Application of Internet of Things in Field of Civil Engineering

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Abstract - **If we can see, technology is progressing and making jobs easier, and we are entering a new age. The Internet of Things (IoT) is one of these novel era innovations that has rapidly evolved, spanning hundreds of applications in various fields such as political, health, military, and agriculture, and the internet of things (IoT) plays a critical role in the implementation of the smart city idea. In this work, proposed an Internet of Things (IoT) based concrete curing and light automation system. The system consists of DHT 11 humidity sensor, DS18B20 waterproof Temperature sensor, LDR sensor, 5V Relay module and Arduino Uno microcontroller to measure the humidity and temperature and light automation.**

The benefits of this system are that we can have real time data about temperature and humidity of concrete curing pond because Humidity and temperature are the two main factors that effects on the strength of concrete such as quick moisture diffusion resulting from high temperature during curing, and it cause shrinkage. by light automation system we can reduce the consumption of electricity.

Index Terms - **Internet of Things, Arduino Uno, Sensor, Temperature, Humidity, Light Automation.**

I.INTRODUCTION

Civil engineering is a technical engineering discipline that deals with the planning, installation, and management of the physical and naturally built environment, including public works such as highways, bridges, canals, lakes, airports, sewerage networks, pipes, building structural materials, and railways. or we can say civil engineering is application of physical, mathematical and scientific principles for the convenience of civilization.

There are a number of sub-disciplines within the broad field of civil engineering such as Construction engineering, Earthquake engineering, Environmental engineering, with the steady improvement of computer technology, bar code is extensively used in different industries, especially in daily life, and bar code technology is extensively used to assist folk enhancing their work effectiveness. By utilizing bar code people [8] can simplify their works because bar code technology has many features such as the production place, producer, production date, financial management, etc. Bar code system for smart city applications based on internet of things. They integrated the barcode technology of the perception layer in Internet of things and the enterprise resource planning system by this it is possible to obtain a new automatic industrial bar code system. They combined two systems bar code and ERP enterprise resource planning system to enhance effectiveness bar code acquisition and active them to do their relative advantages freely in the face of various companies to solve their issues.

Bar code is a collection or group of images with various bandwidth reflectivity which composed due to specific coding roles to show a collection of data and symbols. Nowadays bar code technology is broadly used in producing, financial industries, and from dimension point of view bar code has divided into three-part one dimensional, two dimensional, and three-dimensional bar code.

The Internet of Things (IOT) is a chain of physical objects connected to electronics, applications, sensors, and networks that allows data to be gathered and shared by these objects. Technology is evolving and facilitating the performance of works that we see day by day and we are getting into a new age. The Internet of Things (IOT), which has quickly progressed covering more than hundreds of applications in diverse fields such as political, health, military, and agricultural areas, and the Internet of Things (IOT), is one of these new innovations. The Internet of Things (IOT) is a network of computers, sensors and objects

that are related to each other to provide individuals with different resources in different areas.

II. RELATED WORK

In [1] they utilize IOT and intelligent data analysis technique to monitor corrosion reason factors and estimation of the beginning time of corrosion without utilizing experimental models. The monitoring of chemical assaults is crucial for early degradation detection and IOT based corrosion monitoring system can be applied to the structure by using some sensors in concrete for ongoing measurement of the factors that enhance the corrosion of steel. These ongoing measurements will show us the conditions of our structures.

In [2] they used from GSM, microcontroller (RL78) and some sensors such as accelerometer sensor to detect acceleration forces, moisture sensor to detect absorption time of water, pressure sensor to record applied forces on structure, temperature sensor to monitor changing in temperature, LCD to display data, at various part of the structure.

In [3] This system monitors the level of water in the rivers and due to hazard level creates emergency alerts to the officials via call and massages. The object of this work was to reduce casualties of people due to flood and build a capable system to monitor the change of water level in the rivers and give alert to the officials and inhabitants of cities.

In [4] As we know, buildings are society's essential and vital need and trustworthy approaches, and processes need to monitor the structure because more than 1700 people have died in the past two decades because more than 4000 have been injured due to structural defects. The SHM or structural health monitoring system tool or procedure requires calculating various parameters such as us (vibration, pressure, crack, moisture) using the sensors, capturing the sensed values, conducting the analysis, and taking the right action on that.

In [5] an IOT platform for the structures to monitor moisture, vibration and temperature of the structures. This system includes sensors and network connectivity that can identify and detect the above parameters and transfer the sense data to any part of the world with help of internet. so this system can help us very much to have real time data about the three main parameters such as humidity, temperature and vibration and prevent from cracks and structures damages.

In [6] in this system the robot will move on the bridge surface through an IR sensor and will detect the cracks with help of ultrasonic waves and the exchanging of information is achieved with a simple SMS and the geographical location can be done by the Wi-Fi attached to it.

In [7] the aim of this project is to make the bridges a tracking system. In India, there are several bridges that are structurally deficient in order to safely extend the service life of such bridges. This device detects and feels the crack within the bridge and provides the operating room with the signal to interrupt traffic.

III. PROBLEM DEFINATION

As we know that Humidity and Temperature are the two main factors that effects on the strength of concrete such as quick moisture diffusion resulting from high temperature during curing and Concrete strength of compression, stress and resulting modulus of elasticity will be reduced as temperature and saturation levels rise.

