



# Degradable & Non– Degradable Wastes Seperation Using Pick & Place Robot

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**ABSTRACT:** The aim of development of this research thesis is towards providing an efficient and simple method for Degradable and Non- Degradable waste separation using Pick and Place Robot. Proposal of simplest image processing technique for robotics using Android mobiles is also a part of the research. In India, degradable and non-degradable wastes in streets are separated by humans. Hence human facing lot of communicable diseases. This research paper is about eradication of humans from the street waste management by implementing an advanced Pick & Place Robot for street waste management.

**KEYWORDS:** Pick & Place; Image Processing; Degradable; Non-degradable; Android; Arduino

## I. INTRODUCTION

Robotics is the branch of engineering science & Technology related to robots, and their design, manufacture, application, and structural disposition. Robotics is related to electronics, mechanics, and software. Robotics research today is focused on developing systems that exhibit modularity, flexibility, redundancy, fault-tolerance, a general and extensible software environment and seamless connectivity to other machines, some researchers focus on completely automating a manufacturing process or a task, by providing sensor based intelligence to the robot arm, while others try to solidify the analytical foundations on which many of the basic concepts in robotics are built. The pick and place robot is a microcontroller based Mechatronics system that detects the object, picks that object from source location and places at desired location. For detection of object, infrared sensors are used which detect presence of object as the transmitter to receiver path for infrared sensor is interrupted by placed object. The various mechanisms used for waste separation in India are Human intervention, Picking, Screening, Air Classification, Magnets, Optical separation, Eddy current and Flotation. The Robots are employed for the sewage management in Japan. Such Robots are called as sewer Robots. (Waseda University, Japan). The study of sewer robot in this paper focuses on the sewage water management through different robots such as PIPAT, KARO, KURT, MAKRO[5].

## II. SYSTEM MODEL

Android mobile with apk file is used to detect the usable (vegetables) and non-usable (plastic cover) objects. And it will send that information to the microcontroller unit via Bluetooth module. After receiving this information, microcontroller unit will drive the robotic arm for the particular objects. When microcontroller unit receives '1' means from the bluetooth it will find the non-usable object and it will take and put it on to the separate box. Similarly when it receives '0' means robotic arm will find the usable objects and it will take and put it on to the separate box.

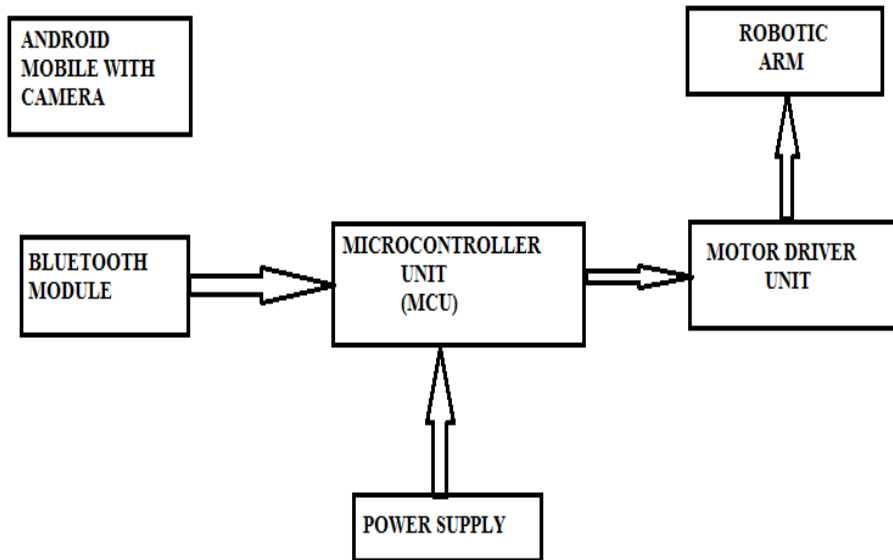


Figure 1- Schematic Block Diagram

### III. ROBOTIC IMAGE PROCESSING

1. Using Mat lab
2. Using Lab VIEW
3. Using DIP
4. Using Programming languages (Java, Python)

In this Project, new technology for robotic image processing through Android devices for Pick & Place Robot. The comparison is done between the captured image and available database content. Then the compared result is transferred to Microcontroller via Bluetooth module. Generally in the above mentioned techniques ordinary Microprocessors such as 8085, MIPS fails to perform Image processing mechanisms such as image recognition, comparison etc. But through Android Image Processing an ordinary Processor can perform Image processing effectively. Hence Comparing with existing technologies the complexity, costs of implementation are drastically minimized.

### IV. ANDROID APPLICATION DATA BASE

The application is developed using Eclipse android app development software. It consists of Degradable & Non-Degradable database image contents. The degradable database contents are labeled as '0' & Non-Degradable data base contents are labeled as '1'. List of some Degradable & Non-Degradable wastes are given in Table 1. These are some Waste Prototype taken for testing purpose.

Degradable wastes under Label '1'	Non-Degradable wastes under Label '0'
Leaves	Glass
Food Wastes	Wood
Papers	Plastic Covers

Table-1

## V. BLUETOOTH MODULE

The Bluegiga WT11 module provides Bluetooth communication between Android mobile and arduino board with microcontroller. It communicates with ATMEGA microcontroller via serial RX and TX pins on the board.



Figure 2- Bluegiga WT11

The BT has 4 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and some low-level code.

