IoT BASED SOLAR INTEGRATED GARBAGE MONITORING USING ROBOT ON RASPBERRY PI

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Abstract - At present the world advancement depends on its technology. IoT(Internet of Things) is the latest technology which connects the devices over a network using cloud computing and web applications to for efficient operation. We know that Smart cities are facing a serious garbage problem. This project is a very innovative system which will help to keep the cities clean. A pick and place robot will be used to collect the trash in the parks, roads, parking places etc. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. For this, the system uses sensors placed over the bins to detect the garbage level. For this, system solar panel is used to power generation and store in battery. When the garbage is full, a SMS will be sent to the respective Municipal/Government authority person.

Index Terms - Internet Of Things (Iot), Raspberry Pi And Android App

I. INTRODUCTION

The universal truth is that wastage of anything is harmful for the society. Still we see wastage of water, electricity etc. in our daily life. The environment is surrounded with natural things but if any calamity or adversity occurs, it distracts the natural environment. The most affecting elements are the water, land, air and noise pollution. Due to this the ozone layer is declining day by day .But the most far reaching municipal waste which is very harmful for human beings and the other creatures.

Robotics is an interdisciplinary of engineering and science that includes mechanical engineering, electrical engineering, computer science engineering, and others. Robotics deals with design, construction, operation, and use of robotics, as well as computer systems for their control, sensory feedback, and information processing.The robot made under this project can move in both forward and reverse direction and can turned in left and right directions. Mobile robots are generally those robots which can move from place to place across the ground. Mobility gives robot a much greater flexibility to perform new, complex, exciting tasks. The world does not have to be modified to bring all needed items within reach of the robot. The robots can move where needed.

Now a days, robots are increasingly being integrated into working tasks to replace humans especially to perform repetitive tasks. The mobile robots are currently used in many fields of applications including office, military tasks, hospital operations, dangerous environment and agriculture. Besides, it might be difficult to the worker who must pick and place something that can affect badly. Painting has similar problems to welding due to the use of toxic chemical products, assembly operation.This paper describes a development for smart clean cities using a real time mobile robot system using raspberry pi used to collect the trash in the parks, roads, parking places etc.

II. LITERATURE REVIEW

M.Chaware [1] et.al.proposed a system presents Garbage Monitoring system, which monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. The System Architecture, in which system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. The proposed system uses Arduino family microcontroller, LCD screen, Wi-Fi modem for sending data and the garbage depot if the Garbage Can full.

Lilyan Anthony [2] et.al. proposed a IOT Based Smart Garbage Monitoring and Air Pollution Control System, in whichsystem monitors the garbage bins and informs about the level of garbagevia a web page. which consists major three modules; Sensor Module, in which sensors are used to sense the garbage levels once and connected to the Arduino board, Communication Module, in which Bluetooth is used for communication between the sensors and Arduino Uno board, and last module is Analysis and Monitoring Module, in which collected is sent to the admin for analysis.

Harish Kumar [3] et.al., proposed a dustbin is interfaced with microcontroller based system having IR wireless systems along with central system showing current status of garbage, on mobile web browser with html page by Wi-Fi. Hence the status will be updated on to the html page. There by to reduce human resources and efforts along with the enhancement of a smart city vision. Considering the need of modern technology, the smart garbage bin can expensive but considering the amount of dustbin needed in India, there for they used based sensors to

reduce its cost and also make it efficient in applications. And at the sender side they used only a Wi-Fi module to send and receive data. But because of the use of weight sensor for detection of amount of garbage in dustbin. It will only detect the weight of waste; not how much level it is.

Sushanth Kanbail Srinivas [4] et.al., proposed a system for The concept of creating machines that can operate autonomously dates back to classical times, but research into the functionality and potential uses of robots did not grow substantially until the 20th century. Throughout history, robotics has been often seen to mimic human behaviour, and often manage tasks in a similar fashion. Today, robotics is a rapidly growing field, as technological advances continue; research, design, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots do jobs that are hazardous to people such as defusing bombs, exploring shipwrecks, and mines. Their findings and suggestions are reviewed here.

