

INDUSTRIAL SECURITY SYSTEM USING IOT

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*2, 3, 4, 5 B.Tech ECE, (20RG5A0402, 20RG5A0405, 20RG5A0406),
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Abstract:

Many sectors have had unexpected accidents lately. Thus, safety is becoming a major concern in many spheres of life. Emerging from this movement, a novel In this study, we offer an intelligent smart security system for industrial facilities, which integrates a number of wireless sensors and actuators, as well as Node MCU microcontrollers, into an Internet of Things network. IoT Based Industrial Security Control and Monitoring System Using NodeMCU detects any chemical overflow or leakage, gas leakage, fire/boiler explosion or short circuit, as well as measuring temperature, humidity, and unwanted sound by means of a number of different smart sensors. It can detect environmental deviations, keep tabs on the latest status of the industries it monitors, and provide alerts to the business owner by email and text message sent over the internet. Therefore, it makes no difference whether the owner lives far away or close by. When it has accurate information on the state of things, it may take measures to prevent accidents in the workplace, which in turn protects workers' lives. The signal is sent by alarms in a conventional security system. Here, information and data are sent and received between the gadget and the internet through the Internet of Things. This allows for remote management and monitoring through computer, mobile phone, or other intelligent device, whenever, and anywhere. The work's main accomplishment is the integration of computer programming with embedded electronics. Its portability and ability to control mobile and computer devices through the internet are two further benefits.

Keywords: NodeMCU, Ultrasonic sensor, Gas sensor, Temperature sensor, Flame sensor, Temperature monitoring.

INTRODUCTION

The abbreviation for "Internet of Things" is "IOT." It's the process of linking gadgets besides computers and smartphones to the web [1]. The Internet of Things (IoT) includes a wide variety of devices, from automobiles and home appliances to security systems and even medical gadgets like

heart monitors. It's anything that has an Internet connection but isn't often thought of as an Internet-connected device. Automation and safety measures are built into every really sophisticated system. When the most stringent security measures have been applied, the smart system has really shined [2]. [3]. A highly automated system is what makes up a smart system. The presence of a computer system that can monitor the whole system and make a decision based on a matching signal from the sensor is what gives this technology its "intelligent" label.

A state-of-the-art intelligent industrial security system will have state-of-the-art automated systems for managing lighting and temperature, multi-media equipment for monitoring and activating security apparatus (alarms and alerts), and other connected security apparatus.

Having both windows and doors, in addition to a host of other features. Technology in this system gives the impression of intelligence due to the ability of its computer systems to keep tabs on several facets of everyday living. On the one hand, the goal of a smart home is to improve the user's quality of life by including a wide range of technologies and sensors to monitor the home's present state (such as the user's location, the occupant's activities, the temperature, etc.). The benefits of installing a home security alarm system extend well beyond just deterring burglars [5] [7].

IMPLEMENTATION

This security and automation solution for the house is web-based. Users have to open any browser\ussing mobile or PC. Users have to specify specified IP address as URL address. Following this, the user must display a password field [8][9]. Putting password user may view entire online application \sand operate home appliance. The following diagram illustrates the general format of this undertaking.

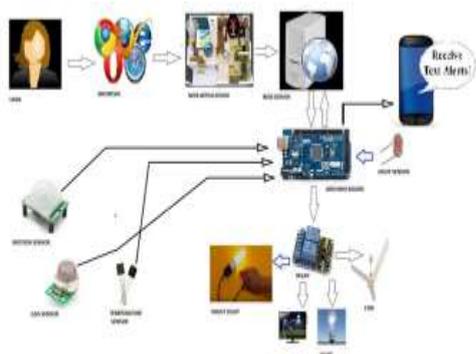


Figure-1: Implementation order

A user may access the dashboard from any computer or mobile device by entering a unique IP address in the browser's address bar.

A user may regulate the lights and fan speed after successfully logging in. In order to switch on a light, a user must click a button that sends a signal to a web server.

This is a genuine Ethernet web server. The data is sent from the web server to the NodeMCU board. The NodeMCU then verifies the current state of the switch. If the light is already on, a yellow light will indicate this, and if it is off, the light will be turned on. The NodeMCU board receives regular updates from gas, motion, and temperature sensors. After the NodeMCU board senses gas or motion, a signal is sent to the web server. In a web application, the notice is sent by the web server. And using the gsm module, an alert sms is sent to the user's mobile phone.

A Method for Regulating Appliance Voltage

The control and monitoring of electrical household appliances is shown in the following diagram. Any user with a valid IP address may access the web app using any web browser on any device. Once he logs in, he will be able to access the program. The user is able to see the operational status of the

appliance. In either the on or off position [10]. The signal is sent to the NodeMCU Mega microcontroller through Ethernet shield when the user activates the fan.

An ultrasonic sensor for operating a factory water pump

A temperature sensor may be used to regulate temperatures in factories, while a gas sensor can detect gas leaks, a flame sensor can detect fires, and a sound sensor can measure the acoustic pressure in a room.

