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Implementation of Smart City Using Raspberry PI

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Abstract: The main aim of this project is to monitor the stuffs in the residential area such as street light, garbage and drainage system and also to display the current condition of those things in the website. Therefore, the corrective actions can be taken by the concerned authority. In this project, the street light can be operated from the website itself and the status of ON/OFF will also be displayed. This is possible because of the LDR sensors. And this project also shows the percentage of waste filled in the garbage and drainage. Thus the corrective measures can be taken without any delay. To identify these ultrasonic and float sensors are used. We are going to implement this project by using Raspberry Pi and coding is done by python language. These are connected over internet with the help of IOT.

Keywords: LDR sensor, Ultrasonic sensor, Float sensor, Raspberry Pi, Python, IOT.

I. INTRODUCTION

IoT is the emerging trend in 21st century. IoT is network of connecting devices; those devices could be tracked, controlled and monitored using remote processors that are connected through internet. Figure 1 shows the basic architecture of IOT. Different protocols are used for communication between two devices. The cloud is the best technology to store the current data and information; it can also be processed for future reference. The processing speed is high compared to normal secondary storage device like hard disk.

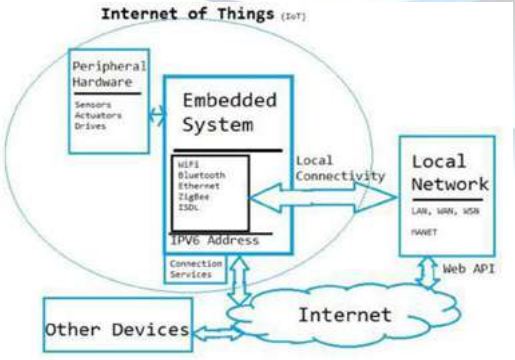

Fig. 1. IOT basic architecture

II. LITERATURE SURVEY

In this system the status of all smart dustbins cab be monitored from anywhere and anytime with the help of internet of things by the authorized person. That person can take a decision accordingly to the status of the dustbins in the cities. By implementing this system the cost can be reduced and the optimization path for the vehicle can also be made. This system can reduce the traffic congestion and also the air pollution. In major cities the garbage vehicle visits the area every day or once in two days depending on the population in that particular area. This information of the dustbin status along with the optimized path can be displayed on the webpage with the help of internet. [1].

This paper tells about performance comparison between traditional human involvements with smart garbage management system, in order to find out effective method to clean the garbage in regular basis, based on the information details of dustbin. Based upon the threshold level mentioned in the garbage bin the corresponding person will be informed about the garbage level to maintain the hygiene environment. If that corresponding person is not acknowledging the information and responding to it, then the message will be forwarded to the higher person in authority This method is used to maintain an cleaner and an more hygiene environment. [2].

Increased This paper addresses all phases of the practical development of an Underground Drainage and Manhole monitoring System (UDMS) through IoT

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applications for metropolitan cities. A real life, demanding application is selected as reference to guide. Aspects of sensor network platform considered are: platform structure, flexibility and reusability, optimization of the sensor nodes, optimization of the communication, error recovery from communications and node operation, high availability of service at all levels, application server reliability and the interfacing with IoT applications. [3].

This paper deals with the design of the drainage system and to maintain the condition of the drainage in real-time at several point in the system using wireless sensors. All the wireless sensors are interconnected and the the information obtained is sent to the main hub and then transmitted to the cloud. The parameters monitored are water level in drainage, water discharge and rainfall conditions near that area. [4].

The big data acts as an dig data store unit from the local vegetable producers to the end user. The production data is updated to the system through mobile application and also the stock availability from the restaurant is also updated to the system. The main objective is to improve the effectiveness of the system through specific big data analysis of the data at rest and in movement.[9]

III. System Overview

In this proposed paper, we are going to implement the idea of IoT in our residential area in order to overcome the basic difficulties which we face in our day-to-day life. We are going to use Raspberry Pi, LDR, ultrasonic sensor, float sensor, LED and incorporate internet with this setup. We are going to switch on/off the street lights according to the environment and also display whether the lights are functioning properly or not. And also, we are going to display how much percentage does the garbage and drainage are filled up. All these are displayed in the corporation authority. So that the concerning actions will be taken immediately without any delay. All these are programmed using python language.

