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IoT Based Multiple Industrial Fault Monitoring System

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Abstract
The Internet of Things (IOT) is a technology that is quickly developing. IoT is founded on the notion of building a networked world where gadgets can talk to each other and with people to exchange relevant information, automate processes, and increase productivity. We are developing a system with this project that will automatically monitor industrial applications, provide warnings and alarms, or use the Internet of Things to make deft judgements. Manufacturing industries could profit from the suggested technology. Any manufacturing business will guarantee people's safety and wellbeing by using technology, and accidents will also be prevented. We employ a range of sensors in our project to monitor a number of industrial variables, including temperature and gas levels.We are keeping an eye on the detection of LPG gas leakages using this system, which was built utilizing IOT-based software, embedded sensors, and controllers. This system does not need any human input.

Index Terms—Internet of Things (IoT), Arduino Uno, Sensors.

Introduction

We must be prepared and aware of new advances since technology improvement is a continuous process. These technological advancements have made daily human existence more convenient. Automation has become a need. Today, the internet allows access to all systems and data, and web technology is constantly developing. A web-based embedded system with an access to the network provides remote administration and control of embedded devices. Through web controllers, sometimes referred to as E-controllers, Internet of Things (IoT) devices may be controlled.A web controller, sometimes referred to as an E-controller, is the most popular approach to web development in the world. It consists of a collection of embedded devices and software stacks. For monitoring, managing, and handling data, big server systems are increasingly being replaced by remote login and monitoring using a distributed web control system created using web pages generated in web applications. Efficiency, comfort, and energy savings are three characteristics of IoT-based web control systems.

Our primary goal is to modify the Internet control infrastructure for the Internet of Things, enabling users to access the application over the Internet from any location in the world. Through the collection and web-scale analysis of a variety of IoT data from

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connected devices, users, and apps, IoT monitoring also helps you to close the gap between companies and gadgets.

The industrial monitoring system establishes a connection with the free app Blynk. For virtual device control and to obtain updates, Blynk connects to an esp8266 device. The brain of the project is the Arduino Mega, which connects to the parts and uses embedded programming to control them. The surroundings of the machine are monitored by sensors such as smoke sensors, temperature sensors, and flame sensors.

Problem Identification

Both in homes and businesses, gas leaks and fire accidents are becoming major issues. The gas's very faint feeling suggests that we are unable to find it owing to human mistake, a lack of perseverance, or some other external situation. It has a good chance of catching fire, which might result in severe property damage, human casualties, and most significantly, tremendous damage. It is essential to have a system in place that can maintain the area's security and notify the proper parties within the designated amount of time if such an incident happens. In the event of a fire, individuals or groups of people may suffer catastrophic injuries, and first aid may not always be able to be given quickly away. Monitoring the commercial appliances will help to stop these disasters from occurring.

2. Literature Survey

The author proposed an IoT-based condition monitoring system for critical equipment in manufacturing. The system uses wireless sensor nodes to collect data from the equipment and sends it to the cloud for analysis. The system can detect faults such as bearing wear, misalignment, and imbalance. The authors demonstrated the effectiveness of the system through a case study on a compressor [1].

The authors developed an IoT-based fault diagnosis system using a multisensor data fusion approach. The system uses multiple sensors such as vibration sensors, acoustic sensors, and temperature sensors to collect data from the equipment. The data is then fused to detect faults such as bearing faults, gear faults, and motor faults. The authors evaluated the system through experiments on a gearbox [2].

The authors developed an Industrial automation using Internet of Things (IOT). The system which will automatically monitor the industrial applications and generate Alerts/Alarms or take intelligent decisions using concept of IoT.IoT has given us a promising way to build powerful industrial systems and applications by using wireless devices, Android, and sensors [3].

3. Existing Method

There are no tools available to detect unfair business practices. Manual input is needed for monitoring. Despite the deployment of CCTV, no alerts are being generated. Not being manually conducted, observation and appropriate. Manually identifying and producing warnings is a time-consuming process.

