Designing and Modeling of Automatic Garbage Collector

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ABSTRACT

This research aims to design and make AGATOR (Automatic Garbage Collector), a rotor robot model as automatic garbage collector to counter accumulation of garbage in homes and offices. The method of implementation is design and construction. This method includes the identification of needs, analysis of the components required specifically, hardware and software engineering, developing, and testing. The test results obtain data by specification of AGATOR include MC 8051 and Bluetooth module with 5 V voltage and IC Driver with 12 V voltage Support devices of the robot are mechanical robot, robot control system, sensor system. Maximum load drives the garbage receptacle until 5 kg.

Keywords : Automatic, Counter, Software, Bluetooth, Sensor

I. INTRODUCTION

Garbage is a major problem worldwide attention. It can be seen from organizations that support and fix this problem, such as Ocean Conservancy [1-2]. The process of making things automatic is being exploited in almost all the major fields of life. Making things automatic reduces burden on the humans. The cost and effort used in manually controlled products is much higher than the automated systems. Considering the fact, that the problem of efficient waste management is one of the major problems of the modern times, there is an utmost need to address this problem. The proper waste management system is must for the hygienic society in general and for world as a whole. Solid waste which is one of the sources and causes of environmental pollution has been defined under Resource Conservation and Recovery Act as any solid, semi-solid liquid or contained gaseous materials discarded from industrial, commercial, mining or agricultural operations and from community activities. Solid waste also includes garbage, construction debris, commercial refuse, and sludge from water or waste treatment plants or air pollution, control facilities and other discarded materials. In order to protect human health and the environment from the potential hazards of delayed waste disposal and environmental pollution a systematically supervised and controlled handling of these wastes is must. The type of wastes which constitute environmental pollution and which this work emphasizes on is domestic refuse consisting of degradable food waste s, leaves, dead animals and non-degradable ones such as plastics, bottles, nylon, medical and hospital wastes, generated in households, hospitals, industries and commercial centres[3].

II. LITERATURE REVIEW

Gabriele Ferri, Alessandro Manzi, et al. (May 2011)[4] reported on the design and the experimental results of Dust Cart, a wheeled autonomous robot for door-to door garbage collection. Dust Cart is able to navigate in urban environments avoiding static and dynamic obstacles and to interact with human users. The robot is managed by an Ambient Intelligence system (AmI) through a wireless connection: it navigates to collect garbage bags to the houses of users and then moves to discharge the collected waste to a dedicated area. The architecture, navigation and localization systems are described along with the results achieved indifferent urban sites. In particular, a localization approach based on optical beacons was used and guaranteed position errors sufficient for a safe robot navigation. This can be considered as a first step in using robotics in the everyday life of a real town for providing a real service.

Wilson, Jovna Jetto,Alna Thomas, Dhahabiya V K(August 2016)[5] explained that From the times of the British raj to this date ,scavenging rail tracks has been a puzzling social issue. The fact that humans have to clean human waste and other garbage thrown on rail tracks is a situation that needs immediate remedy. Manual scavenging is done now-a -days, owing to the peculiar nature of the job, and many who are engaged for this job suffer from related health problems. The prevailing condition can be rectified to some extent by the adequate use of robotics and control technology. The proposed idea of automatic railway track cleaning system comprises an automatic vehicle that goes on landand track. This proposed intelligent machine specially designed for the Indian railways can clean the railway tracks in a systematic manner. It consists of a four-wheel running robot with a suction unit, cleaning unit, automatic displacement unit, an intelligent control system, We have accomplished some functionality critical in the waste clean-up in railway tracks ,and have also tried to find solution for connected problems.

Seohyun Jeon, Minsu Jang, Daeha Lee, Young-Jo Cho, Jaeyeon Lee(November 2015)[6] presented a mathematical formulation of the problem of cleaning a large public space with multiple robots ,along with a procedural solution based on task reallocation. The task in this problem is the cleaning zone. A group of robots are assigned to each cleaning zones according to the amount of Resource constraints make cleaning robots stop operation periodically, which can incur a mission failure or deterioration of the mission performance. In our solution approach, continuous operation is assured by replacing robots having resource problems with standby robots by task reallocation. Two resource constraints are considered in our formulation: the battery capacity and the garbage bin size. We describe and compare the performance of three task real location strategies: All-At-Once, Optimal-Vector ,and Performance-Maximization. The performance measures include remaining garbage volume, cleaning quality, and cleaning time.

