University of Southern California
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Final Project Proposal

Celina Chow
celinach@usc.edu

Device Need

Hygienic practices are needed to reduce risk of infection from unsanitary waste. A touchless smart trash can would address the need by allowing a user to dispose of their trash without having to physically touch the can at all. In addition, the lid would be secured and controlled so that stray animals would not be able to spill the garbage. A dashboard will display historical information of one's garbage use and suggest ways to reduce their waste with helpful environmentally friendly tips, as well as display current status of the trash can. It will also be able to be remotely driven out to the curb.

Target Audience

The intended audience for this product is in homes and other locations where hygienic practices are important. For example, households with pets will need protection of their trash containers from the curiosity of the animals, and hospitals will need touchless systems to reduce contact-based infection transmission.

Key Features

The required features include the use of a minimum of two sensors, a minimum of two actuators, use of cloud and internet, sending data to the cloud, and receiving feedback from the cloud.

The trash can will have a touchless mode such that it will open upon being approached. A second mode will allow the user to control and drive the can via Bluetooth to move it elsewhere. Two motors will be attached to wheels for enabling the movement.

In addition to the functional electronic features, the device will incorporate some mechanical design. A scaled version of the trash can will be used a proof-on-concept for the device. The base of the can will feature a compartment with a detachable snap-fit cover that will be designed and 3D printed to house the circuitry.

Sensors

The sensors for this project to achieve the desired product functions are described in Table 1.

Sensor	Location	Purpose
Light Sensor	Underside lid of can	Detect if lid is open or closed
Ultrasonic Sensor	Outside facing outside of can	Detect if a motion is made
Piezo Element	Inside of can near top	Detect if trash level is high

Interaction Patterns

A user will wave his or her hand over the ultrasonic sensor to trigger a motor to open the trash can. After an appropriate amount of time, if there is no longer a person in front of the can, the lid will close.

The sensors will send data to the Cloud, and the results will display on the Losant dashboard interface application. The dashboard will show whether the container is open or closed via live indicator, level of fullness, and historical data on previous openings and emptyings. The dashboard would show the waste levels for all your trash cans and an evaluation your waste production history along with tips to improve.

In addition to the dashboard, the LED will glow red when the trash needs to be taken out, determined by the . A physical button or a dashboard option will switch the garbage into Bluetooth mode for which the trash can be controlled and be driven out to the curb. While in this mode, the LED will glow blue until it is disabled.

A panel in the interface app will provide the option to disable the ultrasonic sensor so that racoons or other animals' movement toward the container will not trigger it to open. Finally, a switch will be implemented to enable the user the option to turn off the smart system entirely and save power.

BUDGET

Including both kit items and non-kit items such as building supplies and other sensors, the budget is as follows. The only non-kit item is actually the 3D printed parts.

Name	Quantity	Price	Subtotal
Breadboard (Half)	1	$ 4.95	$ 4.95
Jumper Wires Standard 7" M/M - 30 AWG	1	$ 2.25	$ 2.25
Hobby Gearmotor - 140 RPM (Pair)	1	$ 4.95	$ 4.95
Piezo Element	1	$ 1.50	$ 1.50
Ultrasonic Distance Sensor - HC-SR04	1	$ 3.95	$ 3.95
Optical Detector / Phototransistor - QRD1114	1	$ 0.95	$ 0.95
Resistor 330 Ω 1/4 Watt PTH - 20 pack	1	$ 0.95	$ 0.95
Resistor 10K Ω 1/4 Watt PTH - 20 pack	1	$ 1.20	$ 1.20
LED - RGB Diffused Common Cathode	1	$ 2.05	$ 2.05
3D print material (resin, PLA, or ABS)	-	Estimate	$20.00

Total: $42.75

Total from kit: $22.75

Total not from kit: $20.00