According to available literature, no specific work was reported using IoT technology for interconnected to android app to detect the level in garbage. So this system will be helpful to keep the cities clean and to solve the over flow of garbage problems in public areas. The IR sesnsors are placed over the bins to detect the garbage level continuosly garbage pickup ising raspberry pi. The garbage system uses a mobile application that is connected to the cloud computing . Here robot(a pick and place robot) is used to collect the trash and fill the garbage. when the garbage is full SMS will be send to municipal authority. this entire system is performed by using raspberry pi a single board.
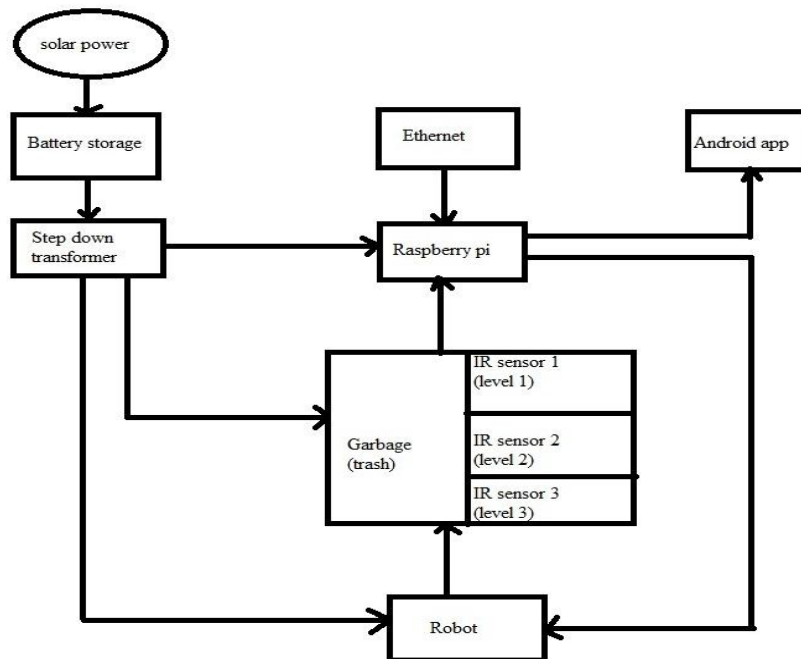
III. PROPOSED SYSTEM:

Fig1: Block diagram of IoT based solar integrated garbage monitoring using robot on Raspberry Pi.

IV. EXPERIMENTAL SET UP

An embedded system is a system which is going to do a predefined specified task. It is even defined as combination of both software and hardware.

The proposed system has the following components:

A)Hardware components:
1. Solar Panels
2. Battery,9v connector,wire
3. Step down Transformer
4. IR sensors
5. Pick and plce robot
6. Robotic arm with motors and dpdt switches.

B)Software description:
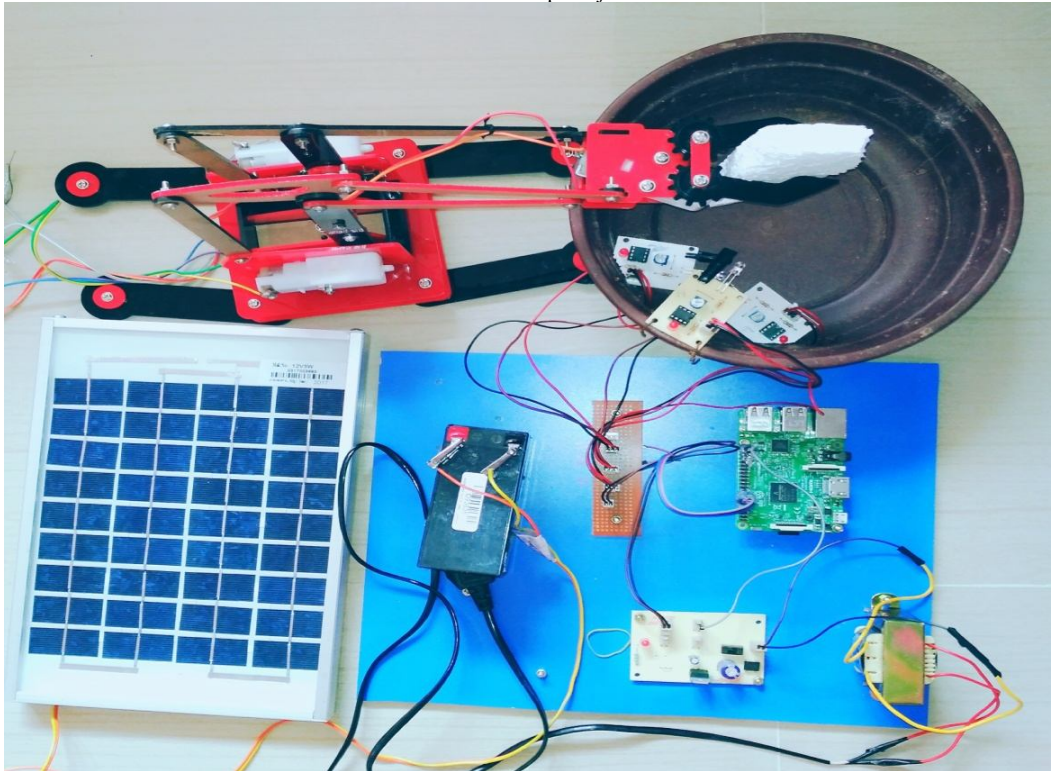1. Raspbian OS
2. Android App.