## VI. ARDUINO BOARD

Arduino is an open source prototyping platform based on easy to use hardware & software. In our project we use Arduino board mounted with PIC controller, they are able to read inputs from Bluetooth module and turn into an arm movement.

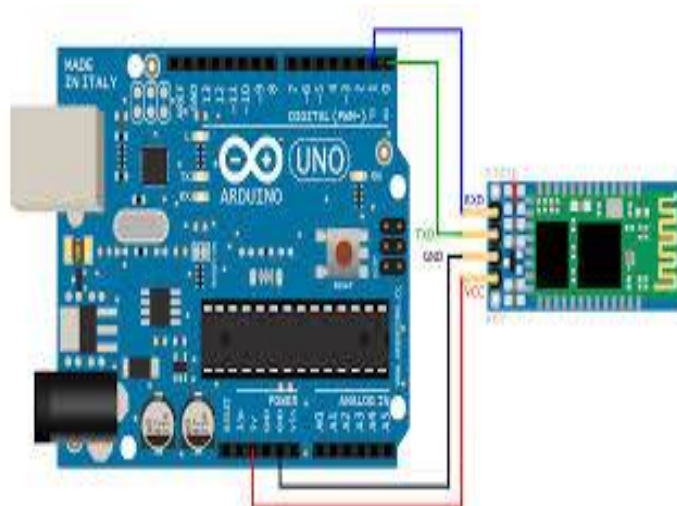


Figure 3- Arduino UNO

Arduino programs may be written in any programming language with a compiler that produces binary machine code. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio.

#### IV. ANDROID APPLICATION PERFORMANCE



Figure 4- Android app performance

#### V. PICK & PLACE ROBOT

Pick & Place robots are made up of mechanical arms, they usually programmable, with similar functions to a human arm. The links such as manipulator are connected by joints allowing either rotational motion or translational displacement.

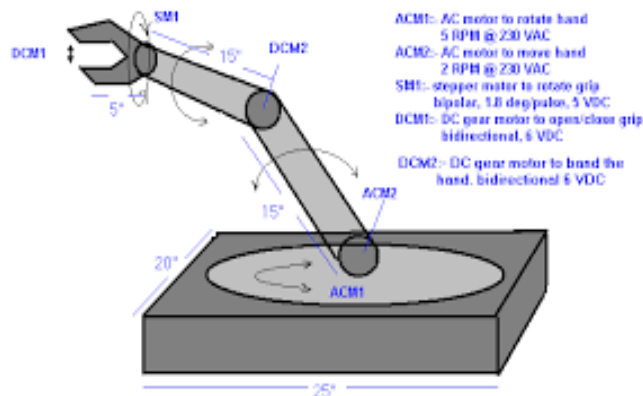


Figure 5- Pick & Place Robot

#### VI. ROBOT PERFORMANCE

The Pick & Place Robotic arm moves with respect to the transmitted Bluetooth signal. The Bluetooth serial signals are transmitted from user using Android mobile through LMDA application to Bluegiga module. The table shown below explains the robotic performance with respect to transmitted signal. The following table explains the user interface with Robotic arm.

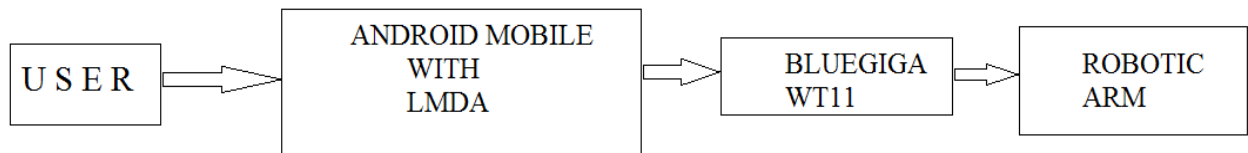


Figure 6- User interface with Pick & Place Robot through Bluetooth

Transmitted Bluetooth Signal	Robotic Arm Performance
0	Pick & Place the object Left
1	Pick & Place the object Right
3	Move Robotic Arm down
4	Move Robotic Arm up
5	Open the Robotic Hand (End Effector)
6	Close the Robotic Hand (End Effector)
7	Rotate the Robotic Arm Clockwise (Right side)
8	Rotate the Robotic Arm Anti- Clockwise(Left side)

Table- 2

## VII. TEST SIMULATION

The Performance of the pick & Place Robotic arm is simulated for testing purpose. A simple Serial motor is assumed as Pick & Place Robot's Arm. The test is made through Proteus E-design Software and the coding for Microcontroller is done with Arduino software (Embedded C). When the push button is pressed then the motor runs in clock wise direction (When Degradable waste is sensed by android camera then it is to be picked and placed in left side). When the push button is released the motor runs in Anti-Clockwise direction (When Non-Degradable waste is sensed by Android camera then it is to be picked and placed in Right side).

## VIII. EXPECTED OUTCOME

Simulating Motor rotation in both clockwise & anticlockwise directions with respect to the inputs from push buttons. Obtaining high speed communication through Bluetooth modules. Achieving better wastes separation through pick & place prototype.

## IX. ADVANTAGES

Minimal cost of operation & Implementation. Occupies compact space. Effective waste separation. Human intervention in waste separation can be eradicated.

## X. CONCLUSION

By implementing Android image processing, a simple microcontroller can perform better image processing effectively. Hence Robotic arm accurately separates the wastes with which humans are free from waste separation process. Implementing for bulk waste handling. Implementing Online based monitoring.



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