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AUTOMATED STREET LIGHT CONTROL AND MANHOLE MONITORING WITH FAULT DETECTION & REPORTING SYSTEM FOR MUNICIPAL DEPARTMENT

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ABSTRACT

This project involves the design and implementation of an automated street light control system and an underground drainage monitoring system using GSM technology. Besides this, it can also check the status of the manhole lid. The system's low maintenance and low cost are some of its main advantages. This system can monitor the status of the street lights and manholes in real time. It can also notify the officials through a text message.

KEYWORDS: ARDUINO, IOT, STREET LIGHT MANAGEMENT, MANHOLES MONITORING.

1. INTRODUCTION

An embedded system is a particular type of computer system that is primarily made to carry out several activities, including accessing, processing, storing, and controlling the data in various electronics-based systems. Embedded systems are made up of both hardware and software, with the software—often referred to as firmware—being integrated directly into the hardware. These systems' ability to provide the o/p within the allotted time is one of their most crucial qualities. Embedded systems assist in improving the accuracy and convenience of the task. So, both basic and complex gadgets routinely use embedded systems. The principal real-world uses for embedded systems are in a variety of appliances, including microwaves, calculators, TV remote controls, home security systems, and local traffic management systems.

1.1 OBJECTIVE

Making automatic street lights was mostly done to conserve energy. As the light goes ON and OFF as needed, it conserves energy while also reducing our workload. In addition to aiding the general public, this method reduces the risk of mortality for manual scavengers who clean underground sewage. The apparatus looks for obstructions between the two manholes, measures the volume and depth of various hazardous gases, and sends out alerts with information.

1.2 SCOPE

Cities will reap via fewer electricity costs, fewer CO2 emissions, and better maintenance thanks to these lighting systems. With auto-dimming, scheduling, and a variety of other features, smart street lighting might help cities save 50–75% on energy expenses.

2. RELATED WORK

S. NO	YEAR	TITLE	AUTHORS	DESCRIPTION
1	2016	Design and Implementation of Automatic Street Light Controller for Energy Optimization Using FPGA [1]	Mr. Amey J.Manekar and Dr. R.V. Kshirsagar	Street lighting uses a significant amount of electricity. Additionally, because we have limited resources for power generation and the cost per unit is high, it is always preferable to rely on renewable energy sources. So, reducing energy consumption in street lighting is the purpose of the current study. Due to street lights lighting up the night continuously under the current system, power consumption occurs. The easiest and most effective method is the automatic street light control system. Up to 100% of the manual labour is released. Therefore, it is suggested to design a system that dynamically switches lights ON and OFF in accordance with traffic and light intensity. As a result, the most amount of electricity is conserved. FPGA and an IR sensor were used to implement the suggested notion.
2	2013	"GSM Based Autonomous Street Illumination System for Efficient Power Management,"[2]	Chaitanya Amin, AshutoshNerkar, Paridhi Holani, and Rahul Kaul	The primary goal of the project is to provide control and identification of the damaged street light automatically. The lighting system which targets the energy and automatic operation on economical affordable for the streets and immediate information response about the street light fault. In general, the damage of the street light is observed by getting the complaints from the colony (street) people. Whereas in this proposed work using sensors these lights working status is easily captured without any manual interaction. So that it reduces manual efforts and the delay to fix problems. So, to reduce such problem we come with the solution wherein automatic detection of street light issue.
3	2015	"Street Light Monitoring and Control System,"[3]	Abdul Latif Saleem, Raja Sagar R, Sachin Datta N S, Sachin H S, and Usha M S	The objective of the project is to provide automatic control and fault detection on street lamps. The lighting system which targets the energy and automatic operation on economical affordable for the streets and immediate information response about the street lamp fault. Moreover, errors which occur due to manual operation can also eliminate. The street light switched ON/OFF through an Internet of Things(IOT)
4	2013	"Intelligent Street Lighting System Using GSM"[4]	K.Y. Rajput, Gargeyee Khatav, Monica Pujari, and Priyanka Yadav	This system of street light control uses a driver circuit to drive the low power from Arduino microcontroller to regulate the current flow. Here additionally a relay is used to control the turning ON and OFF of the streetlight.
5	2013	"Arm Based Street Lighting System with Fault Detection." [5]	V. Sumathi, A. Krishna Sandeep, and B. Tarun Kumar	The monitoring device is installed under the manhole cover, three key problems, how to measure the tilt angle or state of resources Â°. For the second problem, long range (LoRa) is adopted. A 433-MHz whip antenna is designed to overcome the shield of manhole cover and the absorption of electromagnetic waves of the earth. The field tests show that the effective communication distance has been extended more than 700 m by using the whip antenna. In addition, the parameter spreading factor (SF) and bandwidth (BW) are configured. For the third problem, sleep mode is used and input output (IO) pin is configured

