Industrial Automation Using IoT

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Abstract - Internet of Things represents a general concept for the ability of network devices to sense and collect data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purposes. Some also use the term industrial Internet interchangeably with IoT. This refers primarily to commercial applications of IoT technology in the world of manufacturing. The Internet of Things is not limited to industrial applications, however. Internet of Things (IoT) is rapidly increasing technology. IoT is the network of physical objects or things embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. In this paper, we are developing a system which will automatically monitor the industrial applications and generate Alerts/Alarms or take intelligent decisions using concept of IoT. Security has becoming an important issue everywhere. Home, industries and vehicle security is becoming necessary nowadays as the possibilities of intrusion are increasing day by day. Safety from leaking of raw gas and fire are the most important requirements of home and industries security system for people. A traditional security system gives the signals in terms of alarm. However, the GSM based security systems provides enhanced security as whenever a signal from sensor occurs, a text message is sent to a desired number to take necessary actions in this system use GPS and GSMA main contribution of this review paper is that it summarizes uses of IoT in industries with Artificial Intelligence to monitor and control the Industry.

Keywords:(Arduino UNO R3, Sensor, DC motor driver, DC Motor, WiFi module ESP8266).

I. INTRODUCTION

Home and industries security has changed a lot from the last century and will be changing in coming years. Security is an important aspect or feature in the smart home applications. The new and emerging concept of smart homes offers a comfortable, convenient, and safe environment for occupants.

Conventional security systems keep homeowners, and their property, safe from intruders by giving the indication in terms of alarm. This report mainly focuses on the security of a industries when the user is away from the place and industrial areas away from cities if fire occurs during night this system sends the location details by means of sending longitude and latitude angles by using GPS and sends messages to fire station, police station, and predefined numbers. At the fire and police station received information has a destination address to find route in google map from fire and police station. This system uses fire sensors and gas sensors that finds fire occurred or not if occurred it sends control signal to microcontroller. The microcontroller receives the GPS information by GPS modem connected to the microcontroller and it sends the message using GSM modem containing information of longitude and latitude angle calculated by GPS. The microcontroller also sends signal to the alarm and signal to the emergency window that opens by means of actuators.

II. SYSTEM MODEL

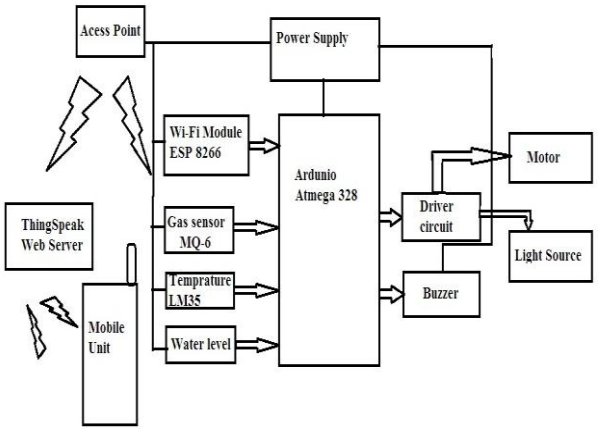


Fig. 2.1 Block diagram of project

III. PREVIOUS WORK

Industrial automation involves the integration of physical machinery and processes with sensors, computers, and software. The result is an intelligent manufacturing infrastructure for increased safety and efficiency, and lowered costs. However, industrial automation comes with its own set of challenges. These include the need to connect multiple proprietary control systems, maintain end-to-end system uptime, reduce energy consumption and total costs, adhere to regulatory requirements, and increase safety and security at every phase.

At its core, industrial automation aims to bring together the advances of two transformative revolutions: the machines, facilities, fleets and networks that arose from the Industrial Revolution, and the powerful advances in computing, information and communication systems established via the Internet Revolution. The intersection of these two diverse and disparate sets of technologies often results in a mixture of individual solutions. Businesses need their distributed manufacturing and business processes and control systems to behave like a single, flexible computing platform combined securely with a modern development platform to build, deploy and update applications.

The next major transformation in industrial automation is underway. Intelligent devices, ubiquitous Internet connectivity and growing IT infrastructure are combining to uncover and drive new business opportunities. As manufacturers increasingly automate their processes and machines, they become an important and growing segment of the Internet of Things (IoT). This term is used to define a system in which the Internet is connected to the real world via ubiquitous sensors and devices. The vision of IoT is to integrate diverse sets of data from physical sensors and the rest of IT to enable analytics that can anticipate events, issues and other needs. As a result, the system as a whole can have a view of what's taking place at any location and point in time. This leads to a set of connected systems that could greatly reduce waste, lower costs, and eliminate loss for just about any human-machine or machine-machine activity.

Fully leveraging low-cost, low-energy sensors and devices that make up the Internet of Things can help unlock savings in terms of power consumption and total system cost. IoT enables sensors and end devices to directly communicate with enterprise infrastructure to provide in-context data awareness around system functionality. According to the 2014 VDC Research paper, "Brewing Embedded Market Success with Java," IoT technology is helping manufacturers sell more products, and bundle additional services with each sale.

A robust IoT platform allows you to seamlessly integrate every automation system and component via standard communication protocols, linking controllers and actuators, machinery, enterprise systems, automated systems, and even video and audio feeds. The goal is to combine sensors and devices (and their data) with analytics to discover previously untapped operational efficiencies and achieve greater optimization.

IoT is driving a new generation of controllers and sensors with increased connectivity and embedded intelligence to further increase automation, optimization and uptime. Wireless IoT protocols deliver expanded connectivity with easier integration across manufacturing sites.