Street light are the major requirement in today's life of transportation for safety purposes and avoiding accidents during night. Despite that, in today's busy life, no one bothers to switch it off/on when not required. This project gives solution to minimize power consumption and manpower. Street light monitoring requires LDR, sensors and microcontroller. In this paper, we have designed an automatic street light control system using a simple light dependent resistor (LDR).

This project will help to eradicate or minimize the garbage disposal problem. The System will inform the status of each and every dust bin in real time so that the concerned authority can send the garbage collection vehicle only when the dustbin is full. For this purpose, ultrasonic sensor is used. It is used to indicate whether the garbage is filled or not. So, the garbage bin can be emptied immediately.

In this project drainage management system is mainly aimed at monitoring the flow of water in the drainage system. The float sensor is used, and it monitors the capacity of the drainage water and displays the percentage amount of the water filled in the website. So that, the blockage can be cleared immediately by the workers.

Thus, it helps to facilitate the functioning of basic things in the residential area with the help of real-time data which are displayed in the website, so that the current status of the stuffs can be viewed and, therefore, the measurements can be taken at the correct time.

RASPBERRY PI 3

The Raspberry pi is a mini computer and also real time operating system. Compared to all real time system is more efficient and high speed multitasking device, interfacing of all real time sensor and actuator is very simple. Raspberry pi used for image processing it also have GPIO pins for feed the input to the pi and also give output for display the corresponding data to user.

LDR

Light Dependent Resistor is used to measure the intensity of light. LDR is a photo resistor the resistance can be decreases with increasing the intensity of light. It convert light energy into electrons for processing the data in real time**.**

ULTRASONIC SENSOR

Ultrasonic sensor is used to detect the presence of the car. Ultrasonic ranging module HC-SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit.

FLOAT SENSOR

Float sensor is one of the level sensor to measure the any liquid system in a tank and float sensor is divided into two main thing one is float switch sensor and another one is float level sensor.

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LED

Light Emitting Diode is a two lead semiconductor light source. It will operate at 3V. It is mainly used for visual indication. In older days only low intensity red light is used for indication but modern led has multicolor in one single led for status of process in the application.

IV. BLOCK DIAGRAM

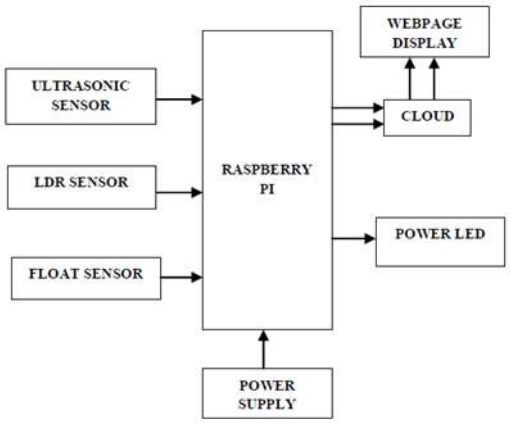

Fig. 2. Block diagram of the proposed system

Figure 2 depicts the block diagram of the system. The sensors such as ultrasonic sensor, float sensor, LDR sensor and power LED are interfaced with the raspberry pi 3. This is the basic outline block of the project. The inputs are given by the sensors to the raspberry pi and the program is written to process the inputs and the results are displayed in the website.

V. FLOW CHART

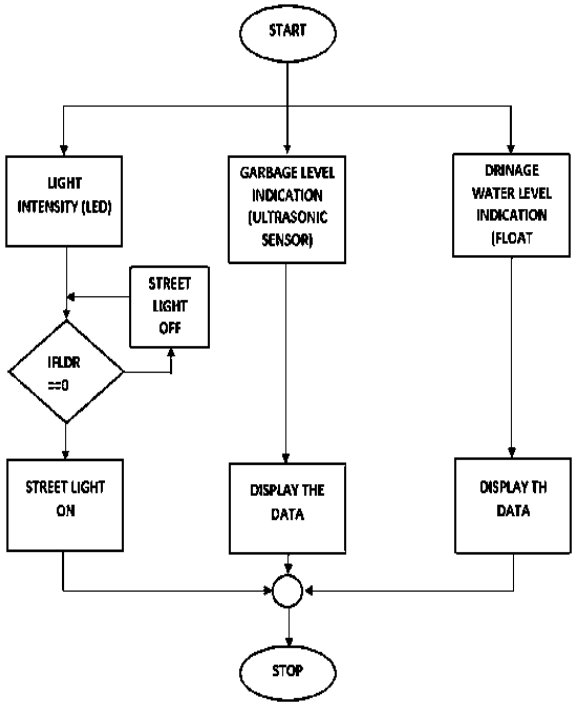

Fig. 3. Flowchart of the system

Figure 3 explains the process involved in the model in a flow chart process.

