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GARBAGE MONITORING AND CLEARANCE USING ROBOTS

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Abstract
The main intention of our nation is to make an environment and pollution free society. Improper garbage clearance makes great pollution in the atmospheres which are dangerous to the living organisms. Recent technologies becoming more helpful for the humans just the same our proposed system handle the garbage clearance in the great way. This system named Garbage monitoring and clearance using robots has an ultrasonic sensor attached with the bin lid shares the garbage level as data to the robot which it tracks the bin by line follower technique and identify the filled bin through RFID scanning then dispose the garbage from that bin.

Keywords-- Ultrasonic sensor, RF Module, Arm Processor, Line follower technique, RFID

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INTRODUCTION

Nowadays, India has become very active for its economic growth, rural development, infrastructure, military research and development, tourism and so on. At the same time there is a rapid growth in population which now reaches about 138 crore. In addition to these, garbage monitoring and clearance become a major concern. As anyone can expect, this will be a huge problem over the world. Improper clearance of garbage leads to air pollution, soil pollution and water pollution. Overflow of trash from the bin leads to cause environmental degradation, stimulate to various kinds of diseases like cholera, dengue, typhoid, food poisoning and diarrhea etc… This system mainly designed to provide a reliable solution to these problems insufficient garbage disposal faced within the schools, colleges, hospitals, parks, theatre, private offices and so on. Handling garbage clearance is a great issue for municipality workers.

Now bothering about the dustbins monitoring and clearance, the public dustbins fixed at each commune leads to a great troubles. Due to insufficient workers and improper work of wages employees the proper clearance of garbage bin suffers. Although municipality has a responsibility to maintain hygiene of society, falling environment toxic waste, running the germ-free surrounding etc. Environment pollution is the beginning of contaminants into the society that provide destruction or embarrassment to people or other living organisms. So far there is no appropriate listening system on the functioning of labors who ever running in that field.

Generally, the Municipal workers uphold trash bins at definite spaces in the household where the people are guided to set out their garbage. The workers clear the garbage in a particular period, they wind up cleaning it after a week, trash bins starts spilling over and smelling. Because of this bacteria and viruses starts raise, this causes the public healthiness problem.To extend capable garbage management system current status of the bin is needed to make a resolution on garbage clearance. To defeat all these troubles, this system are designed with some fascinate concepts which will shares the bin status with garbage level, bin route and accurate bin to be cleared. Through this information, the robot easily finds the bin's route and filled bin for clearance without human assist.

LITERATURE SURVEY

The dustbins positionedvia the municipal corporation causes number of health issues and environmental pollution due to inappropriate clearance.

It handles with actual time trash bin observing scheme by participating various identifying equipment's and new technologies. Abdulla Al Mamun*et.al* [1] has designed the head section surrounds the bins with device node attached in it. The next section encloses the accesses and the Final section is the base station. The improper spot saving the silo records and permits the prospects to implement the data on behalf of administration tenacity. The advanced system is proficient to convey and bring up-to-date the exact status of the bin in actual period which also can support to reduce gathering direction, gasoline rate to sort an atmosphere hygienic and healthy.

To deliberate an automated electronic structure, to afford a clarification to uneven waste dumping method WaikamReshmi*et.al*[2] has designed method prepared to use bio sensor device, load device and depth sensor to sense excess amount of garbage in the bin and a level of contamination initiated through unsolicited venomous gases from the bin. In this system, the motive is to give explanation for waste management method. In conclusion operating method they requires power we have used solar energy method.

Further Chirag Jain*et.al*[3] executed the wireless communication technologies that are promptly dispersal in several new parts, along with the automation and significance of the usage of wireless technologies in the records attainment building governor and mechanization of developed methods can be improve. Robots are used to do jobs in areas and also in conditions that remain dangerous for human being.

The plan of these project summaries the tactic of creating wireless communication between remote control and robot. The main intention is to build a wireless robot using Arduino which can detect difficulties, combustions and chemicals and the robot can remain controlled by a remote control over RF module. The sensed data can authorized concluded RF to operator and will glow one LED.

EXISTING MODEL

Wireless Dustbin Monitoring and Alert System using Arduino

This system is very helpful to the people. By using the wireless communications it comprises of low cost method. The level of garbage filled in the dustbin can be identified using ultrasonic sensors in this method. When the garbage come to threshold level, the sensor in it sends a message to the server using Bluetooth.It also exits gases which cases diseases people. This method has MQ-4 sensor to detect harmful gases. While gases produced from garbage can leads attentive the way to the nearby peoples and experts.

