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IOT BASED GARBAGE MANAGEMENT SYSTEM FOR SMART CITY USING RASPBERRY PI

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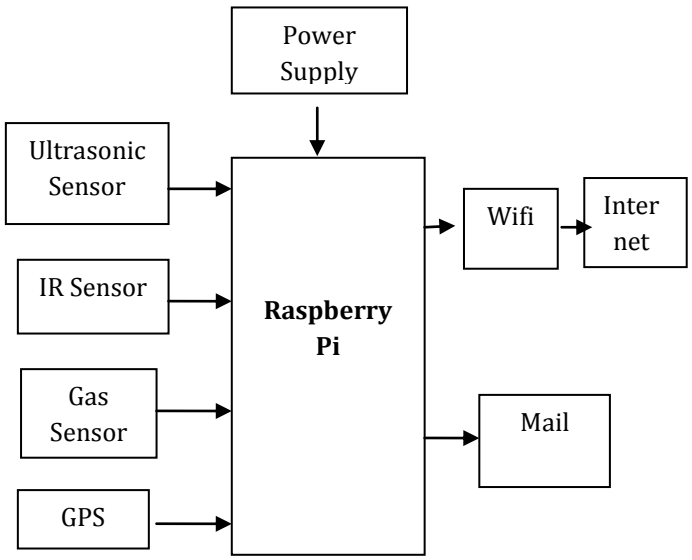
Abstract – We see many dustbins on the road side. Many of those are filled and are spilt all around .It causes many insects to breedom, it resulting in major and serious diseases. It is very harmful for the mankind. In order to avoid those we have developed a smart monitoring system which monitors the level of garbage and gives an alert to the municipality via mail. It uses IOT technology.

***Key Words*: Mail, IOT.**

1. INTRODUCTION

The main aim of our project is to provide a clean city. If a person sitting near to us spits down all the time, how does it feel? It is our country and it is everyone's duty to maintain a clean environment. In our system Raspberry Pi is the main component to which all the other components are connected. All sensors connected to the raspberry are used for specific purposes. And finally the output can be seen through our webpage created also. If the garbage level exceeds the threshold, mail is sent with the data to the registered mail ID.

1.1 PROPOSED BLOCK DIAGRAM



2. HARDWARE DESCRIPTION

2.1 Raspberry Pi

In this project Raspberry Pi 3 is used. Some of the other devices are connected to it. It is installed in our PC .The other devices connected to the raspberry pi are gas sensor, ultrasonic sensor, IR sensor and GPS. All the sensor's values are sent to the raspberry pi and it decides whether to send mail to the municipality or not. Thus the raspberry pi plays the role of brain in a human body in the embedded applications.

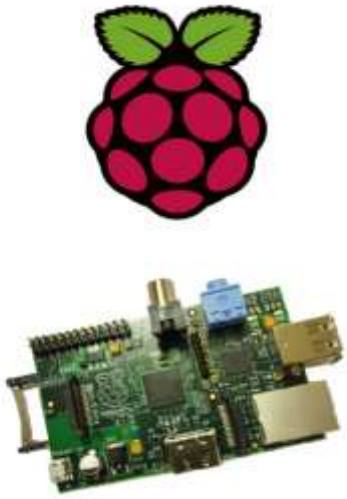


Fig -1: Raspberry pi

2.2 Ultrasonic Sensor

Ultrasonic sensors are devices that use ultrasonic waves to find the distance from an object like echo location is used by bats. It consists of trigger and echo. One is used to send ultrasonic waves and the other is used to receive it.

These types of waves get reflected when it is hit upon an obstacle. Any sound wave above the human auditory range of 20,000 Hz is called ultrasound. The distance from the garbage is thus noted via the ultrasonic sensor.

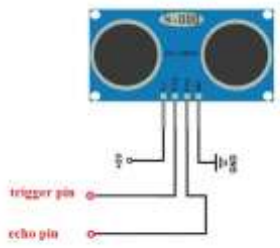


Fig -2: Ultrasonic sensor

2.3 IR SENSOR

All the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor.