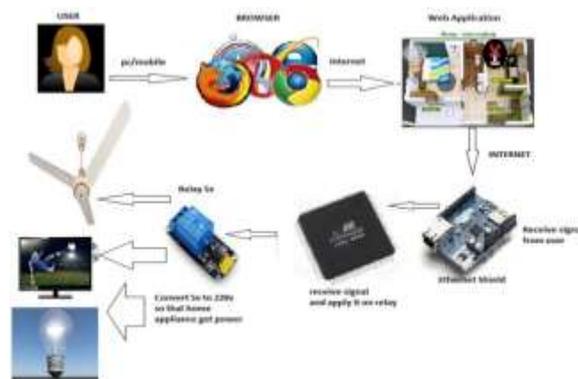


Figure-2: How the electrical appliance are controlled & monitored

The microprocessor either cuts the relay's power or turns it on in response to a signal. If the relay needs a large amount of voltage, it will draw it from an external source. In this method, the power tool may be managed and tracked. The following sensors are used in the planning stages of a factory safety system.

NodeMCU with Ultrasonic sensor

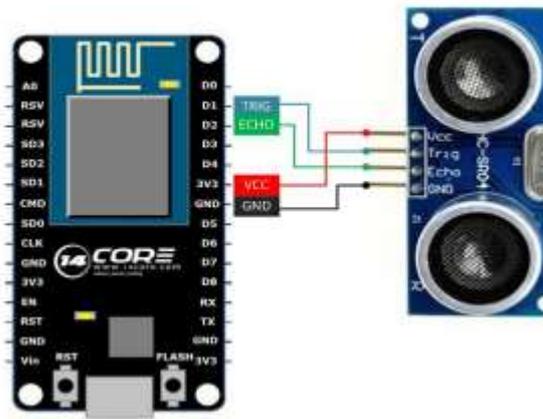


Figure-3: Chemical or water level measure & pump on/off using ultrasonic



Figure-5: Chemical tank

NodeMCU with Temperature sensor

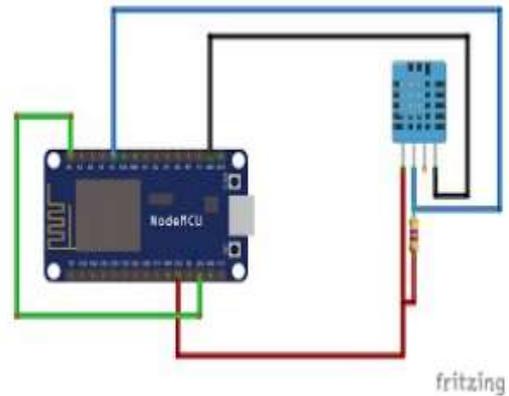


Figure-6: DHT interfacing with NodeMCU

The output of the DHT11 sensor is linked to GPIO5 on the ESP8266, and the sensor's positive (+) and negative (-) pins will be connected to 3.3V and GND respectively.



Figure-4: Chemical or water level monitoring from internet



Figure-7: Cooler control using DHT

NodeMCU with Gas sensor

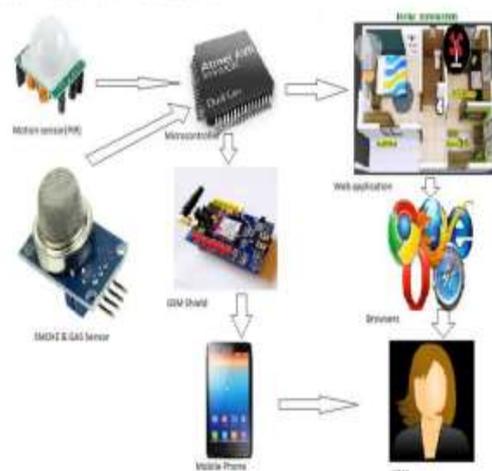


Figure-10: How the MQ-2 gas sensor works.



