Secured IOT Platform for Industrial Automation

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***Abstract*— In the realm of industrial automation, a robust and secured IoT platform serves as the backbone, keeping a vigilant eye on crucial parameters like temperature, gas, current, and voltage levels. This platform acts as a sentinel, continuously gathering and updating this wealth of information on an LCD display, providing real-time insights into the operational environment. The interconnected sensors, meticulously calibrated and strategically positioned, form the nerve center of this system. They tirelessly monitor the fluctuations in temperature, the presence of hazardous gases, and the stability of current and voltage levels. In such instances, the system springs into action, triggering an array of alerts. A visual display promptly highlights the affected parameter, serving as a clear and immediate warning to the operators. Moreover, recognizing the urgency of such critical events, an audio alert system accompanies the visual display on the LCD and IOT alert.**

I.INTRODUCTION

In the realm of industrial automation, a myriad of challenges often loom large, presenting formidable hurdles that demand innovative solutions. Problems stemming from insufficient monitoring of critical parameters like temperature, gas, and electrical levels pose significant risks to both operations and personnel safety. These challenges underscore the pressing need for a purpose-driven approach one that harnesses technology to not just detect these issues but also swiftly address them. It's within this landscape that the implementation of a comprehensive IoT platform assumes paramount importance.

The purpose, therefore, is twofold to fortify industrial environments against potential hazards and to optimize operations for enhanced efficiency. The secured implementation of a IoT platform becomes the linchpin in this pursuit, envisaged to serve as a vigilant sentinel that continuously monitors and analyses data from an array of sensors. By identifying anomalies and deviations in real- time, this implementation seeks to proactively mitigate risks, ensuring a swift response to critical levels that could otherwise disrupt operations or jeopardize safety.

OBJECTIVE

- Articulate the framework of a secured IoT platform, delineating its components, including sensors, data collection, processing, and visualization mechanisms.
- Illuminate the critical role sensors play in monitoring temperature, gas, current, and voltage levels, elucidating their significance in maintaining optimal industrial conditions.
- Showcase how the system actively monitors and interprets data, enabling the identification of critical deviations beyond safety thresholds.
- Explain the response mechanisms triggered by critical sensor values, emphasizing the importance of visual displays and audio alerts in ensuring swift and decisive actions.
- Showcase how this amalgamation of technology doesn't just ensure safety by alerting to potential hazards but also contributes to the overall efficiency of industrial processes.
- Highlight the seamless integration of technology and its role in transforming raw data into actionable insights, empowering operators to make informed decisions.
- Hint at the potential advancements and implications, indicating the continuous evolution of this technology in enhancing safety and productivity within industrial settings.

Industrial automations problems:

Industrial settings often face various fire-related challenges due to the nature of operations and equipment used. One prevalent issue revolves around combustible materials, electrical malfunctions, or equipment failure leading to fires. For instance, in manufacturing plants handling flammable substances like chemicals or fuels, the risk of fire increases significantly. Inadequate safety measures, such as improper storage or handling of these materials,

can easily trigger a blaze.

Temperature-related problems in industries are multifaceted. One common concern involves maintaining optimal temperatures in different processes. Variations from set temperatures can affect product quality or compromise safety. In sectors like food processing or pharmaceuticals, precise temperature control is critical for preserving product integrity.

LITERATURE SURVEY

This paper describes the design and development of a system for household appliance control using cell phone through global system for mobile communication (GSM) technology. The cellular communications is a potential solution for such remote controlling activities. SMS (short message service) technology can be used to control household appliances from distance. Remotely, the system allows the INDUSTRY owner to monitor and control the INDUSTRY appliances via mobile phone set by sending commands in the form of SMS messages and receiving the appliances status as well. The proposed system makes use of wireless control hence can be effectively used in systems were unwired connections are desired. The system uses the user's mobile handset for control and therefore the system is more adaptable and cost- effective and also providing ubiquitous access for appliance control

This paper presents the development of GSM-based control INDUSTRY appliances for smart INDUSTRY system. Themain aim of the prototype development is to reduce electricity wastage. GSM module was used for receiving short message service(SMS) from user's mobile phone that automatically enable the controller to take any further action such as to switch ON and OFF the INDUSTRY appliances such as light, air-conditioner etc. The system was integrated with microcontroller and GSM network interface using assembly language. MPLAB software was utilized to accomplish the integration. The system is activated when user sends the SMS to controller at INDUSTRY. Upon receiving the SMS command, the microcontroller unit then automatically controls the electrical INDUSTRY appliances by switching ON or OFF the device according to the user order. In other word, it read message from the mobile phone and response to control the devices according to the received message. The prototype has been successfully developed and it could provide an effective mechanism in utilizing the energy source efficiently.

