

GARBAGE COLLECTING ROBOT USING IOT

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Abstract - Waste collection and management is a subject undergoing extensive study, and solutions are being proposed meticulously. Thanks to an exponential rise in population, there is an increased production of waste, and also a significant amount of litter consisting of plastic, paper, and other such products carelessly thrown about and scattered in public. Thus, the need for a more robust waste management strategy is essential. Presently, waste management techniques either lack efficiency, or incur high costs.. Collection of the unorganized and scattered garbage is the preliminary and most vital step of waste management, following proper segregation and disposal. This paper proposes, explains, and implements an original concept of making a modular, scalable and cost effective system for garbage collection.

Key Words: Embedded, IoT, LCD, Arduino

I. INTRODUCTION

To make the cities greener, safer, and more efficient, Internet of Things (IoT) can play an important role. The implementation of proper waste management system will avoid the spreading of such disease. In project we proposes a smart mechanism for improving the management of wastes in cities. Things that are connected to the Internet and those devices controlled from the Internet is called Internet of Things. In this system, the smart bin is connected with the internet to display the exact information about the dustbin level and to which area it belong. In present there was a rapid growth in the population which leads to large quantity of waste disposal in the cities. The overflow of dustbin will create a unpleasant environment and it affect many people by spreading the deadly disease.

II. EMBEDDED TECHNOLOGY

As the name signifies, an embedded system is embedded or builds into something else. Embedded systems encompass a variety of hardware and software components, which perform specific functions in host system, for example satellites, washing machine, handheld telephones and automobiles. Embedded systems have become increasing digital with a non-digital peripheral (analog power) and therefore both Hardware and software coding signs are relevant. Most embedded control product must special requirement, cost effectiveness, low power, small-footprint and a high level of system integration.

1. EMBEDDED SOFTWARE

Software in the embedded system is implanted with either assembly language or any high level language. Now-a-days C and C++ has been the choice but language for the embedded software for the following reasons.

- C and C++ are machine independent language, so the programmer can concentrate only on the algorithms.
- C has the ability for direct hardware control and it can be interfaced to run any mechanical machine.

Any source code written in C and C++ or assembly must be converted into an executable image that can be loaded onto an EEPROM chip. The process of converting the source code representation of embedded software into an executable image involves three distinct steps and the system or computer on which these processes are executed is called host computer. The Embedded system software comprise of building program that will run on the host. These tools are called Native tools. Some of them are:

2. CROSS-COMPILERS

The compiler that runs on the host system and produces the binary instructions that will be understood by the target microprocessor is called Cross-Compiler.

3. CROSS-ASSEMBLER

A Cross assembler is the assembler that run on the host and produces binary instructions appropriate for the target system.

4. LINKER/LOCATOR

Linker/Locator links all the object files produced by the cross compiler and assembler. The loader finds memory into load the program from the disk into the memory and may then do various other processing before starting the program.

5. FEATURES OF EMBEDDED SYSTEM

- Higher performance
- Low power consumption
- Slimmer and more compact
- Mission-critical functions

- Reduced design and development time
- Lower system cost

III. LITERATURE SURVEY

The primary objective of this research was to clean up waste materials on coastline beaches. The mobile robot system consists of a shovel to scoop up waste, a trash box to deposit the waste. In order to understand the need for a compact, cost effective and scalable system, and before diving in to provide our own solution, we need to first understand the existing research and work done in the field. In this section, we depict a concise review performed on these existing pieces of work, encompassing mobile robots, garbage collectors and IoT based systems for similar use cases

Image recognition includes ground segmentation, contour extraction, object tracking, and then classification. The neural network used here is CNN. Once identified, the robot will translate such that the image is kept in one particular part of the image continually, and the arm will then take over and pick up the object at a certain distance if it is classified as waste. Robot moves under PID algorithm. If out of range, tries to come back in range. Good accuracy obtained, most for bottles (91.87%), least for waste papers (77.7%).

IV. WORKING PROCESS

1. EXISTING SYSTEM

Too much land pollution/garbage and inconvenient availability (unavailability) of sufficient workforce under all circumstances. While manual labor to clean up garbage is a good source of employment, there are several problems that are associated with cleaning up of garbage manually.

This mechanism incurs high running cost and power consumption.

All existing work includes only ideas and prototypes, and there has been no actual product that has entered the market. The main reason for this is the lack of versatility and extremely high cost of the prototypes.

2. DRAWBACKS

- Unavailability of manual labor in several remote areas (such as railway tracks)
- Safety concerns of humans in hostile work environments
- Lack of resources for hazard proof collection of nuclear waste.

3. PROPOSED SYSTEM

An autonomous garbage collection system is proposed by making the artificial robot system. The autonomous robot can be controlled by the corporation office through internet

the website/app is used to navigate the robot the robot can lift the filled bin and replace with the new bin using robotic arm. Our aim is to substantially reduce the cost, so as to make the implementation on a large scale feasible, including implementation through government bodies.

