

# Automatic Trash Collector Robot

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DOI: 10.29322/IJSRP.10.04.2020.p10028  
<http://dx.doi.org/10.29322/IJSRP.10.04.2020.p10028>

**Abstract-** In our current scenario life people are facing lots of problems due to improper waste collection and disposal of it. Filled garbage bins causes many problems to the nearby persons and also pollutes the environment. Finding the garbage bins on each floors whether it is filled or not is very difficult. For this problem we introduce our system to solve it. It will save the time and it also prevents the surroundings from pollution. This method is used automatically to identify the level of bins and the send data to a trash collector which inturn comes and collect the trash from the bins. Arduino UNO board is used to process the data from the ultrasonic sensor and the Bluetooth module is used to send the data to the UNO board in the trash collector. Garbage level can be detected by using the ultrasonic sensor which is used as the level detection unit and the information is passed to the UNO board with the help of the Bluetooth module. With the help of that data, the trash collector identifies the bin which is filled on the floor and moves in the predefined path with the help of Infra-Red sensors and ultrasonic sensor for movement and returns back to its initial position after collection of trash.

**Index Terms-** Automatic, Arduino UNO, Ultrasonic sensor, Infra-Red sensor, Bluetooth Module.

## I. INTRODUCTION

As the population in our country is rising, tonnes of trash unit are being generated. Improper management of waste affects the standard lifetime of individuals. Thus, waste management is an important issue or crisis to be thought of. Zigbee and GSM units are used in a number of foremost usually known and proved technologies for transmission of signals in the previous areas of analysis. RFID technology has been used for distinguishing the target objects by attaching a tag to the trash bins for identifications. These technologies are designed either for monitoring or collecting trash placed on outdoors. There are very limited technologies that are specifically designed for indoor operations due to some complex and advanced operations in receiving the signals. This planned system is specifically designed for floor waste collection purpose for any high rise buildings.

## II. LITERATURE REVIEW

Shobana et al [1] planned a system which continuously monitors the level of the waste and passes the information on to the cloud storage. Once the garbage is filled the information is transferred to the personnel who with the assistance of a GPS identifies the location of the bin. This system also monitors the temperature of the bin incase of any emergency fire incidents.

Fetulhak Abdurahman et al [2] designed a system that completely monitors the amount of garbage filled in the Bin with different level indicators for denoting the extent of the trash. This system uses Arduino board and ultrasonic sensors for detecting the level of the waste and the info is passed when the bin is filled through a GSM module stuffed to a mobile which is connected.

Rakshith Ranganath et al [3] designed a system which completely does an autonomous process for collecting trash. This system “Wall-E” uses master slave method between a Raspberry Pi and an Arduino Board. The Raspberry Pi board is the master board which identifies the object through a vision system and based on the object identified the command is passed on to the slave board i.e. Arduino Uno which does the remainder of the process such as collecting the trash by activating the motors.

### III. SYSTEM WORKING AND DESCRIPTION COMPONENTS

#### *A. System Working*

The components used in this project are ultrasonic sensor, Infra-red sensor, HC-05 Bluetooth module, Arduino UNO and L298N driver module. The planned system monitors the amount of waste that is being stuffed within the dustbin and when filled the signal is transferred to the arduino board through a HC-05 Bluetooth module. Upon receiving the signal the motor is turned ON and the Infra-Red sensor is employed to follow the trail to reach the required destination of the bin. For making a turn and track the path the IR sensors present on the sides are used as a the detection unit. Based on the signal received from the sensor unit the arduino makes the decision and adjusts the motor to make the turn. Upon reaching the destination wherever the trashcan is placed the arm is mechanically adjusted to pick the dustbin and it is dumped. After the process is finished the Trash collector is returned to its initial position.

#### *B. Use of Simulation software*

To design the graphical model of the overall system Fusion 360 software was used. Each and every part of the system was designed as per the needs and assembled together. A replica of the working model is created using this software and further processing of the design can also done such as the impact it takes due to environmental factors.

#### *C. Description of Components*

This automation technique uses a mix of sensors to work as a single unit and the information is transferred with the help of a Bluetooth module to an Arduino board which does all the necessary processing.

