SMART BIN

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Abstract

The Smart Bin project aims to address the increasing environmental issues due to rapid population growth and the consequent rise in garbage. The project involves the development of a smart dustbin that utilizes an Arduino UNO, ultrasonic sensors, and a motor to enable contactless waste disposal. The smart dustbin senses the presence of an object near it and automatically opens its lid, thereby minimizing physical contact and promoting hygiene. This innovation is particularly pertinent in the context of the ongoing pandemic, where reducing contact with surfaces is crucial for preventing the spread of viruses. The smart dustbin represents a step towards smarter waste management solutions, enhancing cleanliness and hygiene in public and private spaces .

Background

The Smart Bin project is grounded in the necessity for efficient waste management solutions to address the escalating environmental concerns driven by the rapid increase in population and garbage production. The implementation of smart dustbins represents an innovative approach to managing waste more effectively and hygienically, particularly during the ongoing pandemic.

The project employs an Arduino UNO microcontroller as the core component, which interfaces with ultrasonic sensors and a servo motor to facilitate the automatic opening and closing of the dustbin lid. This contactless operation significantly reduces the risk of virus transmission by minimizing the need for physical interaction with the dustbin.

Materials and Methods

I Materials and Methods of Smart Bin Project

Components Used:

1. Arduino UNO: A microcontroller board based on the ATmega328P. It has 14 digital input/output pins (6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

2. HC-SR04 Ultrasonic Sensor: Uses non-contact ultrasound sonar to measure the distance to an object. It consists of two ultrasonic transmitters, a receiver, and a control circuit.

3. Servo Motor: Controls the movement of the lid, enabling it to open and close automatically.

4. Battery: A nine-volt battery, either disposable or rechargeable, used to power the system.

5. Jumper Wires: Connect various components on the breadboard and Arduino board.

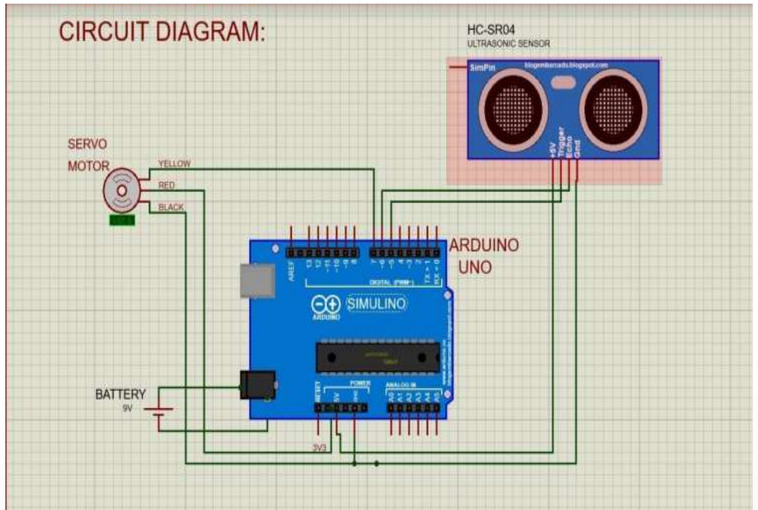
6. Breadboard: A construction base for prototyping electronics.

Software Required:

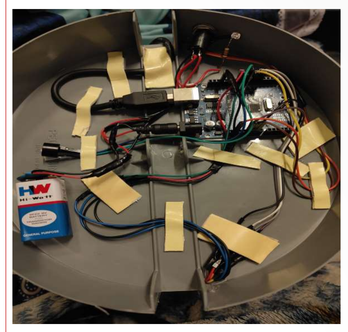
7. Arduino IDE: A cross-platform application used to write and upload programs to Arduino-compatible boards. It supports C and C++ languages and provides a software library from the Wiring project for common input and output procedures.

Wiring and Configuration:

- **Ultrasonic Sensor: Echo pin connected to digital pin D6, trigger pin connected to digital pin D5, +Vcc pin connected to +5V supply, and GND pin connected to the ground pin of Arduino Uno board.**
- **Servo Motor: Control (PWM) pin connected to digital pin D7 of Arduino.**



Results



The project Smart Dustbin using Arduino Uno, HC-SR04 ultrasonic sensor, and servo is completed with a fully functional prototype which meets all the objectives of the project. The robotic dustbin opens its lid itself when the potential user of the dustbin approaches it by adopting the principle of sonar wave as mentioned above. It has been tested under different conditions and with different types of users, and so far, no significant issues have been observed in the prototype.

Conclusion

The project Smart Dustbin using Arduino Uno, HC-SR04 ultrasonic sensor, and servo is completed with a fully functional prototype which meets all objectives of the project. The robotic dustbin opens its lid itself when the potential user of the dustbin approaches it by adopting the principle of sonar wave as mentioned above. It has been tested under different conditions and with different types of users, and so far, no significant issues have been observed in the prototype.

Future Direction

The people of this new world after the pandemic are choosing an anti-touch way of living. This technology can reduce human contact with various objects present in society and would prevent the spread of contagious viruses. The above technology can be implemented on dustbins, toilet seats, ticket counters, no-touch hand sanitization, and many other applications.

Acknowledgments

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