Atmosphere Observation and Alert Through Smart Pole

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Abstract- Main aim of this system is to provide energy efficient system which provides continuous monitoring of environmental parameters like air quality, earthquake and floods. So that people & higher government authorities will get to know about the accidents quickly. To make the system energy efficient, lights from the pole will be turn on & off depending on external light environment. This project will be implemented on existing roadside streetlamps & helpful for generating immediate alert in extreme situations to avoid casualties. 24*7 monitoring of environmental parameters form anywhere. It will be helpful for speed up the rescue operations in flood & earthquake. To avoid the use of external energy, system included with rotating solar panel. All these features make the old streetlight poles SMART. In this proposed system, Air quality sensor is used to monitor hazardous gases & smoke detection. This will trigger an alarm when the air quality goes down beyond a certain level, means when there are sufficient number of harmful gases are present in the air like CO_2, smoke, alcohol, benzene and NH_3. A water level sensor for flood detection & vibration sensor for earthquake detection are used. System will display readings from sensors on webpage through internet. So that government officials will be alert at that exact movement. An alarm will be on, when danger situations are detected, so that people will get start to reach safer places. Street lights on pole will be turn on & off automatically, depending on external light environment. This system is be powered through sun tracking solar panel & will be the efficient and lifetime source of energy for the system.

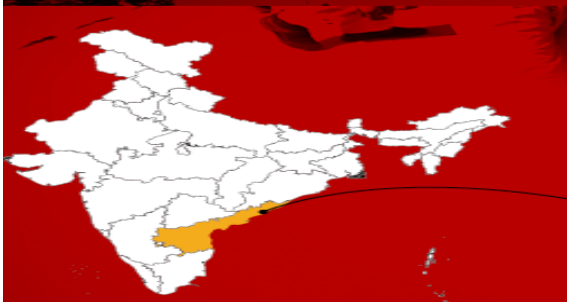**Keywords-** Sensor Network, Microcontroller, Solar Tracking

INTRODUCTION

Gas leak accidents & air contamination is a major issue these days. These accidents are causing many life casualties. It is necessary to generate immediate alerts for situations like this. So that people can go at safer places on time. It is essential to screen Air Quality and monitor it for future and sound living for all. So, we propose an air quality & temperature observing system that help us to check and monitor live air quality temperature through IOT. This project will be implemented on existing roadside streetlamps & helpful for generating immediate alert in extreme situations to avoid casualties. Real time monitoring of environmental parameters form anywhere. It will be helpful for speed up the rescue operations in flood & earthquake. To avoid the use of external energy, system included with rotating solar panel. All these features make the old streetlight poles SMART.In this proposed system, Air quality sensor is used to monitor hazardous gases & smoke detection. This will trigger an alarm when the air quality goes down beyond a certain level, means when there are sufficient number of harmful gases are present in the air like CO_2, smoke, alcohol, benzene and NH_3. System will display readings from sensors on webpage through internet. So that government officials will be alert at that exact movement. An alarm will be on, when danger situations are detected, so that people will get start to reach safer places. Street lights on pole will be turn on & off automatically, depending on external light environment. This system is be powered through sun tracking solar panel & will be the efficient and lifetime source of energy for the system.

<div align="center">NEED OF PROJECT</div>

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MOTIVATION

Not a single living thing can survive without air. Air is the most important element for living. According to the SDG (Sustainable Development Goals) by the UN (United Nations) there are seventeen goals to transform the world to clean, healthy and natural way to live in because at this time there are several problems in human life. The SDG says, Goal 3: Ensure healthy lives and promote well-being for all at all ages, Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all, Goal 12: Ensure sustainable consumption and 3 production patterns, Goal 13: Take urgent action to combat climate change and its impacts, Goal 14: Conserve and sustainably use the oceans, seas and marine resources, Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss. These are the main reason why the topic was chosen for the research purpose

LITERATURE SURVAY

A Wifi-Enabled Indoor Air Quality Monitoring And Control System:

This paper proposes an open platform of a WiFi-enabled indoor air quality monitoring and control system, which could be incorporated into such a 'smart building' structure. The complete software and hardware design of this system is presented, along with a series of control experiments. The proposed system operates over an existing WiFi wireless network utilizing the MQTT protocol. It is capable of monitoring the indoor air quality as well as controlling an air purifier to regulate the particulate matters concentration. Experiment results under a real world office environment demonstrate the effectiveness of the proposed design.

