

# An Automated Irrigation System to Improve Water Usage Efficiency in Irrigation Sector

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**Abstract:** The aim of the project is to amount of irrigation to agricultural fields by observing the moisture content of soil. This is used to address water scarcity at the regional national level. The project automates the process of manually irrigating the fields by switching the pump ON/OFF. It is implemented by using ARDUINO series microcontroller, programmed such as to collect input signals that measure moisture content of soil through sensing arrangement. On receiving the signal, the microcontroller produces an output that drives a relay and operates the water pump. Also, LCD is used which interacts with microcontroller for displaying the moisture content of soil and water pump status. Hence the system reduces human intervention and provides required irrigation to field. This is essential because water must be provided to the plant at a particular time for a good yield. Thus, it is useful in real time scenario and end users are interested in using this system.

**Keywords:** Arduino, DHT11 sensor, Soil moisture sensor, LCD, GSM, DC motor, WIFI module.

## 1. Introduction

Agriculture is the backbone of all developed countries. It uses 85% of available fresh water resources worldwide and this percentage continues to be dominant in water consumption because of population growth and increased food demand. Due to this, efficient water management is the major concern in many cropping systems in arid and semi-arid areas. India is the country of village and agriculture plays an important role for development of country. In our country, agriculture depends on the monsoons which has insufficient source of water. So, the irrigation is used in agriculture field. In irrigation system, depending upon the soil type what is provided to the plant. In agriculture, two things are very important, first to get information about the fertility of soil and second to measure moisture content in soil. Now a day, for irrigation, different techniques are available which are used to reduce the dependency of rain. And mostly this technique is driven by electrical power and on/off scheduling. In this technique, water level indicator placed in water reservoir and soil moisture sensors are placed in the root zone of plant. Irrigation system

Irrigation is the agricultural process of applying controlled amounts of water to land to assist in the production of crops, as well as to grow landscape plants and lawns, where it may be

known as watering. Agriculture that does not use irrigation but instead relies only on direct rainfall is referred to as rain-fed. Irrigation has been a central feature of agriculture for over 5,000 years and has been developed independently by many cultures across the globe.

### *Present Extent:*

In year 2000, the total fertile land was 2,788,000 km<sup>2</sup> (689 million acres) and it was equipped with irrigation infrastructure worldwide. About 68% of this area is in Asia, 17% in the Americas, 9% in Europe, 5% in Africa and 1% in Oceania. The largest contiguous areas of high irrigation density are found

### *Efficiency:*

Modern irrigation methods are efficient enough to supply the entire field uniformly with water, so that each plant has the amount of water it needs, neither too much nor too little. Water use efficiency in the field can be determined as follows:

$$\text{Field Water Efficiency (\%)} = (\text{Water Transpired by Crop} \div \text{Water Applied to Field}) \times 100$$

## 2. Automated Irrigation System Using WSN and GPRS Module

Automated Irrigation system using WSN and GPRS Module having main goal is that optimize use of water for agriculture crops. This system is composed of distributed wireless sensor network with soil moisture and temperature sensor in WSN. Gateway units are used to transfer data from sensor unit to base station, send command to actuator for irrigation control and manage data of sensor unit. Algorithm used in system for controlling water quantity as per requirement and condition of filed. It is programmed in microcontroller and it sends command through actuator to control water quantity through valve unit. Whole system is powered by photovoltaic panels. Communication is duplex take place through cellular network. Web application manage the irrigation through continuous monitoring and irrigation scheduling programming. It can be done through web page.

### A. Existing System

An automated irrigation sensor was designed and implemented to use in agricultural crops. In this system, various sensors such as soil moisture and humidity sensor are connected

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# Smart Street Light System with Automated Feedback

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**Abstract:** The lack of efficient prevention of hazardous accidents that people face on streets can be addressed by designing an automated sensor detection. It is embedded with different sensors so that it can detect the condition of lights on streets. If any street light is not working then the condition of light is displayed on dash board which is at control room of street lights operating station.

**Keywords:** Streetlights, Accidents, NodeMCU, LDR, WiFi transfer, IoT.

## 1. Introduction

As the technology growing immensely in recent year certain improvisation needs to be made street lights have been installed in many villages and state highways in Central India, however many times these lights remain non-functional due to late information about the exact location and unavailability of sufficient service support. Consequently, in the absence of proper lighting, some of these areas become on safe for people at night especially elders' women and children we will develop a good street lighting system which will allow the service engineers to know the exact location of non-functional street lights in their area of responsibility.

## 2. Components

### A. Hardware Components

#### 1) NodeMCU

Node Microcontroller Unit is named as NodeMCU which is open-source software and firmware that is built around System-on-Chip (SoC) called the ESP8266. The ESP8266 is designed and manufactured by Express. It contains the crucial elements like CPU, RAM, networking (Wi-Fi), modern operating system and SDK. The NodeMCU aims to simplify ESP8266 development. It has an operating voltage of 3.3v. It has an operating temperature range of 40°C~125°C. ESP8266Wi Fi So C is embedded with the memory controller, including SRAM and ROM. Micro Controller Unit can enter the memory units through I2C, SPI, and AHB interfaces.