#### *Arduino:*

Arduino Uno is a microcontroller board based on the more capable ATmega328P. It has 14 digital input/output pins of which 6 can be used as Pulse Width Modulation outputs, 6 analog inputs, 16 MHz ceramic resonator for clock triggering, a USB connection. It also consists of a power jack, an ICSP header and a reset button. Arduino Programming is an easy process and can be programmed with the help of Arduino software and can be altered easily based on the needs of the system. The output voltage through the Arduino board is used as the power supply for other components.

#### *HC-05 Bluetooth module:*

HC-05 is a Bluetooth module used for wireless communication with Bluetooth enabled devices such as smart phones and other electronic communication devices. It communicates with microcontrollers using a serial communication. Default settings of HC-05 Bluetooth module can be changed using certain AT commands as per the requirements. It is used for many applications in our daily devices such as wireless connectivity of headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications. It has a range of <100m which depends on geographic & urban conditions. It is possess IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It can also implemented in the function of Master-Slave method.

#### *Infra-Red sensor:*

An on board LED is utilized to demonstrate the nearness of a shaded portion. This is a multipurpose infrared sensor which can be utilized for identification shaded portions. The sensor gives a computerized just as simple yield. The measure of reflected light relies on the shade of surface from which it is reflected. The reflection is diverse for various shaded surfaces. This makes it a shading identifier. An IR LED and a Photo diode are utilized in a blend for nearness and shading recognition.

#### *Ultrasonic Sensor:*

Ultrasonic sensor utilizes SONAR to make a decision of the distance of an object simply like what the bats do to detect obstacles. It offers superb non-contact extend location with high exactness and stable readings in a exceedingly easy to utilize bundle from 2 cm to 400 cm range or 1" to 13 feet. Ultrasonic sensors has the ability to detect with precision of up to 0.3cm.

#### IV. BLOCK DIAGRAM

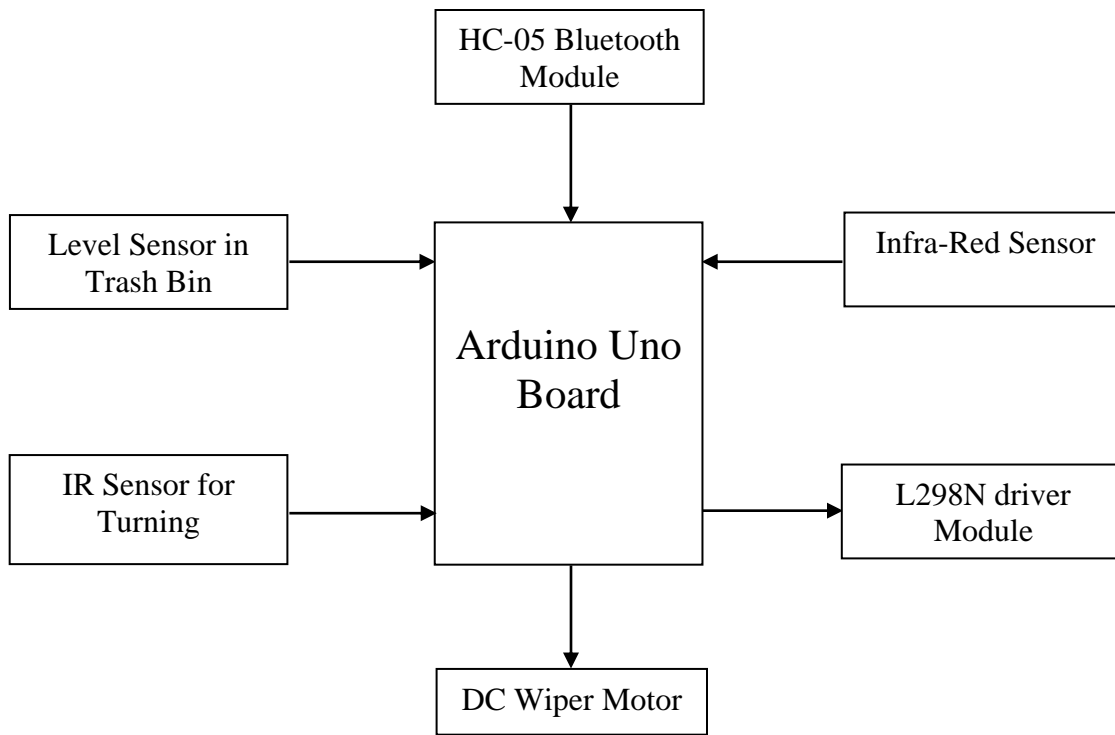


Figure 1: Block Diagram of the Circuit

The above block diagram represents the flow of information from each component to the Arduino board. The Bluetooth module sends the information of the level of trash in the bin onto the Uno board which processes it and later it activates the Motor to start moving forward with the help of the information received from the IR sensors. The required input supply is given to the motors with the help of the driver module.