A Low-Power Real-Time Air Quality Monitoring System Using LPWAN Based On Lora:

This paper presents a low-power real-time air quality monitoring system based on the LoRa Wireless Communication technology. The proposed system can be laid out in a large number in the monitoring area to form sensor network. The system integrates a single-chip microcontroller, several air pollution sensors (NO_2, SO_2, O_3, CO, PM1, PM10, PM2.5), LongRange (LoRa) - Modem, a solar PV-battery part and graphical user interface (GUI). As communication module LoRa sends the data to the central monitoring unit and then the data would be saved in the cloud. The range tests at an outdoor area show that LoRa is able to reach to approximately 2Km. The TX power is only about 110mA which is lower compared with other used wireless technology. An easy to use GUI was designed in the system. Based on LoRa technology, GUI, and Solar PV- Air quality sensing and monitoring 9 battery part the system has several progressive features such as low cost, long distance, high coverage, long device battery life, easy to operate.

Iot Enabled Proactive Indoor Air Quality Monitoring System For Sustainable Health Management:
This paper proposes an IoT based indoor air quality monitoring system for tracking the ozone concentrations near a photocopy machine. The experimental system with a semiconductor sensor capable of monitoring ozone concentrations was installed near a high volume photocopier. The IoT device has been programmed to collect and transmit data at an interval of five minutes over blue tooth connection to a gateway node that in turn communicates with the processing node via the WiFi local area network. The sensor was calibrated using the standard calibration methods. As an additional capability, the proposed air pollution monitoring system can generate warnings when the pollution level exceeds beyond a predetermined threshold value.

A Wireless System For Indoor Air Quality Monitoring:
This paper describes the development of a wireless monitoring system which can be deployed in a building. The system measures carbon dioxide, carbon monoxide and temperature. The system developed in this paper can serve as the monitoring component of a HVAC control system and function as an indoor air quality monitor independently.

Polluino: An Efficient Cloud-Based Management of IOT Devices For Air Quality Monitoring:
The Internet of Things paradigm originates from the proliferation of intelligent devices that can sense, compute and communicate data streams in a ubiquitous information and communication network. The great amounts of data coming from these devices introduce some challenges related to the storage and processing capabilities of the information. This strengthens the novel paradigm known as Big Data. In such a complex scenario, the Cloud computing is an efficient solution for the managing of sensor data. This paper presents Polluino, a system for monitoring the air pollution via Arduino. Moreover, a Cloud-based platform that manages data coming from air quality sensors is developed.

An Embedded System Model For Air Quality Monitoring:
Objective of the paper is to present a system model which can facilitate the assessment of health impacts caused due to indoor air pollutant as well as outdoor and can intimate the human prior about the risk he/she going to have, here we are focusing our work in context to allergic patients as they will be informed by this tool such that they can secure themselves without actually experiencing the risk factors, here a sensing

network based microcontroller equipped with gas sensors, optical dust particle sensor, humidity and temperature sensor has been used for air quality monitoring. The design included various units mainly: sensing unit, processing unit, power unit, display unit, communication unit. This work will apply the techniques of electrical engineering with the knowledge of environmental engineering by using sensor networks to measure Air Quality Parameters.