#### 2) LED

A Light Emitting Diode (LED) is a semiconductor device, which can emit light when an electric current passes through it. To do this, holes from p-type semiconductors recombine with

electrons from n-type semiconductors to produce light.

#### 3) LDR

What is an LDR (Light Dependent Resistor) An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits. Light Dependent Resistors (LDR) are also called photo-resistors

A photo-resistor or light dependent resistor is an electronic component that is sensitive to light. When light falls upon it, then the resistance changes. Values of the resistance of the LDR may change over many orders of magnitude the value of the resistance falling as the level of light increases.

#### 4) Relay

A power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical circuit.

### B. Software components

#### 1) Arduino IDE

The Arduino Integrated Development Environment (IDE) contain a text editor for written code, a message area, a text console, a tool bar with button for common functions and a series of menus. It connects the Arduino hardware to upload program and communicate with them.

#### 2) Things Board

It is an open source IoT platform for data collection, processing, visualization, and device management. It enables device connectivity via industry standard IoT protocols – MQTT, CoAP and HTTP and supports both cloud and on-premises deployments.

## 3. Working Operation

- Power supply is given to NodeMCU microcontroller. The digital outputs from LDR1, LDR2 and LDR3 sensors is given to the microcontroller.
- The condition of light1 and light2 is continuously monitored on the thingsboard interface that are transferred through WiFi.
- If light-1 is not operated, the LDR2 given the signal to

# Smart Safety Device for Coalmine Workers

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**Abstract:** The lack of efficient prevention of hazardous accidents that miners face in the coal mine can be addressed by designing an automated sensor detection. It is embedded with different sensors so that it can detect the surrounding atmospheric conditions that change during any accident thereby alerting workers and send rescue signals to the control cabin.

**Keywords:** Coalmines, Accidents, NodeMCU, DHT11, MQ2, WiFi transfer, IoT.

## 1. Introduction

The accidents occurring in the mines can be predicted by sensing the surrounding atmospheric conditions continuously and detecting abnormal conditions that change during or before an accident. The major parameters include temperature, humidity and smoke concentrations. We also need to detect concentrations of any poisonous gases. We detect temperature and pressure using DHT11 sensor. Smoke levels and concentrations of some common toxic gases can be detected using MQ2 sensor. NodeMCU microprocessor can be used since it has a built in WiFi module through which data and alert signals can be sent to control cabin.

## 2. Components

### A. Hardware Components

#### 1) NodeMCU

Node Microcontroller Unit is named as NodeMCU which is open-source software and firmware that is built around System-on-Chip (SoC) called the ESP8266. The ESP8266 is designed and manufactured by Express. It contains the crucial elements like CPU, RAM, networking (Wi-Fi), modern operating system and SDK. The NodeMCU aims to simplify ESP8266 development. It has an operating voltage of 3.3v. It has an operating temperature range of 40°C ~ 125°C. ESP8266 Wi-Fi SoC is embedded with the memory controller, including SRAM and ROM. Micro Controller Unit can enter the memory units through I2C, dBus, and AHB interfaces.

#### 2) DHT11

The DHT11 is commonly used Temperature and Humidity sensor that comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data.

#### 3) MQ2

MQ2 is one of the commonly used gas sensors in MQ sensor series. It is a metal oxide semiconductor (MOS) type gas sensor also known as Chemiresistors as the detection is based upon change of resistance of the sensing material when the gas comes in contact with the material. It works on 5v DC and draws around 800mW. It can detect LPG, smoke, alcohol, propane, hydrogen, methane and carbon monoxide concentrations anywhere from 200 to 10000ppm.

#### 4) Buzzer

A buzzer or beeper is an audio signaling devices, which may be mechanical, electrotechnical, or piezoelectric (piezo for short).

### B. Software Components

#### 1) Arduino IDE

The Arduino Integrated Development Environment (IDE) contain a text editor for written code, a message area, a text console, a tool bar with button for common functions and a series of menus. It connects the Arduino hardware to upload program and communicate with them.

#### 2) ThingsBoard

It is an open source IoT platform for data collection, processing, visualization, and device management. It enables device connectivity via industry standard IoT protocols – MQTT, CoAP and HTTP and supports both cloud and on-premises deployments.