STEP 1: Initialize the ultrasonic sensor, LDR and float sensor.
STEP 2: LDR is used to measure the intensity of light.
STEP 3: Based on the intensity the sunlight the operation of street light varies**.**
STEP 4: Ultrasonic sensor is used to find out the garbage waste level.
STEP 5: The corresponding waste level is displayed on the webpage.
STEP 6: Float sensor is used to find out the level of drainage flow.
STEP 7: The drainage flow data is also displayed on the webpage.
STEP 8: Stop the process.

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VI. EXPERIMENTAL RESULTS

The proposed system is practically experimented as a working model. Figure 4 shows the working models along with the components connected.

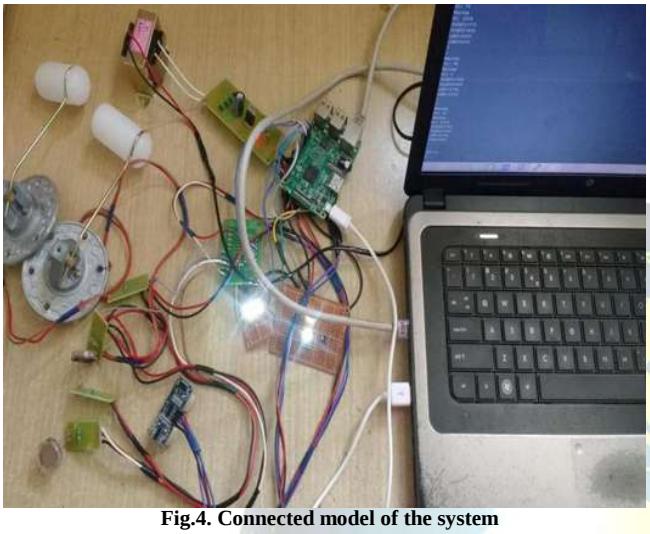

Fig.4. Connected model of the system

The figure 4.1 is the simulation results of the proposed system .Light 1 is OFF, light 2 is ON, ultrasonic sensor 1 is at high level (which means the garbage has no space to accommodate wastes), ultrasonic sensor 2 is at low level (which means the garbage has more space to accommodate wastes), float sensor 1 is empty (which means the drainage is empty) and float sensor 2 is half full (which means the drainage is half full).

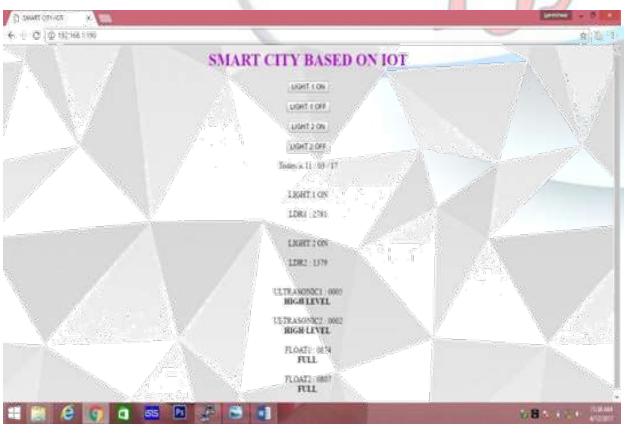

Fig 4.1.Output 1 in webpage

Fig 4.2.Output 2 in webpage

There are many cases where the values changes, so the result will be monitored continuously in the webpage. Figure 4.2, figure 4.3 and in figure 4.4 displays the different cases.

Fig 4.3. Output 3 in webpage

Fig 4.4. Output 4 in webpage

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The output values are displayed in the webpage and the values varies continuously in real time, which will be reflected in the website also. With the help of connecting internet with the real world objects, those objects can be controlled and monitored from the website itself. This saves time and manpower. This can be implemented in a simple and efficient way to computerize the basic stuffs in the street such as street light, garbage and drainage and helps in developing the smart city.

VII. CONCLUSION

It is inferred and concluded that the stuffs such as street light, garbage and drainage system can be effectively maintained by incorporating each of these with the internet, so that the current condition can be viewed parallely on the website and the actions can be taken immediately by the concerned authority. This serves a very effective method to monitor the residential area and provide a better environment. They also have a proper database for future reference.

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