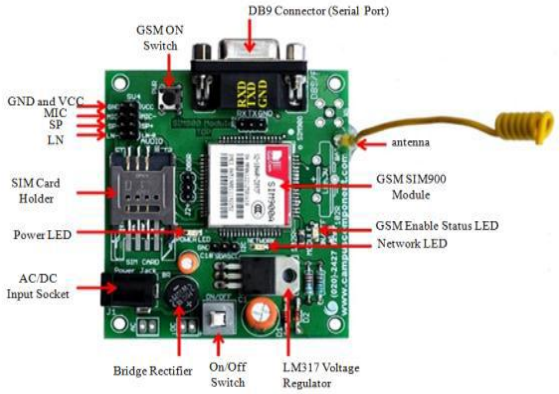

Figure 1. GSM Hardware Module

The trash bins are listened well by sending alert to the local corporation. In this method time can remain achieved and solid waste can be observed successfully. Therefore lastly it achieve that the method remains subsequently much accommodating in favor of monitoring the silos effectively lacking of spilling over in the streets.

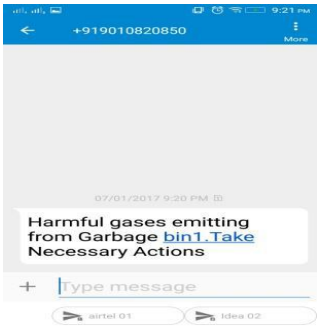

Figure2. Message from dustbin

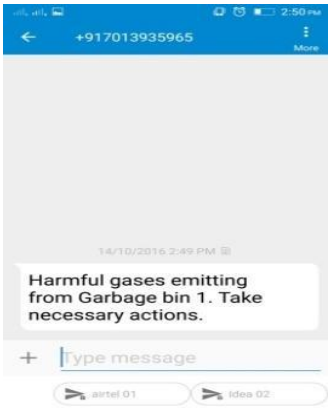

Figure3. Harmful gas message from dustbin

All nodes are given that a GPS position of the silo via GIS method that established taking place plotting it uses like Google maps which is used to listen the position of silo.

PROPOSED MODEL

The garbage monitoring and clearance using robots starts its working when an Ultrasonic sensor shown in Figure.4 transmits the data to the Arduino board exposed in Figure.5.

Ultrasonic sensor is the type of audio sensor classified into following types namely transmitters, transceivers and receivers. Transmitters in ultrasonic sensor exchange signals into ultrasound, receiver converts ultrasound into signals. The time of sending a signal named ultrasonic wave and getting an echo. The sensor emits a wave and gets the wave reflected back from the obstacles. It senses the level of garbage and transmits information to the Arduino Uno.

Figure 4. Ultrasonic sensor

It operates on 16 MHz clock frequency. It has operating frequency of 5V and input voltage as 7 to 12V. It has the flash memory of 32KB. It has 14 digit input and output pins in which 6 can be utilized as analog inputs, 6 outputs, power jack, a reset button, a 16 MHz resonator, ICSP header and an USB connectivity.

Figure 5. Arduino UNO board

In this proposed system, Arduino is connected with ultrasonic sensor, RFID transmitter, laser module and RF transmitter module. Here it works as an intermediation for transmitting and receiving devices with the help of software program predefined to it.

The term RF stands for "Radio Frequency". It is an ASK Hybrid Transmitter and Receiver module operates at 433 MHz frequency. These modules are cheap for its functions and are available. They can either be used as standalone Transmitter and Receiver or be interfaced with a MCU/MPU like Arduino. Here, the RF transmitter from the garbage bin transmits the bin information to the robot and transmitted datas are received by RF receiver in the robot wirelessly.

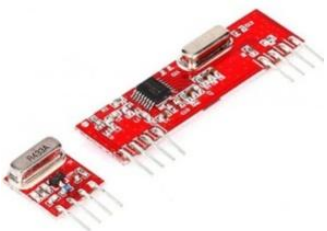

Figure 6. RF Module

IR sensor is an electronic appliance that is used to intellect definite characteristics of its environment. It operates moreover detecting Infrared radiation. IR sensor is used to sense the black and white surface. It is fixed to the underside of the robot.

Figure 7. IR Sensor

When light from the IR sensor falls on a white surface gets reflected and if it falls on black surface light gets absorbed. In this technique, IR transmitter and IR receiver is used. Here IR sensor mainly used in line follower concept.