Fig2: Experimental set up of proposed system

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PI

Fig3: IR sensor

Fig4: Step down transformer

Fig5: Android app

V.WORKING PROCEDURE

A.Pick and place robot: The pick and place robot is a human controlled based system that detects the trash, picks that trash and which can move from one place to another place across the ground with the help of sensory feedback as well as computer systems and information processing. This prevents sensor detect the target trash. The robot made under this project can move in both forward and reverse direction and can turned in left and right directions. This paper describes the develop a real time mobile robot system a development for smart clean cities using a raspberry pi.

B.Garbage monitoring:
Sensors: For the garbage monitoring system, IR (Infrared) sensors are used to detect the garbage level.the ultrasonic sensors are placed over the bins of sides to detect the garbage level and compare it with the garbage bins depth. informs about the level of garbage collected in the garbage bins via a android app. Where as Androiod app is built to show the status to the user monitoring it. When the garbage is full a SMS will be send to municipal authortity. The android app shows the status of the garbage level. The system makes use of Raspberry pi, The system is powered by a 12V transformer.
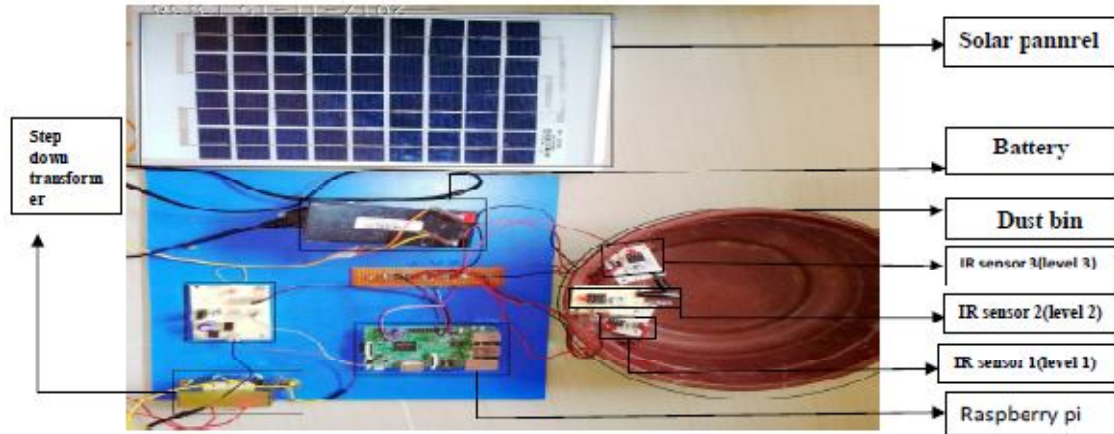

Fig6: Working of garbage monitoring.

VI. RESULTS AND DISCUSSION:

1. The garbage level is displayed in the mobile app. The following figures   explain the garbage monitoring.

Fig7: Display of Android app showing garbage level.

In the above figure showing level1 that means trash is fill up to level 1 of garbage.

Fig8: Display of Android app showing garbage level.

In the above figure showing level1 that means trash is fill up to level 2 of garbage.
2. The system has been successfully modeled and it has the capability to rotate 360° and handle the required task. It can take specific colored object, hold it and put it to a particular station even to some height using RGB color sensor. Color sensing section performed two main tasks objects detection and color recognition. The cost effective system was designed to perform the continuous and reliable tasks without human errors using the simplest concepts. The robotic sorting systems are useful in industries and different household activities. Since this system is mainly controlled by the Raspberry Pi Microcontroller, the results obtained are more reliable and faster.
APPLICATIONS:
This project can also be used in the" SMART CITY". This project is also helpful in the government project of "SWACHH BHARAT ABHIYAN".

CONCLUSION

In this project, an integrated system of IoT and solar is introduced for efficient and economic garbage collection. the container in residential area which is previously either loaded manually or with the help of loaders in traditional trucks. This project analyzed the solutions currently available for the implementation of IoT. With this work we can avoid over flowing of garbage in the public places. It can monitor the garbage level and When the garbage is full a SMS will be send to municipal authority. The technologies which are used in the proposed system are good enough to ensure the practical and perfect for garbage collection process monitoring and management for green environment.

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