## 3. Working Operation

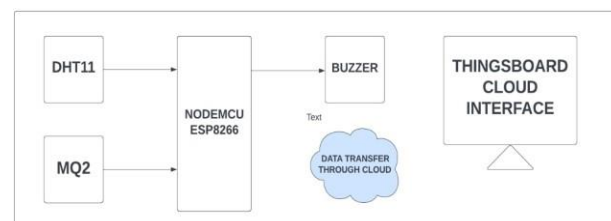


Fig. 1. Block diagram

- Power supply is given to NodeMCU microcontroller. The digital outputs from DHT11 and MQ2 sensors is given to the microcontroller.
- The values of temperature, humidity, concentrations of

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# Touchless Attendance System using QR Code and Power Apps

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**Abstract:** In this era of technology smartphones plays a significant role in our day-to-day life. Now-a-days smartphones can solve most of the problems very quickly and easily. It has made a life of every person simple and easier with different social apps, commercial apps, problem solving apps, apps for education and marketing etc. Followed by the technology the project proposed a system that will handle a problem for recording the attendance. The proposed system is a couple of two applications, one for generating the QR code by entering the student details and designing power apps for generating the attendance in CSV or XLS format. The teacher will need to scan the QR code of particular student to confirm their attendance. The paper discusses how the system verifies the student validity to eliminate false registration. The aim is to provide a touchless attendance system for office purpose, school purpose, college purpose.

**Keywords:** Spreadsheets, Power apps, Share point, .excel, .CSV file.

## 1. Introduction

Power Apps is Microsoft's answer to building business heavy applications without a ton of coding involved. It is a feature that allows professionals to create real and highly powerful apps without the need to write a single line of code.

When all other applications stop performing, Power Apps keep going forward. It allows non-developers to create and customize applications using Azure Functions. With the power of visual tools, Power Apps allows users to create applications that can solve big and small problems alike.

A quick response (QR) code is a type of barcode that can be read easily by a digital device and which stores information as a series of pixels in a square-shaped grid. QR codes are frequently used to track information about products in a supply chain and often used in marketing and advertising campaigns. QR codes are considered an advancement from older, uni-dimensional barcodes, and were approved as an international standard in 2000 by the International Organization for Standardization (ISO). QR codes were designed by DENSO WAVE in Japan and first came into use in 1994. Although the term "QR code" is a registered trademark, the technology itself has not been patented and is therefore available for anyone to use.



Fig. 1. QR code

## 2. Background Study

### Manual System:

Prior to the age of technology, manual attendance was the most common method of tracking attendance. The employee's time is recorded in a Register or an MS-Excel or in a book, depending on how it is recorded.

### Timesheets:

The sheets document when tasks are started and finished by employees. As a result, the employer will receive a detailed breakdown of the tasks the employee accomplished during his or her entire tenure. Information like this is used to estimate time and manage resources.

### Biometric Attendance:

The purpose is to verify and identify the employee to the employer within an organization using a biometric device.

This template is captured and stored on a smart card or database of a biometric machine so that it can be used for the purpose of verifying a user's (employee's) identity. Consequently, users are identified by their biometric characteristics alone, without the use of smart cards, usernames, or other identification methods.

## 3. System Design and Architecture

### Power apps:

Power Apps is Microsoft's answer to building business heavy applications without a ton of coding involved. It is a feature that allows professionals to create real and highly

# Home Automation Using Ultrasonic Sensors

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**Abstract:** The aim of the project is energy conservation across homes automatic systems. It is found that there is an 18.70% decrease in energy consumption when the home automation system acts to manage the power consumption of the devices in the home yet intelligent automation typically result in cost saving of 40% to 75%, with the payback ranging from several years. The key is to understand the different types of software automation. Sensors are used to detect the motion of an object. The sensors used in home automation are ultra-sonic sensors.

**Keywords:** NodeMCU, Transformer, Ultrasonic sensors, LCD, LED.

## 1. Introduction

Node Microcontroller Unit is named as Node MCU which is open-source software and firmware that is built around System-on-Chip (So C) called the ESP8266. The ESP8266 is designed and manufactured by Express. It contains the crucial elements like CPU, RAM, networking (Wi-Fi), modern operating system and SDK. The Node MCU aims to simplify ESP8266 development. It has an operating voltage of 3.3v. It has an operating temperature range of 40°C~125°C. Figure 3.1: Node MCU Board ESP8266 Wi-Fi So C is embedded with the memory controller, including SRAM and ROM. Micro Controller Unit can enter the memory units through I Bus, d Bus, and AHB interfaces.

### A. Node Microcontroller Unit

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SOC from Expressive Systems, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the Eula project, and built on the Es press if Non-OS SDK for ESP8266. It uses many open-source projects, such as lua-cjson and spiffs. The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (Micro Controller Unit) capability produced by Shanghai-based Chinese manufacturer, Es press if Systems. The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer, AI-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no

English-language documentation on the chip and the commands it accepted.



Fig. 1. NodeMCU

### B. LCD (Liquid Cristal Display)

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.



Fig. 2. LCD

### C. Ultrasonic Sensor

Ultrasonic Sensors also known as transceivers when they both send and receive work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid.

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