3. EXISTING SYSTEM

Street lights and manholes are manually monitored under the current system. As a result, it is impossible to discover a malfunction with lights unless someone complains. Additionally, there is no automatic monitoring for manholes.

3.1 DISADVANTAGES

- Manual Interference
- Lack of Automatic Detection
- Potential for Accidents due to Ignorance of Open Manhole

4. PROPOSED METHOD

Both the monitoring of manholes and street lights is being done in this initiative. To sense day and night and turn on and off the street lights, we are setting up LDR sensors.lights in line with it. If any of the lights are not on, a message about that light will be sent through GSM to the appropriate authorities. Here, an IR sensor is being used to monitor manholes and identify openings. An ultrasonic sensor to measure manhole fill levels. All values are continuously updated on the cloud server, and if any value crosses a threshold, a message alert is issued to the appropriate authorities via the GSM Module.

4.1 ADVANTAGES

- Flexibility
- Affordability
- Speed
- Reliability
- Increased performance and lamp life

5. ARCHITECTURE

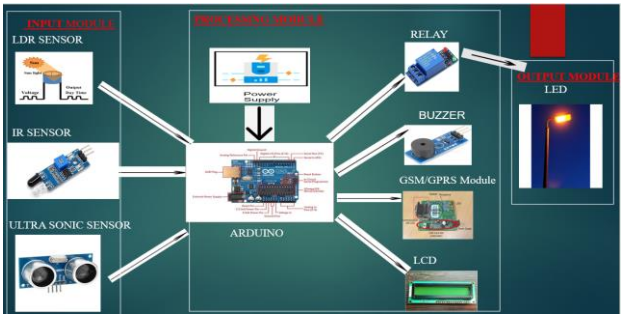

FIG 5.1 Automated Street Light Control And Manhole Monitering With Fault Detection &Reporting System For Municipal Department

INPUT MODULE:

In the input module, there are three steps the first one The resistivity of an LDR sensor, sometimes referred to as a photoresistor or a light dependent resistor, depends on the electromagnetic radiation that strikes it. They are hence light-sensitive technology. Other names for them include photoconductors, photoconductive cells, and just plain old photocells, Infrared sensors(IR) are electronic devices that emit infrared light in order to detect certain features of their environment. An IR sensor can monitor an object's heat while also spotting movement, When an object is in the way, an ultrasonic sensor sends out ultrasonic waves into the air and detects the reflected waves. Ultrasonic sensors have a wide range of uses, including in car backup sensors, automatic door openers, and intrusion alarm systems. New sectors of application are expanding and should continue to do so as a result of the quick growth of information processing technology, including factory automation equipment and automotive electronics.