Figure-8 Temperature monitoring from internet



Figure-11: Gas level monitoring from internet



Figure-9: TEMP high & Cooler ON



Figure-12: During Gas high light & buzzer ON

NodeMCU with Flame sensor

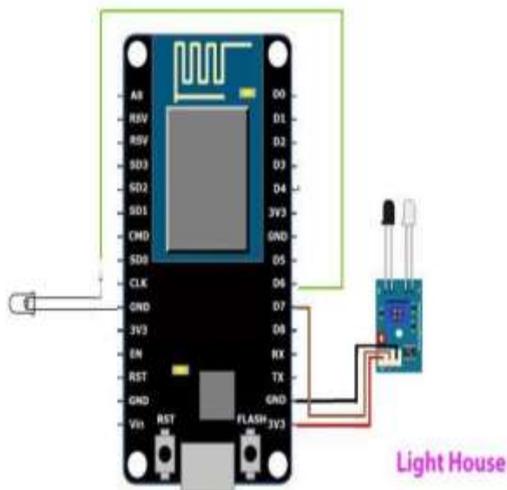


Figure-13: Flame sensor interfacing

NodeMCU with Sound sensor

NodeMCU with Sound sensor

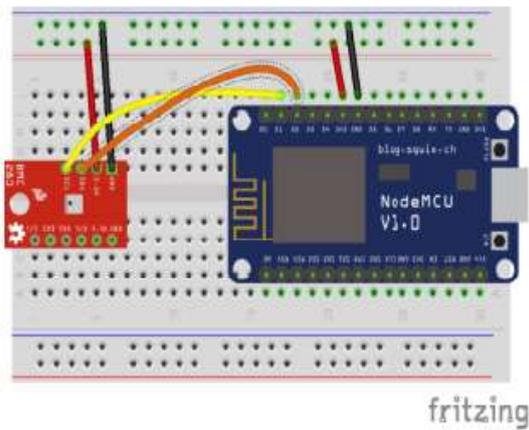


Figure-14: Audio sensor interfacing



Figure-16: Mobile view



Figure-17: Complete monitoring by internet from anywhere

The Overall Monitor & Control System View



Figure-15: Analog view

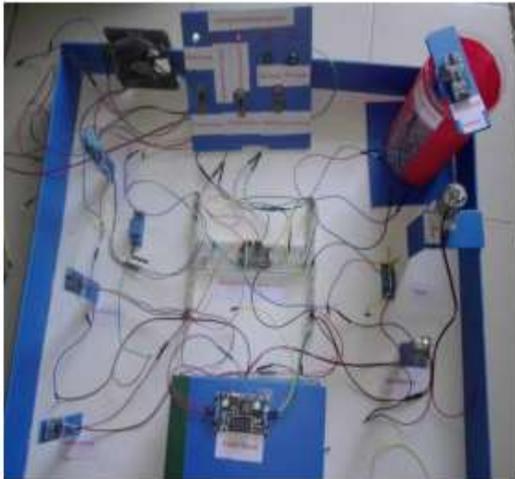


Figure-18: Final implemented System (front view)

Parts list with cost estimation

Name	Quantity	Price
NodeMCU	1	500tk
Ultrasonic sensor	1	200tk
Temperature sensor	1	200tk
Gas sensor	1	200tk
Flame sensor	1	200tk
Sound sensor	1	200tk
PUMP	1	200tk
Cooler	1	180tk
Battery	2	600tk
Adapter	1	200tk
Bread board	1	200tk
Relay	3	250tk
Jumper wires	4pac	200tk
Resistors	1pac	50tk
LED	10pic	50tk
Ethernet cable	1	100tk
Sheet board	2	400tk
Switch	3	50tk
Soldering iron	1	200tk
Glue gun	1	200tk
Knife	1	100tk
AC wires		50tk
PAPER	4	1000tk
Others		200tk
TOTAL		6000+

III. DISCUSSION

There are several challenges that must be overcome before an intelligent security system can be implemented. Now that we've fixed this issue, the system is performing as expected. There seems to be an issue with the power supply. The 2A current need is too much for the regulated IC to provide. Those modules can't operate without that source of energy. As the sun's infrared rays reach Earth, the IR sensor picks them up. This module is thus rendered inoperable if direct sunlight falls upon its location. When there is background noise, voice-controlled programs can't understand what you're trying to say [11]. Therefore, it is quite challenging to regulate in such setting. Unfortunately, the Isheild has several compatibility issues with Android devices. Once these obstacles were resolved, the system began functioning as intended.

LIMITATION

Although we strive to excel, there are limitations to our endeavor that we must take into account [12]. I make an effort to catalogue a few laminations

This project merely worked before we used a real IP address.

internal network only; no internet access; no option to personalize passwords; catastrophic site failure in the event of sensor damage or malfunction.

CONCLUSION

This security system is versatile and inexpensive since it is built using readily accessible, low-cost components. Any business or workplace may readily adapt to using this approach. Multiple rounds of testing confirmed that the intended technology could be controlled effectively from afar. Last but not least, this security system may be used with Bluetooth, Infrared, and WI-FI without any design changes.

Because of this, the system may be easily expanded.

FUTURE WORK

Our horizons for growth and progress in this endeavor are expansive. We make an effort to catalog certain tasks that may be introduced later on [13].

The use of a camera and some kind of image processing might help identify familiar and unfamiliar faces. When a recognized face is detected, the system may send an SMS or email with a photo and any associated data.

Improved user friendliness of the web app is possible. Can voice-activated interfaces be integrated?

To minimize losses, the system will immediately take action upon detecting hazardous conditions, such as gas leaks or smoke.

The addition of a face-detection feature makes this system more sophisticated, which is what people want.

The burglar may be identified with more certainty now that CCTV cameras have replaced hidden spy cameras.

You may make this device self-sufficiently fire-retardant by installing a cylinder of carbon dioxide gas.

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