IV. PROPOSED METHODOLOGY

1) For Automation:

Our system uses an Arduino family microcontroller for processing all user commands. A WIFI modem is used to connect to the internet and receive user commands. On sending commands through the internet they are first received by our WIFI modem. The modem decodes information and passes it to the microcontroller for further processing. The microcontroller then switches loads and operates the motors as per Receivers commands. Also it displays the system state on an LCD display. Thus we automate entire industry using online GUI for easy industry automation.

2) For Security System

Proposed system consists of various sensors like fire sensor, gas sensors, light sensor, temperature sensor etc. Home appliances like LED lights and fans are also connected to make the home energy efficient. The proposed system is controlled by an Arduino microcontroller. If fire sensor detects fire then send control signal to the controller interfaced to it the microcontroller take necessary action like alarm, sending information to the owner.

V. HARDWERE DESCRIPTION

- Hardware Specifications for Automation
    1. Arduino uno R3
    2. DC Motor
    3. Power supply
    4. Motor Driver
- Hardware Specification for Security system:
    1. Temperature Sensor
    2. Gas sensor
    3. Smartphone

Arduino uno R3 Specification

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O	20 mA

Pin	
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

Temperature sensor

features

- Calibrated Directly in Celsius (Centigrade)
- Linear + 10-mV/°C Scale Factor
- 0.5°C Ensured Accuracy (at 25°C).
- Rated for Full −55°C to 150°C Range.
- Operates from 4 V to 30 V .
- Less than 60-µA Current Drain
- Low-Impedance Output, 0.1 Ω for 1-mA Load
- Suitable for Remote Applications

The Challenges of IoT in Industrial Automation

Increased automation and non-human intervention represents enormous potential for increased efficiency and value throughout the entire industrial domain. The Internet of Things adds to this by vastly increasing the potential to innovate. But with all of this come potential challenges and concerns.

» Safety and security: The first challenge is the safety of workers and security of systems involved in production, control, and monitoring processes. This is the central challenge of combining control systems with communication or social systems, yet maximum value demands an integrated experience.

» Implementation portability and cost: Manufactures are challenged with the additional potential cost of increased automation. Many of the systems involve disparate and diverse legacy applications, implemented over time, which need to be integrated with newer technology. Often proprietary, they require specialized tools and implementation skills, while others require varying hardware and OS support.

» System availability and uptime: When entire assembly lines, factory conveyor systems, plant operations, or city-municipal services are at stake, the uptime of each individual component is critical. From sensors and control systems to servers, every part of the automated system must work flawlessly and communicate reliably to ensure the highest level of productivity.

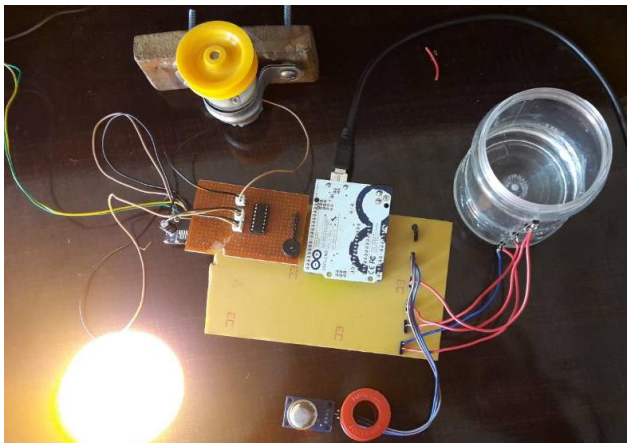
» Energy consumption: Given the breadth of IT deployment in a typical industrial automation solution, energy usage can fluctuate and otherwise become hard to predict or plan and budget for. The ability to continually reduce energy consumption can be a competitive advantage.

» Standards and regulatory requirements: Failing to meet standards and requirements of regulatory bodies may result in waste in terms of energy and other resources, non-interoperable production lines, worker safety hazards, or the risk of being shut down due to non-compliance.

» Enterprise integration and coordination: When your automated processes connect to your corporate network and decision-making systems, it truly adds value. Building autonomous control systems that leverage the value of IoT means increased integration with outside systems and enhanced connectivity.

VI. CONCLUSION

We conclude that by implamenting these system we can access the live data and also control the device interfaced with our system.



VII. FUTURE SCOPES

The ongoing research in the field of IoT and its implementation in full or partial manner will definitely improve the quality of life of human civilization .Today IOT is being implemented everywhere which is of human concern like Smart city, smart environment, security and emergencies, smart business process, smart agriculture, domestic and home automation and healthcare. Search engine giant Google has already taken initiatives to mark its presence in the field of IoT. It is trying to transform the IoT by putting their enthrall concept of making the physical URL as future of IoT instead of apps which we commonly use. In this process, the browser will display a beacon style broadcast in which the nearby object will appear which will be present in the near proximity and can be communicated directly with the help of URL's according to the preference of users and signal strength of the smart object.

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REFERENCES

[1] Jinsung Byun, Insung Hong, Byoungjoo Lee, and Sehyun Park, Member Intelligent Household LED Lighting System Considering Energy Efficiency and User Satisfaction,IEEE paper February 2013
[2] Li Da Zu" Internet of Things in Industries: A Survey" IEEE Transactions on Industrial Informatics, vol. 10, no. 4, November 2014.
[3] Sadeque Reza Khan Professor Dr. M. S. Bhat "GUI Based Industrial Monitoring and Control System ``IEEE paper, 2014