PROCESSING MODULE:

A microcontroller board based on the ATmega328 is called the Uno with Cable. It contains 6 analogue inputs, a 16 MHz ceramic resonator, 14 digital input/output pins (six of which can be used as PWM outputs), a USB port, a power jack, an ICSP header, and a reset button. It comes with everything needed to support the microcontroller; to get started, just plug in a USB cable, an AC-to-DC adapter, or a battery. Uno, which translates to "one" in Italian, will be the name of the next Arduino 1.0 release. Moving forward, the reference versions of Arduino will be the Uno and version 1.0. The Uno is a USB Arduino board that was released most recently. standard design for the Arduino platform; see the index of Arduino boards for a comparison with earlier iterations. The Atmega8, 168, or 328 can be used in the Uno R3 reference design. Current versions use the ATmega328, although an Atmega8 is shown in the schematic for comparison. Every single one of the three CPUs has the same pin layout.

OUTPUT MODULE:

When the Arduino performs the command then that command is displayed on LCD. An important class of industrial LEDs that can be clearly distinguished. The ternary composition intended to combine GaAs and GaP is denoted GaAs1-yPy. In this case, the quaternary (four-component) III-V compound with an instantaneous bandgap is InGaAlP. A homojunction is a type of LED that uses two semiconductors that are doped differently but have the same base material. When identified using various bandgap materials, they are called heterostructure devices.Heterostructure LEDs are brighter than homojunction LEDs.

6. RESULT

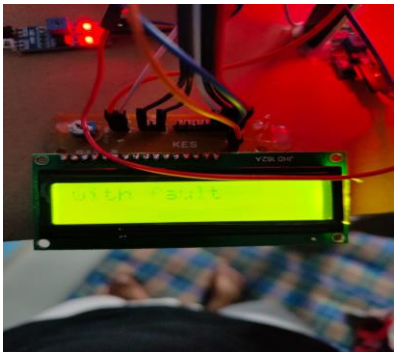

FIG 6.1 Manhole detected output

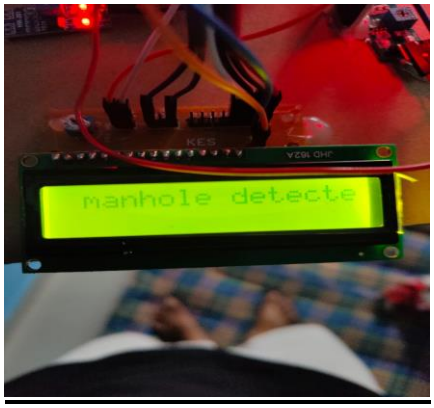

FIG 6.2 Fault detection output

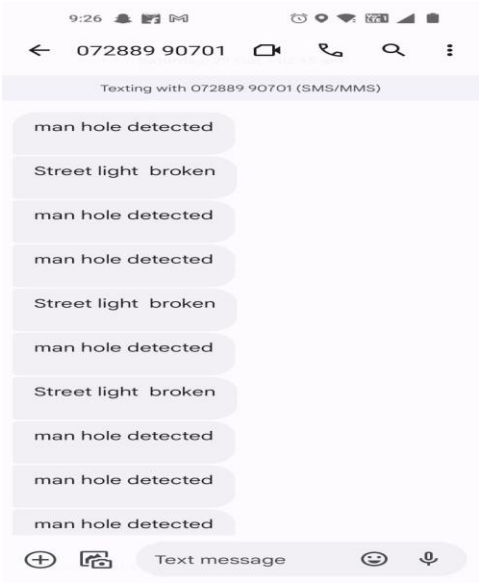

FIG 6.3 Output Messages of Manhole Detection and Street Light Monitoring

7. CONCLUSION

Through the Internet of Things, a sensor unit automatically detects and updates the real-time values of physical parameters such water level, manhole cap openness, street light status, dustbin levels, and path hole detection. The system becomes automated and smart as a result. In a developing nation, the use of Wireless Sensor Networks (WSN) facilitates the creation of Smart cities

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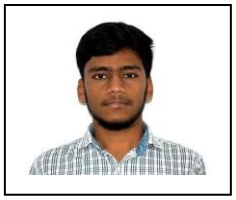

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