TITLE : Design of Real Time Data Acquisition with Multi Node Embedded Systems
AUTHOR : MukeshKumar,SanjeevSharma,Mansav Joshi

DESCRIPTION

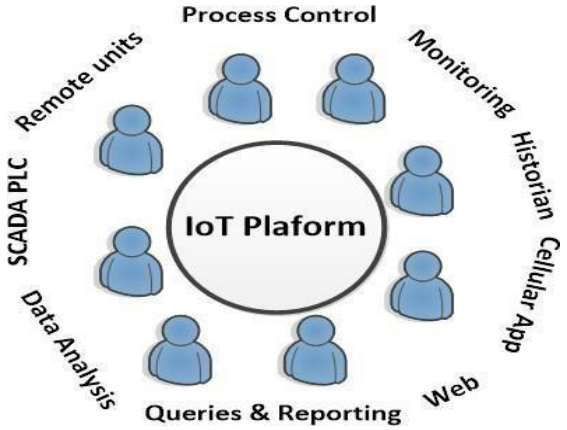
This paper is about the application of data acquisition systems in industrial requirements for real time execution of events with industrial process control and automation. Multiple embedded nodes are measuring various industrial parameters to monitor and control industrial process. Data acquired from each node is processed, displayed and sent to master processor (CPLD XC9572) that compile data received from different nodes and send this information to remote location using GSM technology and simultaneously display the variations in quantity under measurement to local and remote system configured with Lab VIEW platform. In addition, the master processor process this information and generates controls signals based on predefined cases or can receive the controlling action from remote controller to control the industrial application like CNC machines, Electric drives etc. The paper adds the value towards the low cost, less manufacturing time, ease of implementation with reliable measuring, controlling and data logging demands of industry.

Addressing these issues often involves implementing robust safety protocols, regular equipment maintenance, and investing in advanced fire detection and suppression systems. Monitoring and controlling temperatures through advanced sensors, coupled with backup systems, can mitigate temperature-related challenges. Additionally, comprehensive employee training on fire safety and emergency response procedures is crucial to

prevent and manage such incidents effectively

IOT

The term IoT, or Internet of Things, refers to the collective network of connected devices and the technology that facilitates communication between devices and the cloud, as well as between the devices themselves.



Internet of Things offers user interoperability and connectivity between devices, systems, services, networks and in particularly control systems. IoT involves enhancing network to proficiently collect and analyze the data from various sensors and actuators then sends the data to the mobile phone or a personal computer over a wireless connection. Building IoT has progressed essentially in the last couple of years since it has created a new era in the world of information and communication technologies. Security is becoming an important issue nowadays as the possibilities of intrusion are increasing day by day. Safety from intrusion, theft, fire and leakage of flammable gas are the most important requirements of INDUSTRY security system for the people. The aim of this work is to provide security and surveillance to INDUSTRY through internet. In this work, the proposed system is designed using ARM-11 architecture and Linux OS based Raspberry Pi-
3 board, USB camera and DC motor. The DC motor is interfaced with Raspberry Pi-3 board via driving circuit (L293D) to control the door while the camera is connected to the USB port of Raspberry Pi-3 board. A webpage is provided to the end user with username and password in order to allow the entry of only authorized users.