Keita Matsuo, Yuichi Ogata, Kouhei Umezaki, Evjola Spaho, Leonard Barolli(2012)[7]described that recently, there are many problems caused by global environment warming. The limited natural resources require efficient methods and systems for recycling and

processing of the wastes for a better environment. One of the problems today is the processing of the kitchen garbage, because when they become in large amounts in small areas, the natural capacity of the environment cannot assimilate them. Therefore, construction of the recycling systems is needed to save the resources and minimize the wastes. For this reason, in this paper, we have proposed and implemented waste management robots, which can change the kitchen garbage to compost .Then, the compost can be mixed with the ground and used for growing of vegetables and other plants.

Chang Wang, Koen V. Hindriks and Robert Babuska (November 2014)[8]explained that learning to perform household tasks is a key step towards developing cognitive service robots. This requires that robots are capable of discovering how to use human-designed products. In this paper, we propose an active learning approach for acquiring object affordances and manipulation skills in a bottom-up manner. We address affordance learning in continuous state and action spaces without manual discretization of states orex ploratory motor primitives. During exploration in the action space, the robot learns a forward model to predict action effects. It simultaneously updates the active exploration policy through reinforcement learning, whereby the prediction error serves as the intrinsic reward. By using the learned forward model, motor skills are obtained to achieve goal states of an object. We demonstrate through real-world experiments that a humanoid robot NAO is able to autonomously learn how to manipulate two types of garbage cans with lids that need to be opened and closed by different motor skills.

III. OBJECTIVES

The main goal of this automatic root is to make ensure cleanness of unwanted things or garbage in the surroundings by the use of Bluetooth module and microcontroller.

IV. METHODLODGY

The idea of the project automatic garbage collector is to ensure that , the specific areas under this robot , such as home , offices are clean. The main objective of the project to design a robot which can clean unwanted

things or garbage in homes and offices by using the combination of microcontroller and Bluetooth technology. MC 8051 is used which is of 8 bit. For sending and receiving data to robot, HC-05 Bluetooth module is used.HC-05 module is an easy to use Bluetooth module SPP(Serial Port Protocol) design for transparent wireless serial connection setup . Two different level of supply is used for robot , one is12v for DC geared motor and another is 5v supply for MC unit. By using of BT module technique we can reduce the chances of mismatches of frequency. The main part of this system is an Android App , which is send and receive commands. The another advancement in this system is, obstacle avoiding. When any type of obstacle in front of robot , then it will change their path automatically to avoid the obstacle. So overall cost is reduced by using of BT module and MC unit. Figure 1 shows the block diagram automatic garbage collector. Figure 2 shows the flow chart of proposed project[10].

A. FOR HARDWARE

- For hardware general purpose PCB is used, which containing circuit layout on backside.
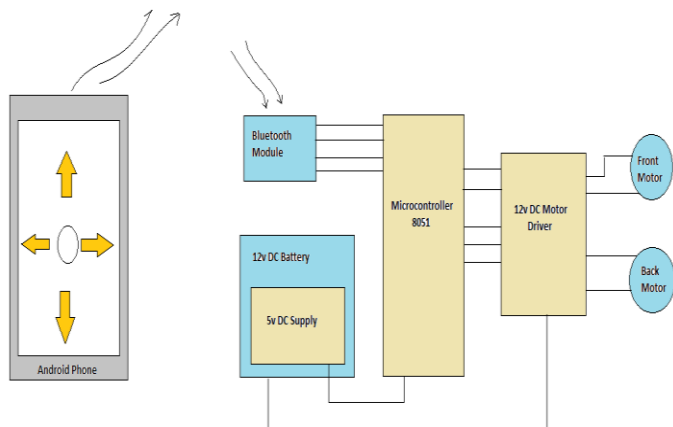
Figure 1. Block Diagram automatic garbage collector
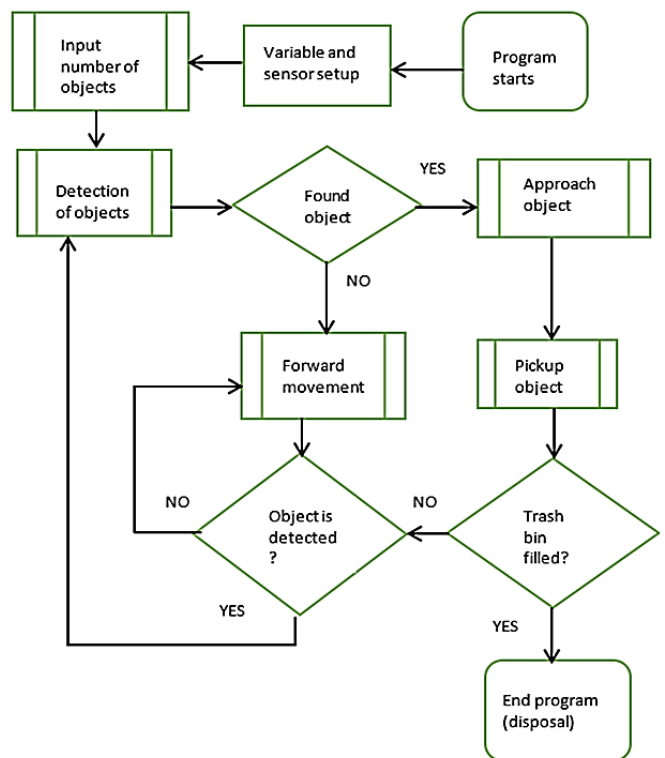
Figure 2. Flow chart of proposed project[10]