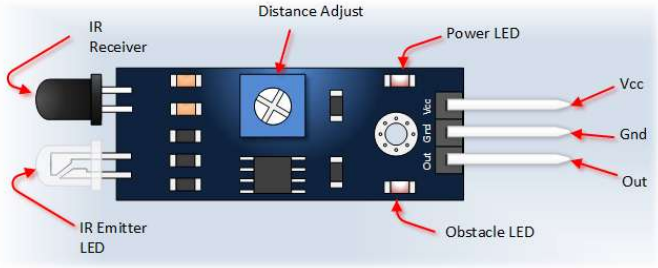


Fig -3: IR Sensor

The emitter is simply an IR LED (Light Emitting Diode) and the detector is an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received. In our project, it is used to count the number of particles thrown into the dustbin.

2.4 GAS SENSOR

This insight covers a methane gas sensor that can sense gases such as ammonia which might get produced from methane.

Fig -4: Gas Sensor

When a gas interacts with this sensor, it is first ionized into its constituents and is then adsorbed by the sensing element. This adsorption creates a potential difference on the element which is conveyed to the processor unit through output pins in form of current. The webpage indicates the amount of gases present in the atmosphere.

2.5 GPS

The Global Positioning System (GPS) is a space based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone to anyone with a GPS receiver.

Fig -5: GPS Module

GPS devices may have capabilities such as

1. Maps, including streets maps, displayed in human readable format via text or in a graphical format turn –by-turn navigation directions to a human in charge of a vehicle or vessel via text or speech.

2. Directions fed directly to an autonomous vehicle such as a robotic probe.

3. Traffic congestion maps (depicting either historical or real time data) and suggested alternative directions.

3. SOFTWARE DESCRIPTION

3.1 PYTHON

Python is a high level, interpreted, interactive and object oriented scripting language. It is easily understandable for the reader as well as writer. IDLE – In this project Python IDLE is used, which is Python's Integrated Development and Learning Environment. Code for this project is written in IDLE. It has two main window types, the shell window and the editor window. It is possible to have many editor windows simultaneously.

3.2 RASPBIAN OS

Raspbian is a Debian based computer operating system for Raspberry pi. There are several version of raspbian including Raspbian stretch and Raspbian Jessie. Since 2015 it has been officially provided by the Raspberry pi foundation as the primary operating system for the family of Raspberry pi

single board computers. Raspbian was created by Mike Thompson and Peter Green as an independent project. The initial build was completed in June 2012. The operating system is still under active development. Raspbian is highly optimized for the Raspberry Pi line's low performance ARM CPU.

3.3 Internet of things

The term "Things" in the Internet of Things refers to anything and everything in day to day life which is accessed or connected through the internet.

Fig -6: Internet of things

IoT is an advanced automation and analytics system which deals with artificial intelligence, sensor, networking, electronic, cloud messaging etc. to deliver complete systems for the product or services. The system created by IOT has greater transparency, control, and performance. As we have a platform such as a cloud that contains all the data through which we connect all the things around us. For example, a house, where we can connect our home appliances such as air conditioner, light, etc. through each other and all these things are managed at the same platform. Since we have a platform, we can connect our car, track its fuel meter, speed level, and also track the location of the car. If there is a common platform where all these things can connect to each other would be great because based on my preference, I can set the room temperature. For example, if I love the room temperature to to be set at 25 or 26-degree Celsius when I reach back home from my office, then according to my car location, my AC would start before 10 minutes I arrive at home. This can be done through the Internet of Things (IOT).

4. IMPLEMENTATION

To see the result in our laptop we have to first download three applications namely Advanced IP Scanner, putty and tight VNC Viewer. Provide some source of internet and provide power supply to the Raspberry pi , then search for the available IP using advanced IP Scanner .Note the IP address of the Raspberry pi and connect to the Raspberry pi using putty. A new window appears ,we will there give our user name and password. Using tight VNC viewer, we are directed to the Raspberry Pi window.

5. CONCLUSION

In the entire world, waste management is a major challenging one. If it is not properly dispose or cleared which will causes lot of diseases and spoil the environment. An embedded based intelligent alert system is devised for the proper monitoring and maintenance of the garbage. We have used sensors to indicate if the bins are filled. Thus this system comes in handy as an admirable solution in environmental maintenance. This system is eliminating the current day status about the bins which are the most of the time laying in a pathetic situation regarding full of garbage without being cleaned. In addition to this it also aids to diminish the need for high human intervention in garbage maintenance of the municipality and pollution monitoring system. This model is providing lot opportunity of improvement and future development

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