SMART URBAN USING INTERNET OF THINGS (IOT)

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Abstract: *The Internet of Things (IOT) shall be able to consolidate apparently and harmlessly an outsized variety of various and heterogeneous finish systems, where as providing open access to choose subsets of information for the event of a many digital services. Building a general design for the IOT is thus a really advanced task, primarily as a result of the very giant style of devices, link layer technologies, and services that will be concerned in such a system. One amongst the most considerations with setting our surroundings the environment has been solid waste management that additionally to distressing the balance of the environment additionally has adverse effects on the health of the society. The detection, observation and management of wastes is one amongst the first issues of the current era.*

This an advanced method in which waste management is automated and another problem is power consumption, to decrease this automatic street light based on IOT method is used. This project Smart urban using IOT is a very innovative system which will help to keep the cities clean and make less power consumption. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page and design the automatic control of street light with amendment of the intensity of daylight i.e. Because the intensity of daylight decreases, intensity of street light will increase.

Key words: Wi-fi modem, Arduino microcontroller, IR sensor, LDR sensor, Ultra sonic sensor, Solid waste management.

1. INTRODUCTION

Garbage observance system:

Garbage might consists of the unwanted material left over from town, public space, society, college, home etc. This project is said to the "Smart Urban" and supported "Internet of Things" (IOT). So for good lifestyles, cleanliness is required, and cleanliness is begins with Garbage Bin.

Automatic street lights:

Street lights are the foremost demand in today's life time of transportation for safety functions and avoiding accidents throughout night. Despite that in today's busy life nobody bothers to change it off/on once not needed. In any town" STREET LIGHT" is one in all the foremost power over consuming factors. Most of the time we have a tendency to see street lights are ON even after sunrise thus wasting lot of energy.

The project introduced here offers resolution to the present by eliminating personnel and reducing power consumption by exploitation "Internet Of Things" (IOT).

As the world's population increases at a fast pace, more and more waste is produced day to day and waste management becomes a more crucial matter. There is importance in the collection of solid waste from city garbage bins [1] and as nobody is bothering about how much power is wasted due to unwanted usage of power.

This project can minimize the overflow problem of garbage bins and reduce the power consumption in day to day life.

This project Smart urban using IOT is a very innovative system which help to keep the cities clean. By this project we can observe level of the garbage by using Arduino microcontroller, IR sensor, Ultra sonic sensor, Wi-Fi modem, DC motor, L293D motor driver, whereas web page is used to show the status of the garbage bin whether the bin is full or empty. And this project can also decreases the power usage by using LDR sensor and LED light.

1.1 PROBLEM DESCRIPTION

As we see many times the dustbins are get over flown and concern person do not get the information on a time and due to which unconscious condition form in the surroundings, at the same time bad smell come out from waste and spread in surrounding. Due to the presence of un clean environment some harmful diseases are easily are spread in given locality. Sometimes, the employer may forget to on and off the road lights. If in a cloudy whether the road looks darker then the travellers may led to unsafe and also the employer may not off the light at day time it leads to more power consumption and more power loss.

1.2 LITERATURE SURVEY

In this world of information and assets are provisions of being on the top of millions of real time interacting and communicating devices, these are system based on Internet of Things (IOT) technologies which are aimed at exploiting these assets in typical flexible and sustainable way which allows them to reach their full potential. In this paper we present to you, to unique smart city IOT applications: heat and energy management which aims at utilizing different resources in order to optimize the use of energy in commercial places and residential areas. The second application is in reference to sail control for public transportation, which aims at utilizing the different resources as to provide driving recommendations that aim at economic efficiency. This paper also highlight the challenges

of IOT implementation and also the potential enabling technologies that allow for the realization of the proposed applications [2].

The increase of population in urban regions demand adequate provision of services and infrastructure in order to meet the requirements of city inhabitants, residents, and tourists. Proper utilization of the information and communications technologies in order to achieve this objective presents on itself an opportunity for the development of smart cities, which is where city management and citizens alike are given access to real-time information about the urban environment which is the base for decisions, actions, and future planning. This paper presents a holistic frame work for the realizing of smart urbans through the implementation of Internet of Things (IOT). The framework provides all-encompassing solution for the complete urban information system, from the sensory level and networking support structure throughout data management and cloud-based implementation of systems and services, and forms an essential part of the existing cyber-physical system. This vision for the smart urban using IOT is applied to a noise mapping case study which will illustrate a new method for all existing operations that can be adopted to enhance important city services [3].

