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Smart Bin: Garbage Collection System Using Internet of Things (Iot)

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Abstract

The IoT is a system that combines mechanical, computer and digital machines, animals can provide us with a digital solution with human interaction and transfer data across the network. Today IoT is providing us solution in every field and waste management field is also getting solution with Internet of Things. Times have turned the world into tiring place. It is primarily because of the rapid growth of both population and materialistic things. There is another factor, along with these two variables, which in effect has a terrifyingly high rate, which is the amount of garbage being disposed of. As everyone would expect, this has become one of the main issues faced today not only by our country, but by the entire world. This concern is not limited to cities and towns, but the collection and disposal of garbage has become quite a headache for the government, even in small villages. As regards helath and Sanitation, as well as the environment's cleanliness, while dustbins and bags are the most common ways of disposing of garbage, but that is not used by anyone. This result in garbage disposal becoming a highly time-consuming and daunting operation and places like hospitals, hotels, schools, manufacturing plants and other buildings are severely affected. To solve this potential disaster, it would prove to be highly effective to incorporate an automated system using electronics and port programming provided in such areas. It would be quick to get the job done, with minimal human resources and health risks, as well as saving time and money in the process.

1. Introduction

Civilization's development and growth has had its share of drawbacks, and one of the main features of concern is the contamination that has infected the world, be it soil, air or water. The amount of waste produced by each household has increased with the increase in the total population and the increasing demand for food and other necessities. Finally, this waste is dumped into municipal waste collection centres from where it comprises of communities in the region to be poured into the dumps.. Nonetheless, not all this remaining is gathered and

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transported to the ending dumpsites due to either insufficient resources or poor infrastructure. If that is the case, Due to people's full of activity life patterns, this has become unpredictable. So, combination with the new technology, a proper garbage disposal system should be making known to for places where people gather frequently, such as schools, hotels and offices [1]. The best way we can do this is to bring together an automated garbage disposal system.

2. Garbage collection system

The Automated Garbage Collector is a good solution to solve the challenge of collecting garbage in areas like workplaces, hotels, manufacturing facilities, hospitals and special schools where it is important to travel from location to location to gather garbage.[3] The way the hardware and software are integrated into a single system is explained in this section, and a solution is provided. We have designed our project in such a manner that the garbage container is inclined at 45 degree angle. Hence it will be easy to dump garbage with help of gravity and servo motor, which will open the lid of dustbin. The dustbin is supported on a chassis made with hard cardboard shown in below figure. Dustbin is designed in such a manner that the people will not find it difficult to through garbage in it.

Figure 1: Chassis of dustbin

There are three main components of this system. Garbage Containers, which are fixed to outside walls at 45 degree angle, the line follower (IR sensor), that moves from end to end to dump the garbage from the garbage containers, and the Servo motor lid, which is used to open lid of the bin. In this section the different modules of the system are described to give an overall idea of how the system is formed from the assembly of different components. As shown in below figure.

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Figure 2: Smart Dustbin Outer look

3. Methodology

This project contains four IR sensors two are in front and two are in back. One Arduino is used which is managing all sensors and taking inputs and giving outputs. UV sensors are used to continuously detect the filling level in the garbage container [4]. Initially the dustbin is at its allotted original position collecting garbage in it. Simultaneously ultrasonic sensor is sensing the level of garbage in it, whenever the distance in less than 10 cm it will send signal to Arduino board and Arduino will send output signals to front IR sensors to move.IR sensor will move on black line and if they get output as 0 it will stop working. Now the servo motor will rotate at 90 degree and the lid of dustbin will be opened for 2-3 seconds. [2]After that again Ultrasonic sensor will detect the bin and if it is empty than give command to back IR sensors to move, which will take that dustbin to its original position after dumping garbage to dumpsite. This process will be repeated in a loop, keeping the dustbin active whole day. The user can predefine periods for when the garbage collector operates inside a day, or the user can press a specific button on the remote controller unit so that the garbage collector starts the garbage collection instantly. Below is a connection of line following robot using IR sensors and Arduino board. It will detect the black line and sends inputs to Arduino, then Arduino sends output signals to motor to rotate.

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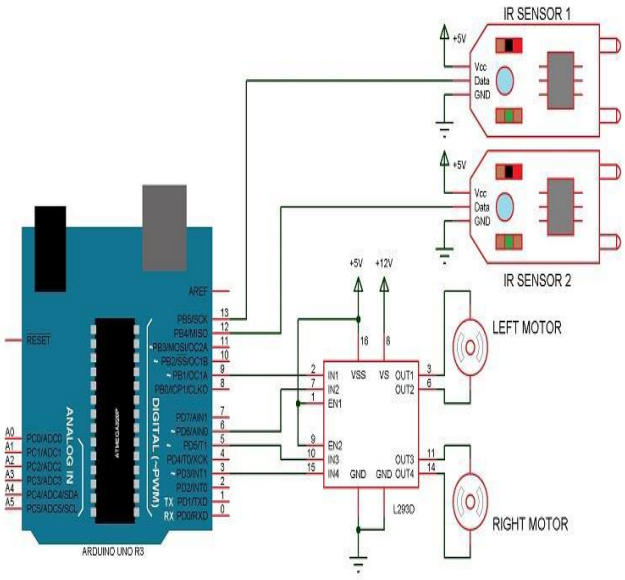

Figure 3: connection of line following robot using IR sensors and Arduino board

Other than that we have used Ultrasonic to detect the level of garbage in bin and servo motor to open the lid of dustbin. Both circuit connections with Arduino are given below.

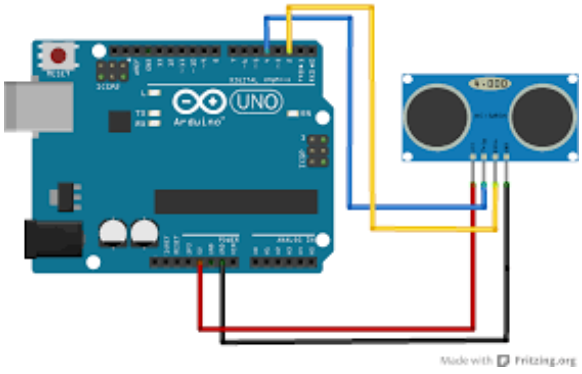

Figure 4: circuit connections with Arduino

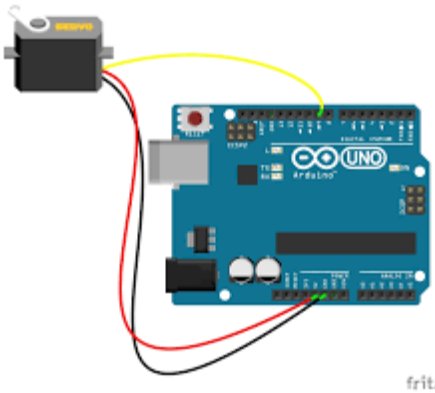

Figure 5: circuit connections with Arduino

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4. Conclusion and future scope

Garbage collection system is small initiative to big project. Basically we are solving problem of shifting garbage from one place to main garbage area. After a project's initial deployment, we can evolve it again to make it work better [2]. Next, we assessed the inclusion of a GPS based navigation system in the garbage collector to replace the current method that we have to find the path which involves IR sensors and a black line. This would be helpful to solve the difficulties we experienced when using the black line as the dustbin route. We are also mindful of extending our plan to storied houses, rather than being confined to single-story buildings. A climbing robot has to be used for this purpose, where the robot has the competence of climbing stairs. This would greatly develop the scope of use of our project.

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