AutoBin

Portable Automated Trash Bin

- **Abstract:**

  The objective of this project is to provide a smart solution for collection of waste where the user has to engage in as little mobility as possible. This project was designed for people who are physically handicapped or for environments that require less mobility. The primary interfacing components used in this project are Arduino Uno R3 x2, Arduino Bluetooth Module HC-05 and Motor Shield L293D. The Arduino Bluetooth Module HC-05 uses the bluetooth SPP protocol along with UART protocol. The bluetooth protocol is used to wirelessly transmit serial data between the HC-05 and the paired bluetooth device. Meanwhile, the UART protocol is used to communicate with the arduino.

- **Problem Statement:**

  Improper disposal of waste and lack of convenient waste collection methods result in increased human effort and unhygienic conditions. Traditional methods involve a person to manually dispose of waste which can be inconvenient for the elderly or physically handicapped people. This project provides a solution by automating the waste collection process. The robot is called upon via a remote control, when it reaches the user, it opens the bin upon sensing an object in front of the bin. After collecting the waste, upon command, it goes back to its original position. When the waste basket is full, it notifies the user to empty the basket using a led light.

- **Significance:**
  - An efficient and hygienic waste management system.
  - Helps to keep the workspace clean without leaving the area.
  - Prevents contamination by timely and contactless disposal of waste.
  - Allows workers to remain in their workspace in crucial operation or when mobility is not feasible

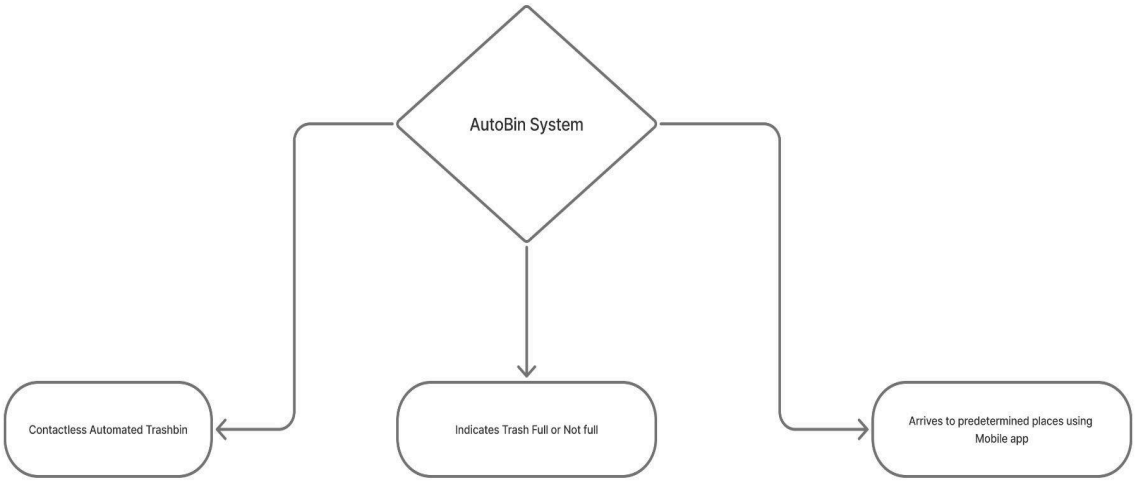
- ## Components:
    - **Microcontroller:** Arduino UNO R3s (containing an ATmega328 microcontroller, I/O pins, a power supply interface, and a COM port).
    - **Sensors:**
        - HC-SR04 Plus Ultrasonic Sensor.
        - IR Sensor Module.
    - **Actuators:**
        - Servo Motor Micro SG90 (180 degree).
        - BO Geared Motors (motors with wheel attached).
    - **Body/Chassis:** foam board, plastic trash can, and 4WD wooden chassis.
    - **Additional Components:** Motor Shield L293D, Arduino Bluetooth Module HC-05, LED light, Li-ion Batteries, mini breadboard, battery holder, rocker switch, jumper cables, and thread.

Image of AutoBin:

● Communication Protocol:

The UART protocol is used to facilitate serial data communication between the HC-05 Bluetooth module and the Arduino board. Additionally, the Bluetooth protocol is employed to enable wireless transmission of this data between the HC-05 module and a paired external device.

Flowchart



● Future Work:

For future developments, camera based navigation with waste classifier can be installed to detect and properly identify between users and obstacles and include a hardware to collect the found waste automatically.

● Potential Applications:

In professional environments such as laboratories, hospitals or workstations, this robot can ensure that waste is disposed of in a timely manner without the operator/worker having to leave their designated space. Also can be used in Elderly & Disabled Care Facilities and Smart Cities with Urban Infrastructure .