A Real-Time Ambient Air Quality Monitoring Wireless Sensor Network For Schools In Smart Cities:

In this paper, a low-cost solar-powered air quality monitoring system based on ZigBee wireless network system technology is presented. The solar powered network sensor nodes can be deployed by schools to collect and report real-time data on carbon monoxide (CO), nitrogen dioxide (NO2), dust particles, temperature, and relative humidity. The proposed system allows schools to monitor air quality conditions on a desktop/laptop computer through an application designed using LabVIEW and provides an alert if the air quality characteristics exceed acceptable levels. They tested the sensor network successfully at the Singapore campus of the University of Newcastle, Australia. The experimental results obtained by them demonstrated that the sensor network can provide high-quality air quality measurements over a wide range of CO, NO2 and dust concentrations.

PROPOSED SYSTEM

In this proposed system, Air quality sensor MQ135 is used to monitor hazardous gases & for smoke detection. This will trigger an alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases are present in the air like CO2, smoke, alcohol, benzene and NH3. DHT11 sensor is used to measure temperature & humidity in the environment. To detect vibrations in the earth surface, vibration detection sensor is used. System will display readings from sensors on webpage through wifi module ESP8266. All the process & readings will be displayed on LCD. Street lights on pole will be turn on & off automatically, depending on external light sensed by LDR sensor. This system is be powered through sun tracking solar panel controlled by servo motor & this will be the efficient and lifetime source of energy for the system.
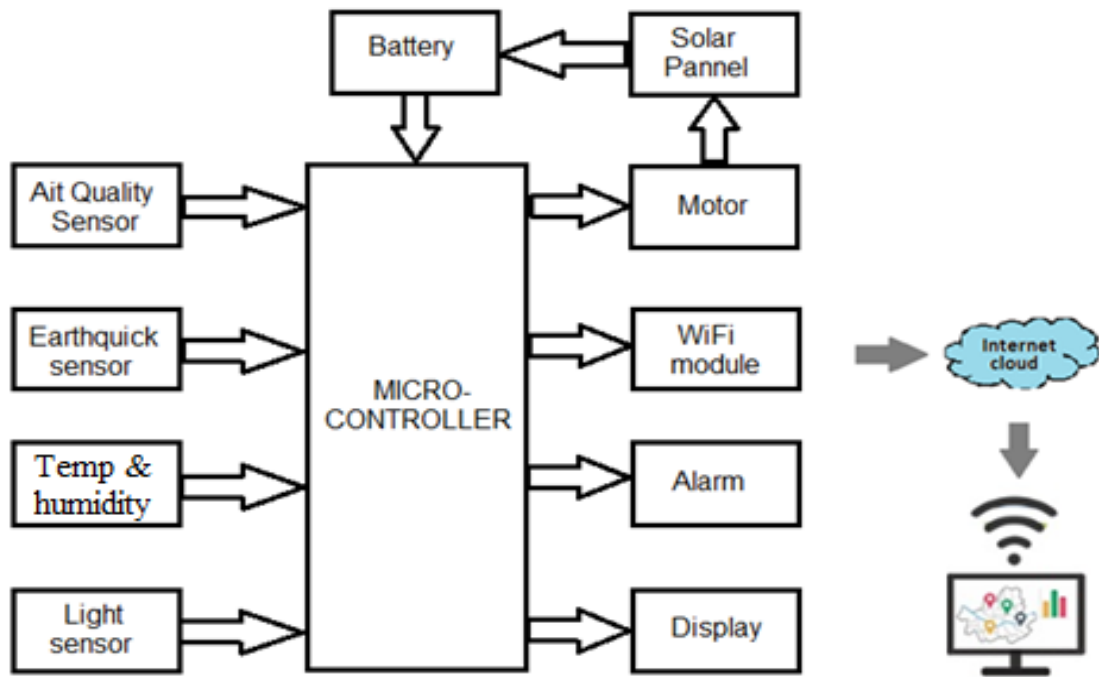
CONCLUSION

By implementing this system on street poles, issue of external energy requirement & maintenances of street lights can be reduce. Due to use of IOT alert, lot of lives can be save before the disasters like gas leak. Use of solar energy makes the system energy independent & reliable.By using such a Smart Pole we can easily monitor on changing environmental conditions. This project helps to provide alarm system of upcoming environmental dangerous conditions. This system provides the database for the research studies on natural disaster.

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