Robotic arm will move according to the servo motor and it can pick and place the filled bin with the help of gripper attached at the end of the arm. These arms produce good output, reduce damage and more efficient. The robotic arm and its circuit diagram are shown in the figure 8 and 9.

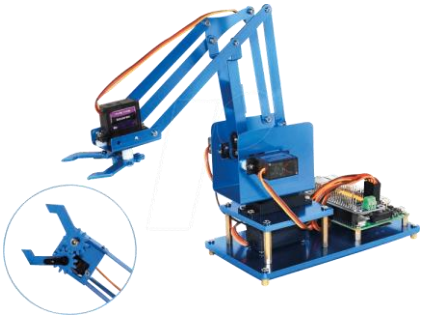

Figure 8. Robotic ARM

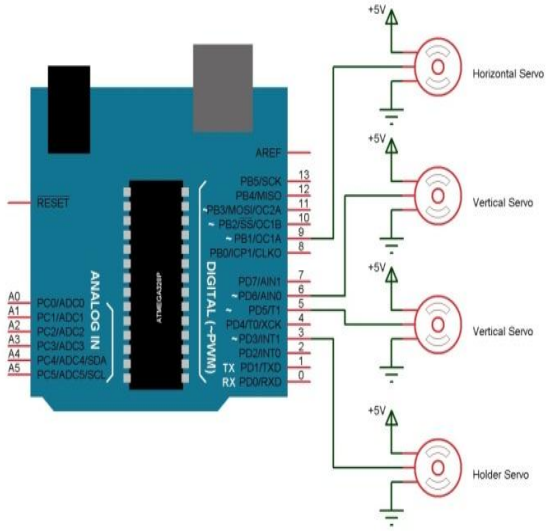

Figure 9. Circuit diagram for Robotic ARM

Servo motor (5SG90) is fixed with arm of the robot to control it axis movement, robot wheels and also control the speed. The servo motor is assembled of four things: a normal DC motor, a gear reduction unit, a position-sensing device and a control circuit.

Figure 10. Servo Motor

These components are connected as exposed in the block diagram from the figure 11 and 12.

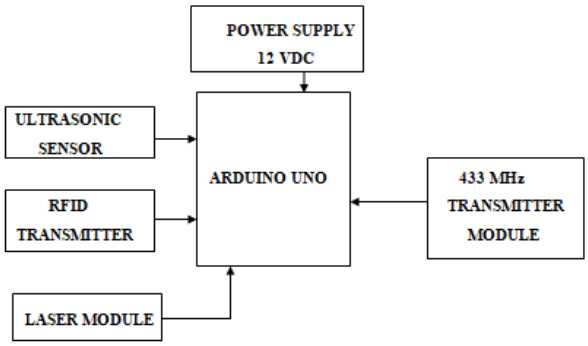

Figure 11. Bin block diagram

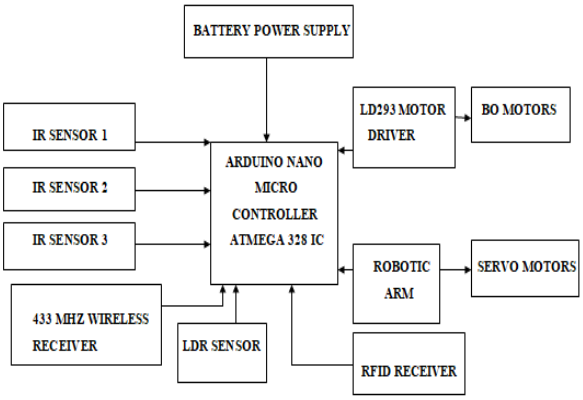

Figure 12. Robot block diagram

RESULT AND DISCUSSION

Garbage Monitoring and Clearance using Robots provides entire information about the bin. Here three bins have been installed with ultrasonic sensor for this process. Wastes are filled in the bin and that status has been measured using a measuring scale fixed with the trash bins. The garbage level is sensed through an ultrasonic sensor attached on the lid. For the complete data about the bin and its position the claimed data contains information such as garbage level, line following direction and bin identification. Once garbage level gets detected from the bin, the execution of entire system gets started.

Bin Output

A measuring scale fixed on the bin which it has 0-30cm range. The level of the garbage increases rapidly according to the human use. When it reaches 1cm from the bottom, the ultrasonic sensor fixed with lid senses the obstacles and shares the information to Arduino UNO. It shares the data through RF transmitter module to RF receiver module wirelessly. The following Fig.13 shows the output of the bin status.