4. Proposed Method

Operation

In this system proposal, we have created a novel method for IoT-based industrial parameter monitoring. Here, a variety of sensors are being utilized to keep an eye on variables including flame, temperature, proximity, and lpg. This information is constantly being monitored by Arduino, which then uploads it to the Blynk Server. IOT Blynk Applications allow users to access and monitor this data from anywhere in the world.

The Industrial Monitoring System project is built on the Internet of Things (IoT). Arduino is utilized to operate a variety of sensors (using smoke and temperature sensors), giving the business total control. The Internet of Things (IoT) is used in this project to deliver data to the user. The Internet of Things (IoT) is a network of 'things' that allows physical items to communicate data by using sensors, electronics, software, and networking. These systems do not require human interaction because they are self-sufficient.

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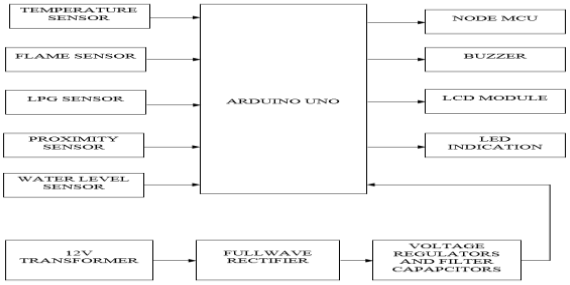
The main aim of this project is to provide security for homes, banks, industries, etc. using IoT and Arduino. Arduino-Based Home Security systems uses four Sensors, namely, Temperature, Proximity, LPG/Smoke, and Flame sensors.

Block Diagram:



The main aim of this project is to provide security for homes, banks, industries, etc. using IoT and Arduino. Arduino-Based Home Security systems uses four Sensors, namely, Temperature, Proximity, LPG/Smoke, and Flame sensors.

Data is then transmitted from these sensors to the Arduino, which includes a built-in signal converter. Arduino then sends data to the cloud server using Node MCU and the user can monitor this data from anywhere in the world using IoT Application.

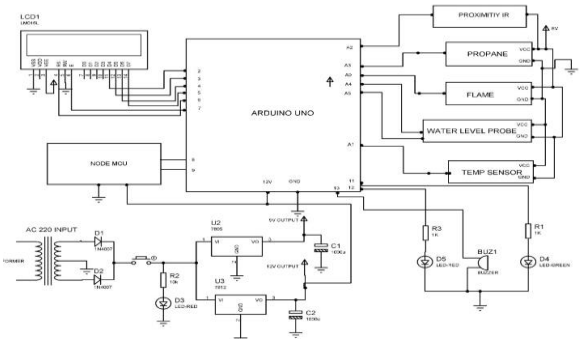
Temperature, Proximity, Flame, and LPG/Smoke Sensor are interfaced with this system.As soon as the fire, Proximity/movement or Gas Leakage is detected, the signal will be sent to the microcontroller which will then send appropriate data to the LCD and Node MCU. Node MCU connects to the local hotspot and updates data on a cloud server.

Embedded C Programming Language is used to program this Arduino UNO controller board. Buzzer module and LED Indicator are also used for Audio / Visual Indication alerts. As Industries have different types of liquids such as Water, Acid, or coolant. Adding a Liquid Level sensor will indicate the status of Liquid on the LCD as well as on the IoT Module. This will help the user to monitor its Level status (Full, Medium, Low) and indicate user when to refill. Arduino IDE Compiler is used to write this program and uploaded using USB Interface. LCD Is connected to Digital Pins 2,3,4,5,6,7. Sensors are connected to analog Pin and Node MCU is connected to Digital Pin 8,0.

This system thus can be used in many domestic applications and industrial setups. A 230/12V step down transformer is used in the system's power supply arrangement to step-down the voltage to 12VAC.

A bridge rectifier is utilized to convert it to DC. The capacitive filter used which makes use of a 7805-voltage regulator to regulate it to +5V will be needed for the microcontroller and other components' operation, to remove ripple.

Circuit Diagram:



Hardware Requirements:

- Arduino Uno
- Node MCU
- LPG Sensor
- Flame Sensor
- Proximity Sensor
- Water Level Sensor
- Buzzer
- 12 Volts Transformer
- Voltage Regulators
- Other Miss Components.