4. ADVANTAGES

- It is flexibility to be utilized in a large number of environments.
- In order to make the whole system fully autonomous.
- It is fully wireless technology using IOT

V. BLOCK DIAGRAM:

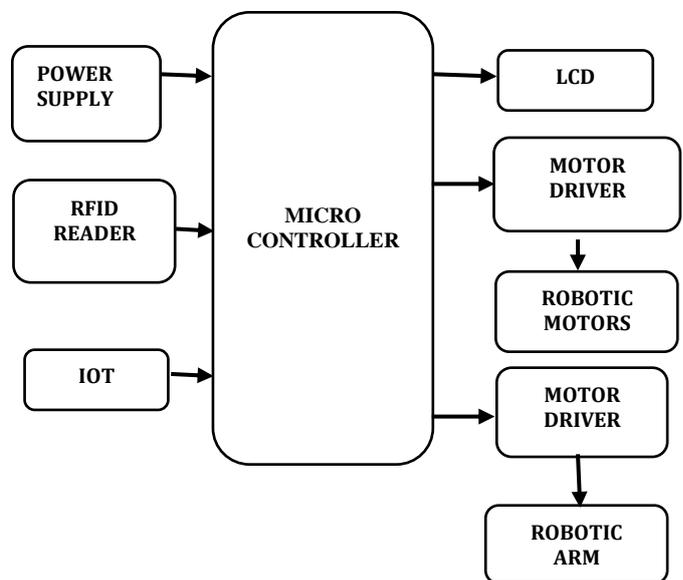


Fig-1: Block Diagram

VI. FUNCTIONS OF THE COMPONENTS IN THE BLOCK DIAGRAM

1. ARDUINO UNO



Fig-2: Arduino uno

"Arduino Uno" Revision 3

Type : Single-board microcontroller

It consists of a standard programming language compiler and a boot loader arduino is a single-board microcontroller to make using electronics in multidisciplinary projects more accessible. The hardware consists of an open-source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. The software that executes on the microcontroller. Hardware design information is available for those who would like to assemble an arduino by hand. It was estimated in mid-2011 that over 300,000 official arduino had been commercially produced.

2. SOFTWARE

The arduino integrated development environment (IDE) is a cross-platform application written in Java, and is derived from the IDE for the Processing programming language and the Wiring projects. It is designed to introduce programming to artists and other newcomers unfamiliar with software development.

3. RFID

Radio Frequency Identification (RFID) is a generic term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object or person wirelessly, using radio waves. It's grouped under the broad category of automatic identification technologies. In the most basic level, it identifies unique objects, processes, transactions or events. RFID does this by using a burst of radio waves to move information, much like carrier pigeons were used to move information from point to point centuries ago. It is possible to explain RFID using only two basic building blocks - A Tag and a Reader. Of course, they may be configured in sophisticated ways to create large networks capable of staggering data flows.

4. IOT(ESP 8266)

The chip first came to the attention of Western makers in August 2014 with the **ESP-01** module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, the chip, and the software on it, as well as to translate the Chinese documentation.

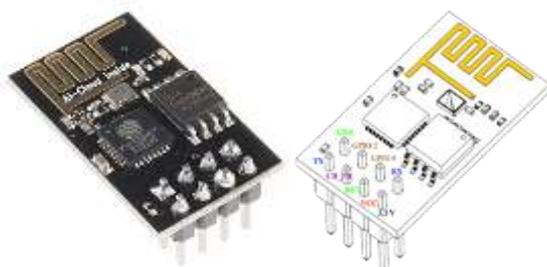


Fig-3: IOT(ESP 8266)

The pin out is as follows for the common ESP-01 module:

- VCC, Voltage (+3.3 V; can handle up to 3.6 V)
- GND, Ground (0 V)
- RX, Receive data bit X
- TX, Transmit data bit X
- CH_PD, Chip power-down
- RST, Reset

5. LCD DISPLAY

LCD stands for liquid crystal; this is an output device with a limited viewing angle. The choice of LCD as an output device was because of its cost of use and is better with alphabets when compared with a 7-segment LED display. We have so many kinds of LCD today and our application requires a LCD with 2 lines and 16 characters per line, this gets data from the microcontroller and displays the same. It has 8 data lines, 3 control lines, a supply voltage Vcc (+5V) and a GND.



Fig-4: LCD Display

- Dynamic scattering type
- Field effect type

The construction of a dynamic scattering liquid crystal cell. The liquid crystal material may be one of the several components, which exhibit optical properties of a crystal through them remain in liquid form. Liquid crystal is layered between glass sheets with transparent electrodes deposited on the inside faces. When a potential is applied across the cell, charge carriers flowing through the liquid disrupt the molecular alignment and produce turbulence. When the liquid is not activated, it is transparent. When the liquid is activated the molecular turbulence causes light to be scattered in all directions and the cell appears to be bright.

6. DC MOTOR

In any electric motor, operation is based on simple electromagnetism. A current carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying

conductor and an external magnetic field to generate rotational motion.

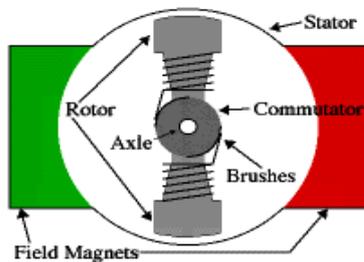


Fig-4: DC motor

Every DC motor has six basic parts -- axle, rotor (a.k.a., armature), stator, commutator, field magnet(s), and brushes. In most common DC motors the external magnetic field is produced by high-strength permanent magnets¹. The stator is the stationary part of the motor this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotors (together with the axle and attached commutator) rotate with respect to the stator. The rotor consists of windings (generally on a core), the windings being electrically connected to the commutator.

7. POWER SUPPLY UNIT

Power supply is an integral parts a vital role in every electronic system and hence their design constitutes a major part in every application. In order to overcome mal-operation which results due to fluctuations in the load and discontinuity in the supply proper choice of power supply is indeed a great need in this hour. Starting with an ac voltage, a steady dc voltage is obtained by rectifying the ac voltage, then filtering to a dc level, and finally, regulating to obtain a desired fixed dc voltage.

VII. CONCLUSION

Hence the proposed prototype has successfully been implemented. The novelty of this paper lies in the concept of a cost-effective system that uses IoT to optimize the working of a network of garbage collectors. Furthermore, the adoption and optimization of the best features from existing technologies, into a single integrated system makes it very efficient. It can particularly be used for nuclear-waste collection, where human presence is unsafe.

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