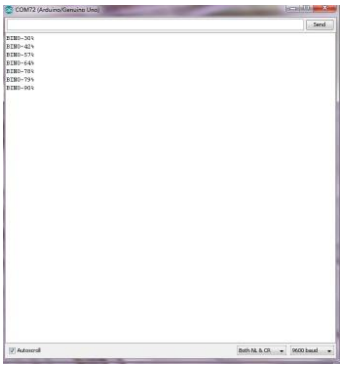

Figure 13. Alert message when dustbin is full

Line Following Technique

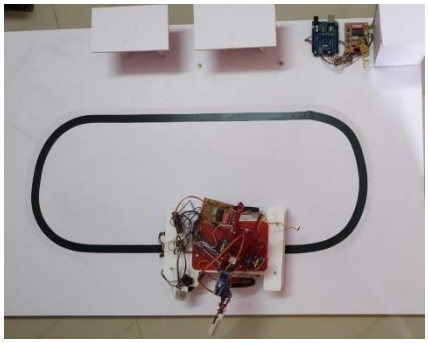

Figure 14. Line following robot

When the Radio Frequency (RF) receiver in the robot receives data from the bin, it transmits the information to Atmega328P. Now the IR sensor attached with the robot starts working. Line follower concept functioning is related to the performance of light at black and white surface. The line follower robot sensor senses white surface when Arduino gets as 1 input and when senses black line Arduino gets 0 as input. According to this concept, the robot moves towards the bin and collects the garbage from the bin.

According to the received data and tabular column conditions the robot starts moving by line following concept towards the filled bin for garbage clearance.

RFID Identification

According to the information the robot gets it reaches the area where the bins are placed it starts scanning the RFID tag placed on the bin. Then it identifies the bin from which the data is transmitted as garbage filled. Now the robot disposes the garbage from the bin with the help of arm processor using gripper and servo motor which it controls the axis of its arm.

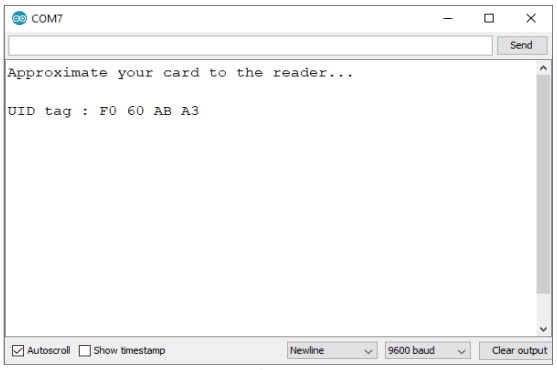

Figure 15. RFID output

CONCLUSION

The graphical representation shows the development in garbage management later than applying smart garbage disposal system.

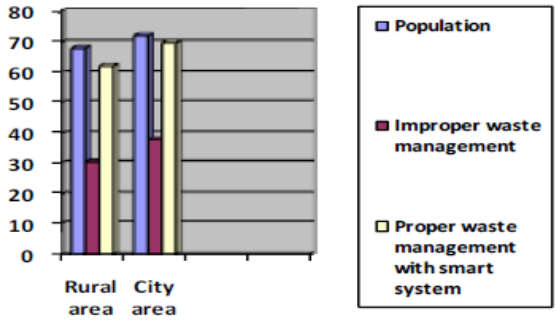

Figure 16. Graphical representation

This system presents a performance on garbage monitoring and clearance using robots. When the waste in trash bin is not emptied in a particular time then an alert message will be transmitted into robot so that necessary action will be taken by it. By this technology, the hazardous wastes are monitored properly and cleared perfectly without overflowing.

It provides best solution for the great problem of managing garbage correctly in terms of informing its level and location. In addition, it does not need human practices in the garbage clearance. If it introduced in present days, the garbage management issues in the society will be concluded and develop the public health production. Also this method will keep us away from the virus & bacteria and prevent people from different diseases.

FUTURE WORK

In this system, implementation is done to sense the garbage level, conveying bin route and trash bin clearance by robot. Instead of this, executing the principles of detecting the biodegradable and non biodegradable wastes from the bin by the robot and separating them will lead a great work. To improve more advanced, without electricity the robot can be charged by the solar panel and make an automated system will be developed.

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