MERITS

- IoT helps optimize various industrial processes by enabling real-time monitoring and data analysis. This leads to increased productivity and efficiency.
- IoT can provide an array of connected sensors to businesses, which will help reduce the points of failure. C.PROBLEM IN EXISTING WORK

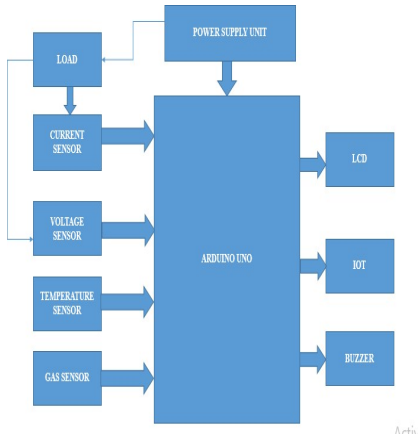
· The existing framework possess helpless interface and must be upgraded with web GUI to make it more intelligent and easy to understand. [6]It must be scaled up to process a lot bigger datasets (terabytes or more) with the objective of one day having the option to perform such investigation on the human cerebrum.It investigates the utilization of Graphulo to perform diagramexamination straightforwardly inside Accumulo which can be redesigned with the utilization of a polystore database, for example, BigDAWG as an information

the executives 'arrangement that intently coordinates information sources with information the board innovation.

PROPOSED SYSTEM

It allows every users to use this wireless security system by using or combining IR sensor, gas sensor, fire sensor and main failure detector at industrial level. It uses the fire sensor for detection of fire in the industry or say go down or gas filling chamber. If the fire is detected then in that case the fire detection sensor will sense and will on the water sprayer pump working as fire extinguisher and when the fire is extinguished automatically the water sprayer pump will be off. No need for manual switching on and off of the circuit. It will work automatically.

Industrial automation is the use of control systems, such as computers or robots, and information technologies for handling different processes and machineries in an industry to replace a human being. It is the second step beyond mechanization in the
System. The proposed system is a fortified IoT platform for industrial automation, meticulously designed to monitor critical parameters on temperature, gas, current, and voltage levels. Anchored by a network of sensors, this system captures real-time data, seamlessly processed and visualized on an LCD interface and shared across an IoT network. When sensors detect critical values, a synchronized alert mechanism triggers both visual cues on the display and audible alerts through a buzzer, ensuring immediate attention to potential hazards.



BLOCK EXPLANATION

Sensors: Positioned sensors temperature, gas, current, and voltage sensors are depicted as input nodes. They gather real- time data from the industrial environment.

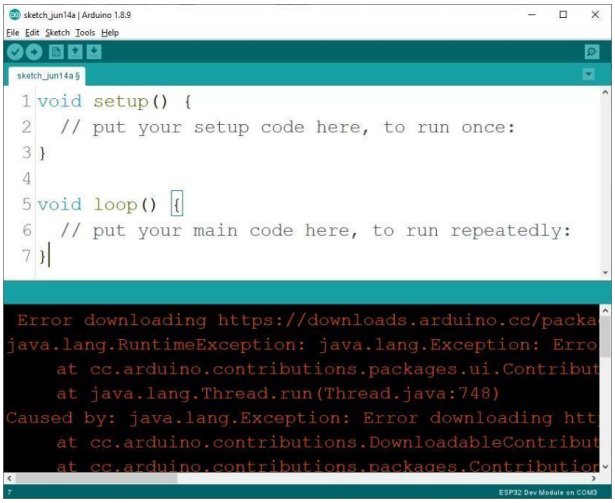
Data Processing Unit: Represented as a central processing block, this unit receives input from sensors. It processes the raw data, applying algorithms and thresholds to analyze information for anomalies or critical deviations.

LCD Display: Shown as an output node, the LCD display receives processed data from the processing unit. It visually showcases real-time information on temperature, gas levels, and electrical parameters for easy monitoring.

IoT Network: Illustrated as a network connection block, this component represents the backbone facilitating data exchange between various system elements. It enables seamless communication and data dissemination across the system.

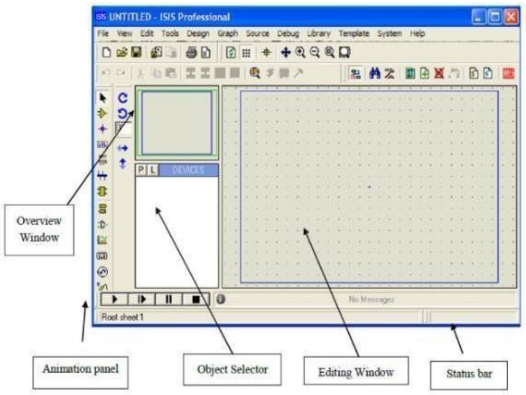
Alert System: Represented as alert nodes connected to the display, these nodes trigger visual alerts on the LCD in case of critical sensor values. Another branch connects to an audio alert component, depicted as a buzzer, emphasizing the auditory notification for immediate attention.

