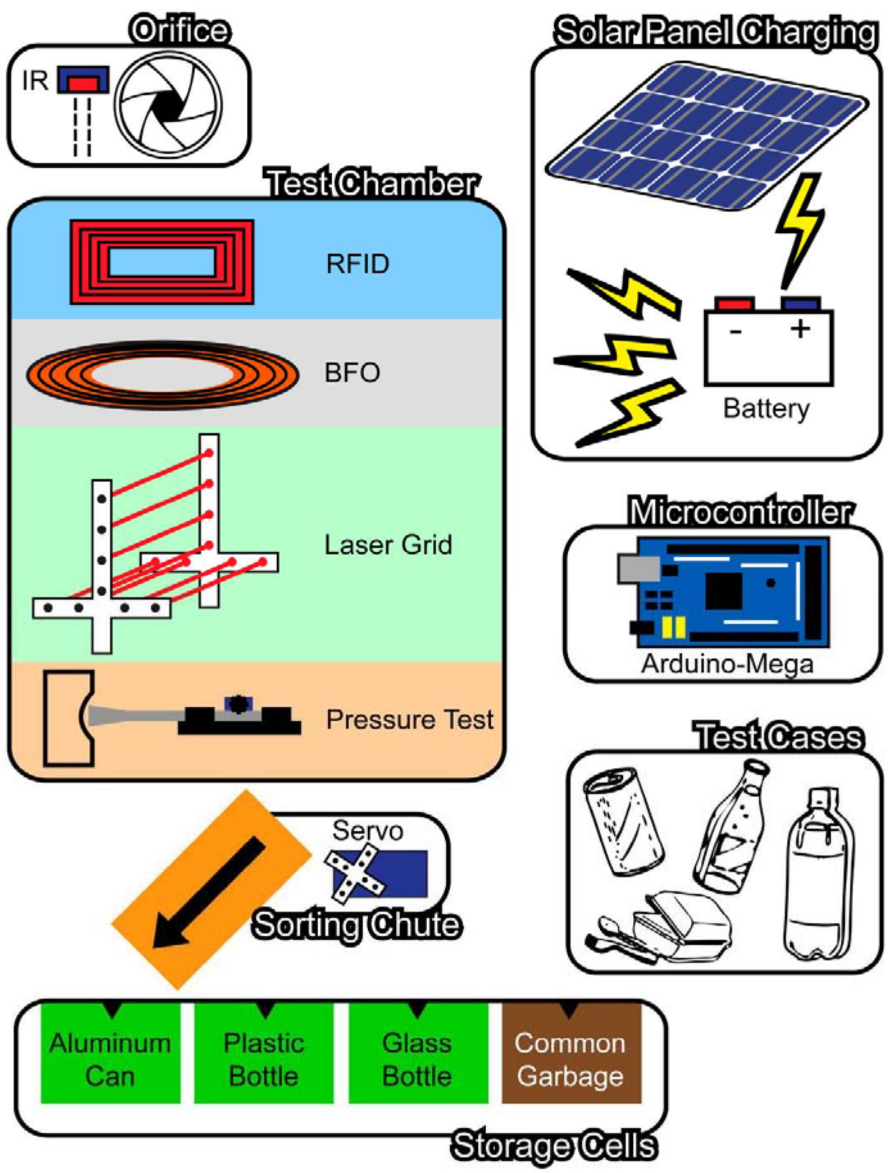
# *Progress Report – March 22, 2010*

The progress of the Green Bin, an enhanced recycling bin system, is detailed over the period of **January 4, 2010** to **March 22, 2010**. Development is slightly behind schedule, as the team encountered several bottlenecks. However, progress will hasten in lieu of their completion.

## System Development

All the components that contribute to the overall system design are presented below:



**Requirements Analysis**
The background research, regarding the practicality and usability, has been completed. An analysis of similar products was provided in the ***Proposal for an Enhanced Recycling Bin System***. The characterization of recyclables that must be processed was presented in the ***Design Specifications for an Enhanced Recycling Bin System***.

**System Level Analysis**
The research required to design and build the 7 components is mostly completed and discussed in the ***Design Specifications for an Enhanced Recycling Bin System.*** The only research that remains pertains to solar panel selection and motor properties. Rigidity characteristics are non-existent and will be conducted through testing.

**Technical Specification**
The system requirements of the Green Bin have been outlined in the ***Functional Specifications for an Enhanced Recycling Bin System***. They form a checklist for functionality, quality and implementation, which acts as a basis for our list of tasks.