Software Requirements:

- Arduino Idle Compiler
- Blynk IoT Cloud Platform

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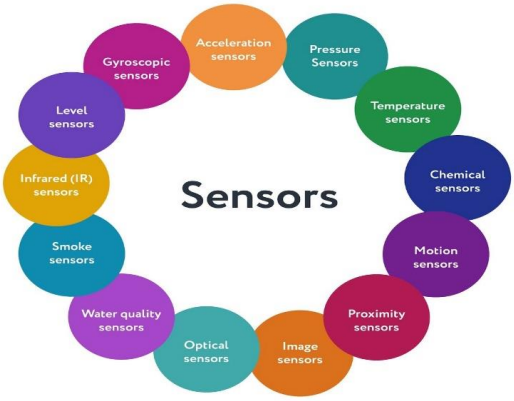
Sensors:

A sensor is a tool that collects physical input from its surroundings and transforms it into information that can be used by either a machine or a human to understand. Most sensors (which transform the data into electronic data) are electronic, but others are simpler, such a glass thermometer that displays visual data. Sensors are used by people to measure temperature, determine distance, identify smoke, control pressure, and a variety of other things. Electronic sensors come in two flavors: analogue and digital. Physical data is converted into an analogue signal using analogue sensors. Compared to digital sensors, which are restricted to a small range of potential values, analogue sensors are far more accurate.



ARDUINO UNO:

One of Arduino's standard boards is the UNO. The Italian word UNO here is for "one." To identify the initial release of the Arduino Software, it was given the moniker UNO. It was also the first USB board that Arduino has ever released. It is regarded as a strong board that is employed in many projects. The ATmega328P microprocessor is the foundation of the Arduino UNO. Compared to other boards, such the Arduino Mega board, etc., it is simple to use. The board is made up of shields, various circuits, and digital and analogue Input/Output (I/O) pins.The Arduino UNO has 14 digital pins, a USB port, a power jack, and an ICSP (In-Circuit Serial Programming) header in addition to 6 analogue pin inputs.

5. RESULT

A user-friendly mobile app that lets you control and monitor your IoT devices, the Blynk app, may be used to build an IoT-based multiple industrial defect monitoring system. The system can save downtime, prevent equipment failure, and boost output. The Blynk app offers a simple user interface for visualizing sensor data and remotely operating industrial equipment. Any unexpected behavior or changes in the industrial environment, such as temperature increases, humidity decreases, or vibrationchanges, may be detected by the sensors, which can then notify the operators or maintenance personnel. The Blynk software enables operators or maintenance personnel to monitor sensor data and manage industrial devices using their mobile devices from any location. Time can be saved, and less physical presence on the plant floor may be required.

Overall, an IoT-based multiple industrial defect monitoring system employing the Blynk app may aid in enhancing safety in the industrial environment, lowering maintenance costs, and improving operational efficiency.

6. CONCLUSION

Through this project, we intend to obtain practical experience with the "Internet of Things" and "Embedded System" technologies that are now popular.Real-time data regarding numerous factors in an industrial environment, such as temperature, Flame, and more, may be

provided by an IoT-based industrial monitoring system utilizing the Blynk app. For all the information gathered from numerous IoT sensors and devices used in the industrial environment, the Blynk app may serve as a single hub. The system is capable of employing a variety of sensors and gadgets, including temperature sensors, flame sensors, Smoke sensors, and more, which may be linked to the internet via IoT technologies like Wi-Fi. The data will be monitored through blynk app.

7. FUTURE SCOPE

The future scope for an IoT-based multiple industrial fault monitoring system is vast and promising. With the growing popularity of Industry 4.0 and the increasing demand for smart factories and automation, the need for such systems is only going to rise. The integration of IoT-based fault monitoring systems with Artificial Intelligence/Machine Learning can enhance their capabilities. By analyzing the data collected from various sensors and devices, AI/ML algorithms can identify patterns and anomalies, predict potential failures, and even suggest preventive measures. Additionally, this project may be connected to GSM technology to deliver SMS alerts about risk conditions to registered cellphone numbers.

8. ACKNOWLEDGEMENT

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