Security Protocols: Often depicted as a layer surrounding the entire system, security protocols ensure data integrity and protect against unauthorized access.



2. PROTEUS

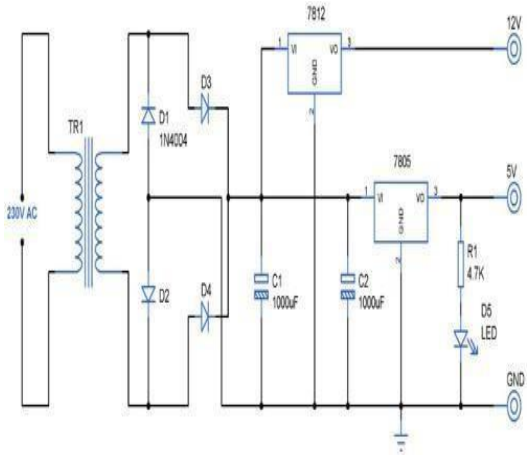
Proteus is a simulation and design software tool for electrical and electronic circuit design created by Lab center Electronics. It also has a 2D CAD drawing capability. The tagline "From concept to completion" is appropriate. It is a software package that includes schematic, simulation, and PCB design. The ISIS program is used to create schematics and model circuits in real time. The simulation enables for human interaction during run time, resulting in real-time simulation. ARES is used to design PCBs. It provides the capability of seeing output in 3D perspective of the created PCB as well as components. The product's designer can also create 2D drawings.



7. HARDWARE IMPLEMENTATION

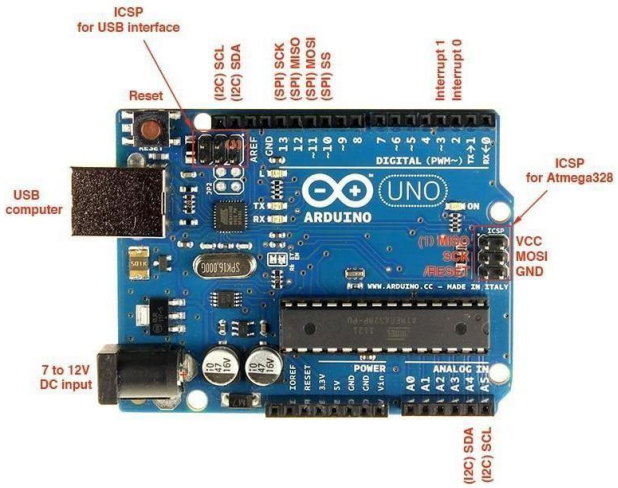
POWER SUPPLY UNIT

A power supply unit (PSU) is an essential component in electronic devices and systems that converts electrical energy from a source (such as a wall outlet or a battery) into a form suitable for powering the various components within the device. It provides the necessary voltage, current, and frequency to ensure stable and reliable operation.



ARDUINO UNO

The heart of the Arduino Uno is the ATmega328P microcontroller. It has 32KB of flash memory for storing the program, 2KB of SRAM, and 1KB of EEPROM for data storage. The Arduino Uno has a total of 14 digital input/output pins. Of these, 6 can be used for pulse-width modulation (PWM) output. It has 6 analog input pins that can also be used as digital inputs. These pins are capable of reading analog signals, making them suitable for sensors and other analog devices. The ATmega328P operates at 16 MHz, providing sufficient processing power for a wide range of application.



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Conclusion

A current sensor is a device used to measure the electrical current flowing through a circuit. It provides an output that is proportional to the current passing through the sensor, offering crucial information for monitoring and controlling electrical systems. There are various types of current sensors, including Hall effect sensors, current transformers, and shunt resistor- based sensors The DHT11 sensor is a widely used digital temperature and humidity sensor. It is a cost-effective and easy-to-use component known for its accuracy and simplicity in measuring environmental conditions.

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