The progress of each of the 7 components is analyzed in terms of what has been accomplished and what still needs to be done before it is ready for integration.

| **Orifice/Interface** | |
|---|---|
| **Complete:** | • Proximity sensor is functional with microcontroller code, sleep and processing modes |
| **Incomplete:** | • Sliding door design and actuator implementation<br>• Programming of status display |

| **Test Chamber** | | |
|---|---|---|
| **Complete:** | **Frame** | • Solidworks design of Test Chamber<br>• Test Chamber tube and mounting ribs fabricated |
| | **RFID** | • Construction of chamber antennas<br>• Circuit finalized and soldered onto perforated circuit board |
| | **BFO** | • Construction of chamber antenna<br>• Circuit finalized and soldered onto perforated circuit board |
| | **Laser Grid** | • Circuits finalized and soldered onto perforated circuit boards<br>• Laser diode and photo-resistor banks mounted |
| **Incomplete:** | **Frame** | • Combine acrylic Test Chamber parts using solvent |
| | **RFID** | • Placement and mounting of antenna on chamber |
| | **BFO** | • Placement and mounting of antenna on chamber |
| | **Pressure Test** | • Design and fabrication of sensor mount<br>• Attach to test chamber<br>• Encoder/Potentiometer characterization |

| Microcontroller | |
|---|---|
| **Complete:** | • Proximity sensor, RFID, BFO, and laser grid are all coded, perform individual testing algorithms and produce results to be tabulated<br>• Basic flow of operations utilizing point-based identification system |
| **Incomplete:** | • Write pressure test code<br>• Write status display code<br>• Write code to output signals which actuate sorting chute motor<br>• Integration of all codes<br>• Load microcontroller with RFID data |

| Sorting Chute | |
|---|---|
| **Complete:** | • Solidworks design of chute<br>• Solidworks design of trap door mechanism<br>• Construction of trap door mechanism |
| **Incomplete:** | • Fabrication and construction of acrylic chute pieces |

| Solar Panel Charging | |
|---|---|
| **Complete:** | • Built circuit design A, which provides regulated 5V: 2 independent channels that each provide 1A, total of 2A.<br>• Small-scale solar panel testing<br>• Backup wall-socket based charging supply for specific components |
| **Incomplete:** | • Order large-scale solar panels that match system specifications<br>• Build circuit design B, which provides regulated 5V: up to 3A on one channel (utilize larger solar panel, higher charge & feed rates)<br>• Implement finalized large-scale solar panels and connect to charging integrated circuit and battery supply |

| Storage Cells | |
|---|---|
| **Incomplete:** | • Purchase of materials and construction of cells |

| Test Cases | |
|---|---|
| **Complete:** | • Accumulation / characterization of typical and unusual recyclables |

## Budget

The awarded grants, incurred costs and projected costs are provided below:

| | |
|---|---|
| **ESSEF Award** | $675.00 |
| **Costs** (up to March 22, 2010) | -$740.22 |
| **Deficit** (up to March 22, 2010) | -$65.22 |
| | |
| **Additional Projected Costs** (March 23 – April 28, 2010) | -$428.24 |
| **Deficit** (up to April 29, 2010) | -$493.46 |
| **Wighton Fund Application** | $493.46 |
| | |
| **Total Project Cost** (up to April 29, 2010) | -$1168.46 |

We have applied to the Wighton Fund to cover all the remaining deficits that the company will incur. In the event that the funding is not provided in full, or there are unexpected additional costs, the team members will provide the remaining funds.

## Human Resources

The interests, abilities and expertise of each group member are elements that determine each person's role and the overall cohesiveness of the team. As mentioned in previous documentation, two distinct parings have been formed:

1. **Testing Sensory Design & Flow of Operations:** Scott Hsieh / Fritz Lapastora
   - Develops the various composition testing sensors
   - Writes the software which performs all processes in a specified order

2. **Sorting Mechanisms and Mechanical Design:** Jeremy Lau / Michael Kume
   - Develops the mechanics involved in sorting refuse
   - Designs and constructs the physical chamber

3. **Overall Design and Documentation:** David Leung
   - Assists both groups with their respective tasks
   - Provides the outline and performs the final edit for all documents

A prevailing issue which arose is whether the sensors should be designed according to the mechanics or vice versa. The resulting design methodology was to compromise and constantly make changes to both designs as development progressed. This methodology is often referred to as agile design. While this methodology is tedious, it has been chosen to ensure that the two systems can be properly integrated into one another.

## Action Items

Unlike the previous timeline, which grouped similar components together, the following provides a more segmented schedule for 510 Innovations to follow. It uniquely identifies each component and presents a more accurate estimation of the deadlines that can be achieved. Several deadlines overlap, as tasks will continue to be done in parallel.

**Solar Power Charging**

| | |
|---|---|
| 24/3/10 | As first priority, the team will decide on the panels that will be ordered |
| 14/4/10 | Upon arrival, the panels and battery will be configured to supply the entire system (with the exception of the pressure test mechanism) |

**Sensors and Software**

| | |
|---|---|
| 27/3/10 | The laser grid, BFO and RFID sensor will be mounted on to the test chamber |
| 30/3/10 | The pressure test mount will be designed and constructed, and will be attached to the test chamber and tested last |
| 3/4/10 | The software will be loaded with RFID data and updated for real-life testing |

**Sorting Mechanism and Mechanical Parts**

| | |
|---|---|
| 27/3/10 | The remaining acrylic components will be cut and constructed |
| 3/4/10 | The actuators will be set to receive output signals from the microcontroller |
| 10/4/10 | Makeshift cells and housing will be created to complement the system |
| 10/4/10 | The orifice will be attached to the test chamber |

**Testing**

| | |
|---|---|
| 16/4/10 | The system will be tested for all typical test cases |
| 18/4/10 | The system will be tested for all unexpected test cases |