Advantages of the Proposed System
1. Measuring Humidity
2. Measuring Temperature
3. Light Automation
4. Energy Saving

IV. METHODOLOGY

4.1 Arduino IDE

The Arduino IDE (Integrated Development Environment) is a software development environment that helps you to write code for the Arduino Uno board. The Arduino Uno board, which is the actual board, receives this code. "Arduino" refers to both the device and the circuit board. The Arduino IDE uses special code structuring rules to support the languages C and C++.

4.2 MS Excel

As we know MS Excel is a widely used Microsoft Office application. It is a spreadsheet program which is used to analyze and save numerical data. In this project we used from MS Excel to get real time data of Humidity and Temperature and plot their graphs.

V. MATERIAL

5.1 Arduino Uno Board

The Arduino Uno is a microcontroller board that uses the ATmega328P microcontroller. There are 14 optical input/output pins on it. Six of the outputs can be used as PWM outputs. There are also 6 analogue inputs, a USB port, a power jack, an ICSP header, and a reset button on the frame. The proposed device collects data from all the sensors. It is an open-source hardware, anyone can obtain the specifications or details of its design and change it or make his own one himself.

5.2 DHT 11 Sensor

DHT11 sensor is a low-cost digital humidity and temperature sensor, and this sensor was utilized to figure humidity in this project.

5.3 DS18B20 Sensor

This is the waterproof version of DS18B20 Temperature sensor, and this is useful or handy When you need to monitor temperature over a long distance or in wet conditions. And over long distances, there is no signal loss since they are digital.

5.4 LDR Sensor

Photo resistors, also known as light dependent resistors (LDRs), are light-sensitive instruments that are often used to detect the presence or absence of light, as well as to determine the intensity of light.

5.5 Relay

5V relay was used in this project to switch OFF and ON the lights and the main function of relay is to provide time delay.

5.6 LIQUID CRYSTAL DISPLAY

16x2 LCD is used in this project to display the value of Temperature and Humidity.

VI. WORKING PRICIPLE

In this project, we used from DHT11 sensor, DS18B20 sensor, LDR sensor, 5V Relay, Bread Board and Arduino Uno board (microcontroller). The sensor will sense and send the data to the microcontroller after that by help of MS Excel we will have real time data with

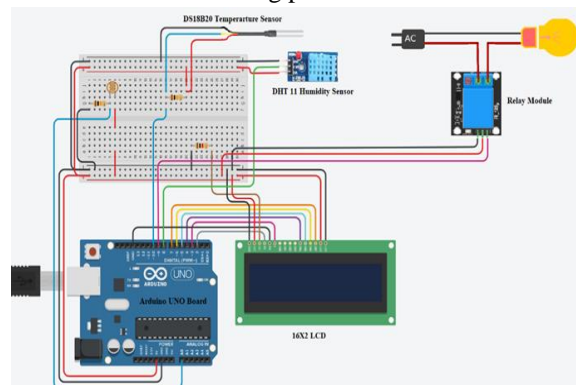their plots. By using this we will be able to have real time data from the curing pond.

Fig: 6.1 Circuit Diagram of the Project

VII. RESULT AND DISCUSSION

The project goals were to have real-time data about the Temperature, Humidity and save the power by the light automation system. The first step in this project is to plan the system inputs and outputs to measure the temperature, humidity, and light intensity.
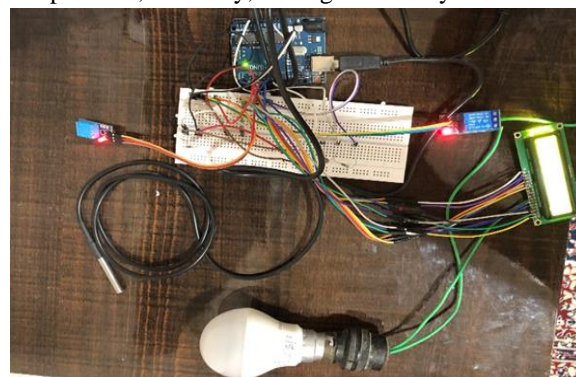

Fig: 7.1 Prototype of IoT based System

Here the above Fig7.1 shows that the complete working prototype of the IoT Based smart intelligent Temperature, Humidity, and Light Automation system which includes DHT 11 Sensor, DS18B20 Sensor, LDR sensor, Arduino Uno microcontroller, and Relay.

VIII. CONCLUSION

A systematic approach in designing the IoT-based system for measurement and control of the two essential parameters temperature and humidity. The results obtained from the measurement have shown that the system performance is quite reliable and accurate because nowadays time, cost and achieving an accurate data is an important matter in field of

industries, an IoT based technology can provide the above-mentioned parameters.

The Internet of Things (IOT) has steadily introduced several technological advancements to our lives and continue to make our lives easier and more comfortable across diverse innovations and applications. The use of IOT in various applications is discussed in this article. The internet of things technology is now, and even in the future, on the path to making human life 'connected' and 'intelligent.' As we know, the most significant things in industries today are time, costs, and the achievement of reliable results, and each IoT technology-based device will provide the things mentioned. The aim of the Internet of Things (IOT) is to connect smart devices, to capture and process data from various environments, and to provide end-users with different offers, and to sectors such as government, transport, health, military, etc.

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