B. FOR SOFTWARE (KEIL SOFTWARE)

- Install the Keil Software in the PC in any of the drives.
- After installation, an icon will be created with the name "Keil Vision3". Just drag this icon onto the desktop so that it becomes easy whenever you try to write programs in keil.
- Double click on this icon to start the keil compiler.
- A page opens with different options in it showing the project workspace at the leftmost corner side, output window in the bottom and an ash colored space for the program to be written.
- Now to start using the keil, click on the option "project".
- A small window opens showing the options like new project, import project, open project etc. Click on "New project".
- A small window with the title bar "Create new project" opens. The window asks the user to give the project name with which it should be created and the destination location. The project can be created in any of the drives available. You can create a new folder and then a new file or can create directly a new file.

- After the file is saved in the given destination location, a window opens where a list of vendors will be displayed and you must select the device for the target you have created.
- The most widely used vendor is Atmel. So, click on Atmel and now the family of microcontrollers manufactured by Atmel opens. You can select any one of the microcontrollers according to the requirement.
- When you click on any one of the microcontrollers, the features of that microcontroller will be displayed on the right side of the page. The most appropriate microcontroller with which most of the projects can be implemented is the AT89S52. Click on this microcontroller and have a look at its features. Now click on "OK" to select this microcontroller.
- A small window opens asking whether to copy the startup code into the file you have created just now. Just click on "No" to proceed further.
- Now you can see the TARGET and SOURCE GROUP created in the project workspace.
- Now click on "File" and in that "New". A new page opens and you can start writing program in it.
- After the program is completed, save it with any name but with the .asm extension. Save the program in the file you have created earlier.
- You can notice that after you save the program, the predefined keywords will be highlighted in bold letters.
- Now add this file to the target by giving a right click on the source group. A list of options open and in that select "Add files to the source group". Check for this file where you have saved and add it.
- Right click on the target and select the first option "Options for target". A window opens with different options like device, target, output etc. First click on "target".
- Since the set frequency of the microcontroller is 11.0592 MHz to interface with the PC, just enter this frequency value in the Xtal (MHz) text area and put a tick the Use on-chip ROM. This is because the program what we write here in the keil will later be dumped into the microcontroller and will be stored in the inbuilt ROM in the microcontroller.

- Now click the option "Output" and give any name to the hex file to be created in the "Name of executable" text area and put a tick to the "Create HEX file" option present in the same window. The hex file can be created in any of the drives. You can change the folder by clicking on "Select folder for Objects".
- Now to check whether the program you have written is errorless or not, click on the icon exactly below the "Open file" icon which is nothing but Build Target icon. You can even use the shortcut key F7 to compile the program written.
- To check for the output, there are several windows like serial window, memory window, project window etc. Depending on the program you have written, select the appropriate window to see the output by entering debug mode.
- The icon with the letter "d" indicates the debug mode.
- Click on this icon and now click on the option "View" and select the appropriate window to check for the output.
- After this is done, click the icon "debug" again to come out of the debug mode.

The microcontroller program is the most important part of our project. It is written in c language[10-11].

V. BENEFITS

- By use of this technique we can make the environment clean.
- High accuracy (due to programming in c language).
- It is reduces human efforts.
- It is reliable as it is automated.

VI. CONCLUSION

The Garbage and recycling pickup work is physically demanding and it exposes workers to many occupational hazards. This project is designed to fulfil the task of collecting garbage from certain places and then dispose it at a single place from where the garbage will then be taken for disposal or process of recycling. To build an automatic trash robot using Arduino microcontroller which detects and collects waste. .Secondly, using highly advanced microcontroller and with the help of

growing technology the project has been successfully implemented. It has been concluded that by implementing these systems we can make our environment clean.

VII. ACKNOWLEDGMENT

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