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ABSTRACT

Industrial Process Monitoring and controlling using IoT

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Today's world is world of internet. In this paper, considering the concept of existing IoT system we will try to explain the Industrial IoT system. IoT is combination of communication system and embedded system which connects hardware devices to the network or internet. The recent trend in the industrial sector, also known as the Industrial Internet of Things (IoT), is the Industrial Internet. Industrial IoT empowers industrial engineering to create smart machines with detection, analyze, control and monitor with the help of embedded system. The main aim of this paper is to summarize importance of Industrial IoT which will control as well as monitor industrial processes and is the future of industries.

Keywords- world of internet, combination, empowers, smart machines

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I. INTRODUCTION

The 'Internet of Things' comprised of the network of physical devices such as home appliances, vehicles and other items embedded with electronics, software, sensors, actuators and connectivity which enables these things to connect and exchange data. The term 'Thing' in 'Internet of Things' is having wider meaning. For example, a thing within the IoT can be a person with a heart monitor implant, a pet with a biochip transponder, a vehicle that has built-in sensors to alert the driver when tire pressure is low or any other natural or artificial object that an IP address can be assigned to, thus gaining the ability to transfer data over a network.

The purpose of the Industrial Internet of Things is not to replace human or human work, but to enhance and optimize it. One of the greatest advantages of Industrial IoT has seen as reduced human errors and manual labour, thus improves overall efficiency so that both time and money can be saved. Here again the goal is to increase the automation level at domestic and commercial levels. In the coming years, IIoT is likely to force more unified device protocols and architectures that will allow machines to communicate seamlessly and thereby enhance interoperability.

The Industrial IoT and Consumer IoT are two different concepts, though there's some overlap between the two. Consumer IoT devices can range from smartwatches to smart home speakers (and light bulbs and door locks and other smart home devices), and even shoes or clothes. The core idea of the consumer IoT is, however, fundamentally the same as that of the IIoT; i.e. to use sensors and automation to make processes more efficient.

Motivation of Research work:

Despite having modern testing facilities, industries need to rely on the continuous human monitoring for the entire process. This becomes very difficult, as the entire testing and reliability demands real-time monitoring, record keeping as well as quick rectification of the problems occurred. For all of these, industrial IoT comes in handy.

Objectives of Research:

- 1. Energy saving; as if there is no one to monitor or control at the place, it can be switched off remotely.
- 2. To control, operate, receiving feedback and record the events as and when we need.

Problem Identification:

From the referred papers I found that industries are still following traditional way for reliability testing of electrical devices which leads to human error, late recognition of fault, no record of fault occurrence.

As continuous monitoring is required for testing there is a waste of manpower and cost. Also, even if fault occurs, that device consumes power, so there is a waste of electricity too. Testing person not able to record occurrence time of fault.

In case of security and safety services, user can get the quick status of remotely connected safety panel but user cannot control or give command to rectify the problem. Thus, requires a real-time two-way communication for such cases.

II. EXISTING SYSTEM

In existing system, all work related to reliability testing and industrial processes is done manually or in some other industries IoT network is implemented to just monitor several common parameters used in industries such as energy, liquid level and DC motor speed control etc. In existing system there is only one-way communication takes place so as to get status of remote located device. User cannot give commands over internet to control the device. Only User can quickly communicate to person nearby to that remote device. In this paper, industrial process controlling and monitoring is done using IoT for different applications. In this proposed system ESP8266 wi-fi module is used to get command from user over internet and drive the output circuit. And further with the help of sensors get the status of device and send back it to user over internet. So, the user can make decision and again can give command to WiFi module to drive output devices placed remotely. ESP8266 is the most unified WiFi module in the industry; it consists of inbuild microcontroller and antenna with less expense.

III. PROJECT DESCRIPTION

HARDWARE DESIGN:

This Proposed system consists of user side i.e. Android Mobile application operated by user in industry. For demonstration three different industrial applications are taken under considerations. Commands such as Device ON and OFF, and ON/OFF cycle count can be configured in mobile application. Consider three electrical devices under reliability testing, which needs to make ON and OFF. User can enter count let's say 500 count in mobile application for all three devices and then make devices ON. Count that has been entered will get communicated to ESP8266 WiFi Module over internet and its output pins of WiFi Module can be made High and Low accordingly with prefixed delays.

The ESP8266 WiFi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, user can simply connect to Arduino device and get WiFi-ability. This module has a powerful on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime.

On another end where electrical devices are located, photosensors attached with that device screen will detect screen light. If screen gets OFF in-between ON/OFF cycle and remains OFF for more than 2 minutes, it will get monitored by ESP8266 input pins. Then ESP8266 will send "Device OFF" message over internet and further to mobile application. Device OFF time will get saved in mobile noting actually operating time of device. User will get actual "Device operating OK" time.

To drive three electrical devices (operating on 230 V) Relay driver circuit is used, which takes input from ESP8266 Output pins and switches between ON and OFF.



Fig 1. Block Diagram

SOFTWARE DESIGN:

ESP8266 WIFI MODULE PROGRAMMING

The ESP8266 is a System on a Chip (SoC), manufactured by the Chinese company Espressif. It consists of a Tensilica L106 32-bit micro controller unit (MCU) and a Wi-Fi transceiver. It has 11 GPIO pins* (General Purpose Input/Output pins), and an analog input as well. This means that we can program it like any normal Arduino or other microcontroller also we get Wi-Fi communication, so we can use it to connect to Wi-Fi network, connect to the Internet, host a web server with real web pages and let smartphone connect to it. There are different ways to program the ESP8266, but we'll be using the Arduino IDE to program ESP8266.

MOBILE APPLICATION DEVELOPMENT

As Android devices became increasingly more common and are easy to operate, we will use android application to get connected to cloud. For this proposed system we will need cloud connected android app so that our mobile can establish communication over internet. Android Studio is an easy to use (and free) development environment available to build android app with the help of Java programming language. Android application will look like below:



Fig 2. Android app UI to monitor and control industrial process

IV.CONCLUSION

Advantages of system

- Improved and intelligent connectivity between devices or machines
- Increased efficiency
- Cost savings
- Time savings
- Enhanced industrial safety
- Energy savings
- Easy to control; when necessary.

Application of Project

- Reliability testing in any industry
- Safety and Security systems e.g. gas leak detection, fire detection system
- Remote power generation monitoring and control
- Transport radio network performance monitoring
- Manhole monitoring during construction
- Logistics and Inventory control
- Safety of workers in industry

The concept used in this project makes use of Android mobile application, internet cloud and ESP8266 WiFi Module to give command to remote located devices for operation and to take feedback from sensors to know the status of remote devices. According to feedback user can take decision and note the actual operating time.

By providing extremely detailed data in real time, the IIoT can help companies understand their business processes better and, by analyzing the data coming from sensors, can make their processes more efficient and even open up new revenue streams. The IIoT can also give them an insight into the broader supply chain, which will allow businesses to coordinate and create further efficiencies.

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