The adoption of Internet of Things various domain is being recognized as one of the key features of the smart urban vision. In spite of the standardization efforts and the world wide adoption of IOT, Web standards and cloud computing technologies, building large-scale smart city IOT infrastructures in practice still remains challenging. The dynamic change in IOT eco system requires them to be able to scale out and evolve over time in order to adopt new technologies and requirements. Responding to similar challenges in the building process of large-scale distributed applications and platforms on the IOT, micro network architecture style has gained a lot of popularity in the industry. In this paper we feature our experience of applying the micro network architecture style in designing a smart city based on the IOT platform[4].

However, in this era advancement in embedded systems, Automatic Street light controlling can be achieved using microcontrollers and light dependent resistors. The supply to the control unit and to light the street light is being achieved by the implementation of solar panels. Again, the LDRs are used to differentiate between day and night light. The discrete analog signals sensed by LDR due to variation in its resistance are converted to digital signals. The Microcontroller is programmed in such a way that during morning and evening as the intensity changes according to which street light intensity is programmed with five intensity levels. This system is basically street light intensity control as well as switching control. A lot more amount of power is conserved as the power is conserved as the power utilization depends on the light in the streets [5].

2. SYSTEM ARCHITECTURE

The smart urban using IOT system is a very innovative system which helps to keep cities clean. This system monitors the garbage bins and it gives the information about the level of garbage collected in the garbage bin via a web page. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level in compare it with the garbage bins depth. The system makes use of Arduino family micro controller (ATmega-328), Wi-fi modem (ESP8266), IR sensor, DC motor, Motor Driver (L293D). This system also helps to make the less power consumption by Automation of street lights using LDR sensor and LED. Whereas web page is created to show whether the garbage bin is full or empty.

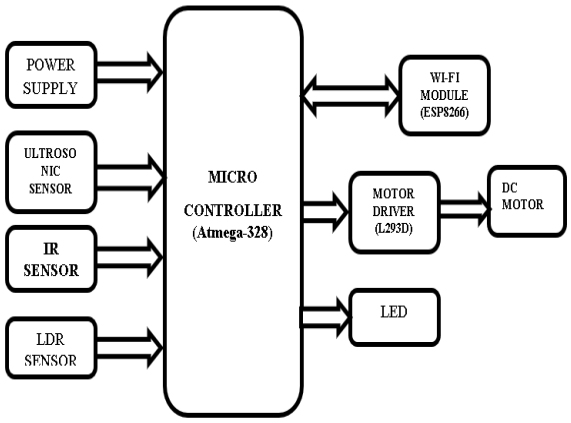

Figure: System Architecture Diagram

3. HARDWARE USED

Microcontroller: This is the heart of the Arduino development board, which works as a mini computer. And can receive as well as send information to the peripheral devices connected to it. It get information from sensor and process on it. It compares the received data with the threshold level set and accordingly output is generated. The Atmel 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, Maximum operating frequency 20MHz. The microcontroller used differ from board to board.

Power Supply: We use 12V power supply in our project. It is mainly used to provide DC voltage to the components on board 3.3V for LPC2138 and 4.2V for Wi-Fi module is applied from power supply 5V is required for relay applied from power supply.

Wi-Fi Module: The ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using At-commands. This module has a powerful enough on board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development upfront and minimal loading during run time. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area.

Ultrasonic Sensor: The ultrasonic sensor works by sending high-frequency sound waves from TX, which then bounce off of an object and then return to a receiver. The sensor has two openings on its front. One opening transmits ultrasonic waves, (like a tiny speaker), the other receives them, (like a tiny microphone). The speed of sound is approximately 341 meters (1100 feet) per second in air. The ultrasonic sensor uses this information along with the time difference between sending and receiving the sound pulse to determine the distance to an object.

IR Sensor: An Infrared sensor is an electronic device that is used to sense certain characteristic of its surroundings. Infrared devices always contains two elements a light emitter and light detector. An infrared emitter is a light emitting diode that emits invisible light within the range of the infrared spectrum. These infrared sensors are also able to measure the heat being emitted by an object and detecting motion of the object. It does this by either emitting or detecting infrared radiations.

LDR Sensor: A light dependent resistor is also called a photo resistor or a Cadmium Sulphide (cds). It is also called a photoconductor. It is basically a photo cell that works on the principle of photo conductivity. An LDR is a component that has a resistance that changes with the light intensity. When the light intensity around the LDR sensor increases then the LED will remain OFF and the light intensity around the LDR sensor decreases then the LED will remain ON.

Motor Driver: L293D is motor driver used for running the motor. The main purpose of motor driver is to take a low current signal and convert it to high current signal for driving the motor. Components like motors, cannot connect directly to the Arduino, they do not get sufficient power from arduino, by motor driver we can connect motor and then supply the power to motor using a 9V battery through motor driver.

