Automated Trash Bin

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BACKGROUND

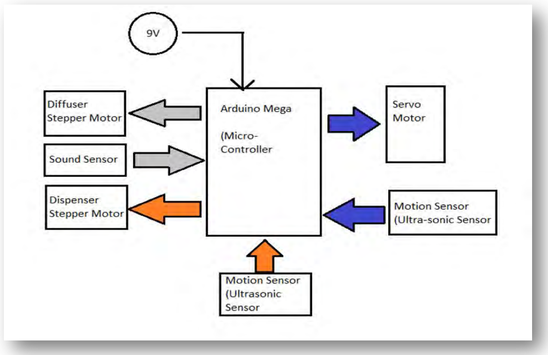
Managing trash at our home is a very important part of our home cleanliness and sanitation. Sometimes it is not cleaned or changed on time and it results in fruit flies hovering over and an unpleasant smell around the house. As we progress our way in developing a smart world, a simple trash bin in our home is also something we can optimize and automate.

Figure 1

PROPOSED SOLUTION

The lid of our trash bin operates through a servo motor that activates when the ultrasonic sensor senses a movement. The dispenser also uses an ultrasonic sensor and dispenses sanitizer after the push-pull solenoid gets activated by the sensor. The diffuser operates on a sound sensors which in turn activates a push-pull solenoid to diffuse air freshener. And all of these would be controlled by an Arduino Mega micro-controller which gets the power supply through a wall plug in.

Figure 2



SYSTEM DESIGN

Ultrasonic sensor:
This sensor detects the subject/object. It uses waves to determine how far the object is located. It sends signal to Arduino for further processing.

Power Supply: (Wall plug-in)
This is the power source for the Arduino and its peripheral. It converts 120VAC to 9VDC. This adapter is chosen based on the voltage and current rating of the Arduino.

Figure 3

Arduino Mega Processor:
Arduino provides a flexible source hardware configuration. Its open software and widespread availability are additional advantages for a system operating on a large scale. It also carries out few minor calculation like the distance of the object.

Servo Motor:
Servo motor is used in two cases. This is used to lift the lid and to pull down the sanitizer. It operates based on the signal provided by Arduino.

Customization

1. Install freshener integrated with stepper motor/ servo motor and sound sensor. More PWM pins would be used for this step.
2. Volume trash detection could also be done. Ultrasonic sensor could be used to detect the height of the trash inside. LED light could be used to indicate if the bin is full.
3. Automatic trash bag closing mechanism. There are YouTube tutorials on how to make it this mechanism more efficient.

Figure 4

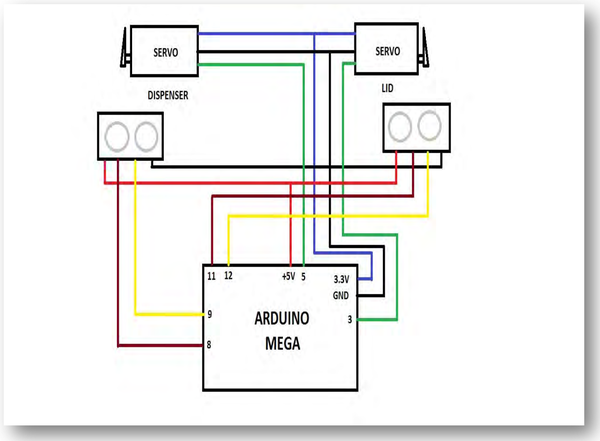
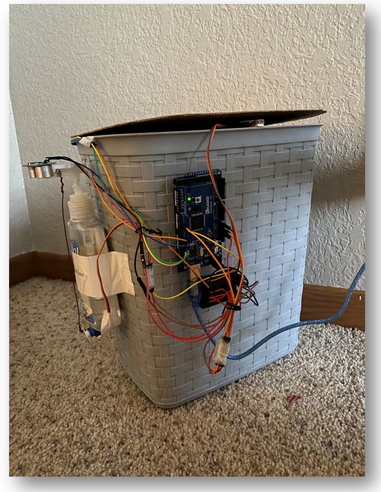


Figure 5



FUTURE DIRECTION

- The running wires could be covered by making an extra layer to the bin.
- To reduce the cost, only specific used components of Arduino could be used through PCB design.
- Explore integrated circuits options to reduce size of smart trash bin.
- Sensor to measure the volume of trash in the bin.
- Volume production to reduce the total per bin cost.

REFERENCES

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