### V. FLOWCHART

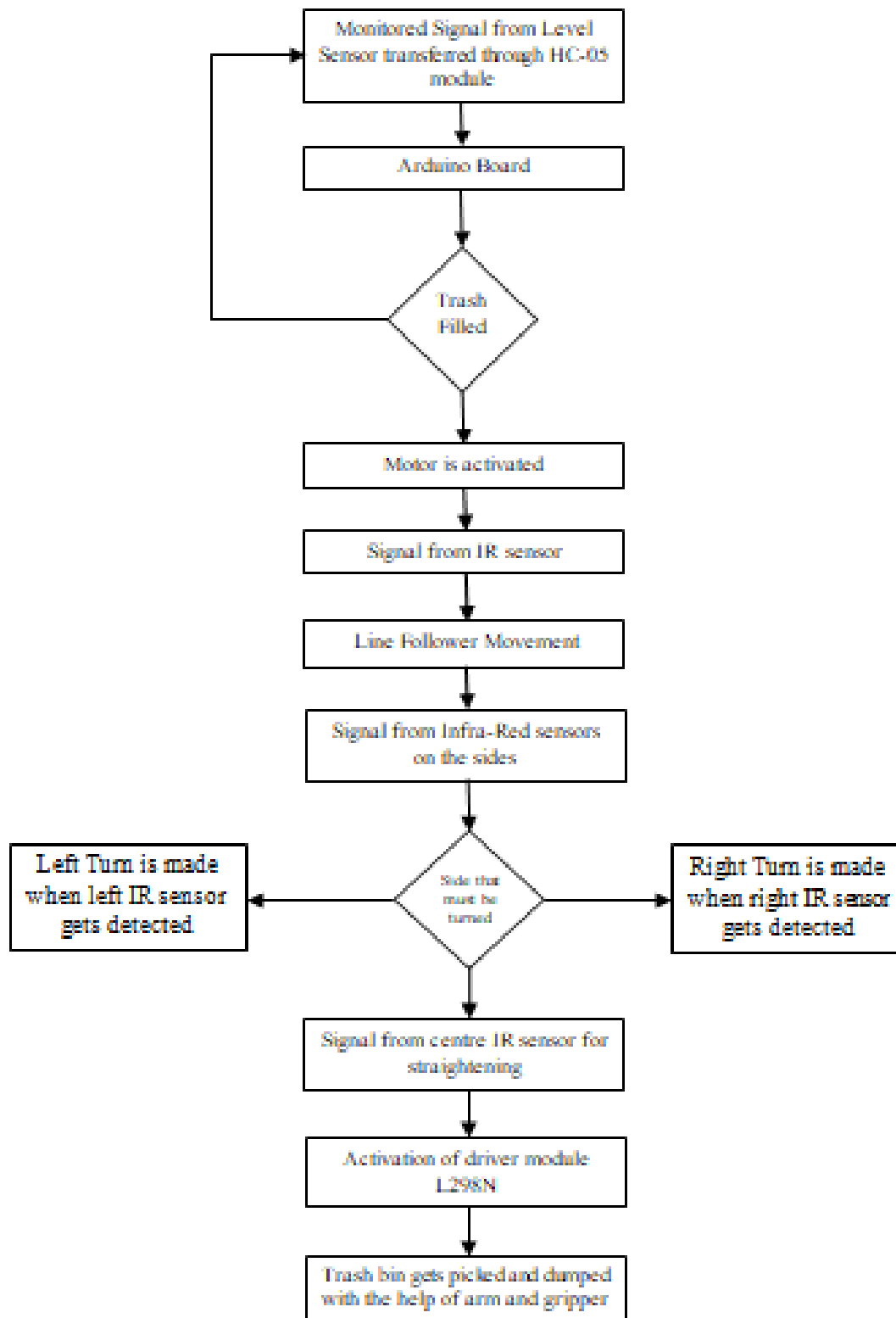


Figure 2: Flowchart of the system process

## VI. DESIGN AND FABRICATED MODEL

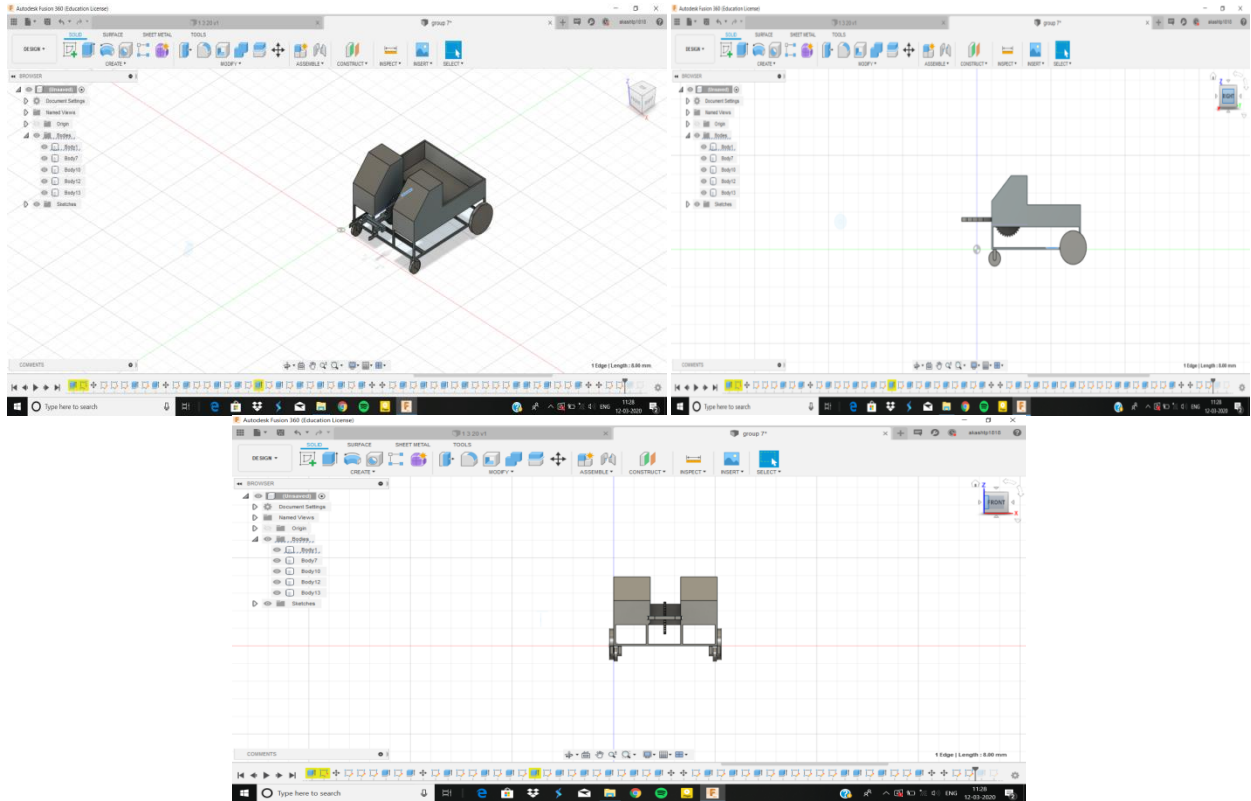


Figure 3: System Design



Figure 4: Fabricated Working Model

## VII. CONCLUSION

This is a perplexing undertaking which interfaces the information processing gadgets, for example, sensors and the Arduino Uno board. As we tend to recognize, creation of recent innovations has prompted fritter away of our valuable time by an extensive edge. This is a Mechatronics venture with such kind of utilization. The tasks like this have an incredible impact in the present situation. The machines can finish the works all the more accurately in brief timeframe with smallest of efforts. By including additional technologies such AI and Machine Learning the robot can perform far more additional tasks.

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