DC Motor: A DC Motor is an electric motor that runs on direct current power. It is a device that converts electrical energy into mechanical energy. It works on the principle that a current carrying conductor placed in a magnetic field experiences a force which cause it to rotate with respect to its original position.

LED: A light emitting diode is a semi conductor that emits light when current flows through it. It works on the principle of Quantum theory. The quantum theory says that when the electrons comes down from the higher energy level to the lower energy level then, the energy emits from the photon. The photon energy is equal to the energy gap between these two energy levels. If the p-n junction is in the forward biased, then the current flows through the diode.

4. RESULTS AND DISCUSSION

The Design and its implementation of ATmega328 microcontroller, based electronics protection for the smart urban using IOT were effectively carried out with the advantages of minimum peripheral interfaces, low power consumption, low cost, high portability. The response of the system is successfully tested in all the conditions of the system that is mentioned in the system. Below Figure shows the hardware components.

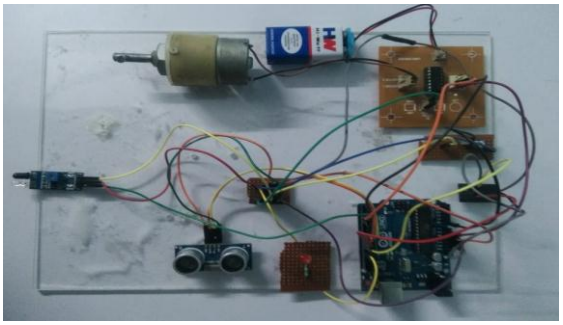

Figure: kit with Hardware components

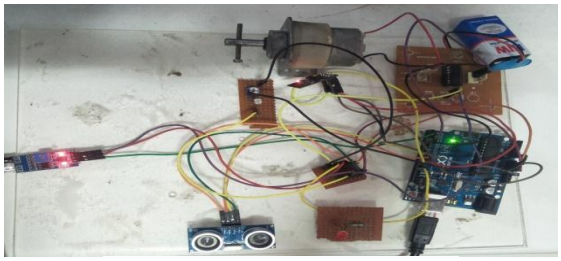

Figure: Output of the Sensors

All the connections are connected to the Arduino Uno board with the ultrasonic sensor, infrared sensor, LDR sensor, WI-FI module, driver circuit, DC motor and LED after giving the supply the hardware modules will ON then the observed outputs are, When we connect the circuit board to the system using a USB cable and dump the code into the Arduino board. The circuit is ready to be used for the purpose that we designed it for. The below figure shows the output of the system after the process is started, and the above shown figure is seen in system screen.

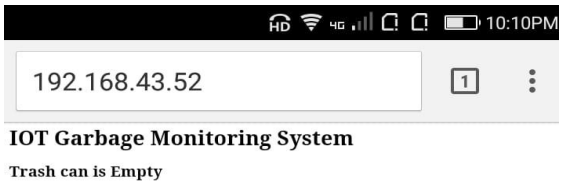

Figure: Output of the garbage when trash can is empty

Above figure shows the readings of the garbage when the level of the bin is empty by using the ultrasonic sensor.

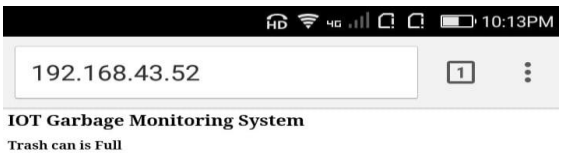

Figure: Output of the garbage when trash can is full

Above figure shows the reading of the garbage when the level of the bin is full by using the ultrasonic sensor using the Wi-Fi module as the interface to notify the information about the garbage bin.

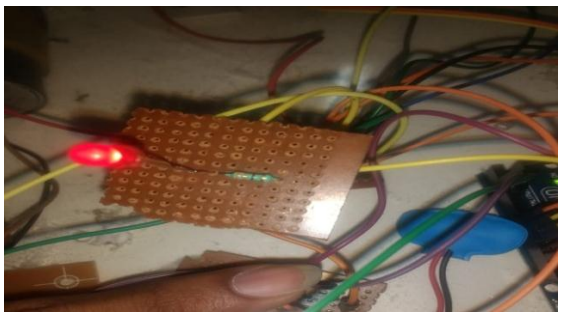

Figure: Output of the LED

Above figure shows the output of the LDR sensor when the climate is dull then the automatic ON and OFF of the road lights.

5. CONCLUSION

The objective of a project has been achieved by developing the hardware and software for smart urban using IOT by using IOT application. The demand for wireless operating device increases, it is more preferable over wired devices. Here we are controlling and monitoring the garbage level and automatic road lights ON and OFF.

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