IOT BASED INDUSTRIAL MONITORING SYSTEM AND CONTROLLING

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ABSTRACT

Internet of Things (IOT) is rapidly increasing technology. IOT is the network ofphysical objects or things embedded with electronics, software, sensors, and networkconnectivity, which enables these objects to collect and exchange data. We aredeveloping a system which will automatically monitor the industrial applications andgenerate Alerts/Alarms or take intelligent decisions using concept of IOT. IOT hasgiven us a promising way to build powerful industrial systems and applications byusing wireless devices, Android, and sensors. A main contribution of this project is thatit summarizes uses of IOT in industries with Artificial Intelligence to monitor andcontrol the Industry.

KEYWORDS:Sometimes, if this control process may not be handled properly, it results in an occurrence of major accidents. So, every process in the industrial sector requires more manual power which is also having issues with the unavoidable manual mistakes. With the upcoming technologies, it is very easy to overcome the greater issues in the industrial automation by using IOT [1].

1. INTRODUCTION

Now- a- days, the industrial monitoring field requires more manual power to monitor and control the industrial parameters such as pressure, temperature, fan, motor speed, and light etc…This is one of the most upcoming issues in the industrial sectors. If the parameters are not monitored and controlled properly, it leads to a harmful situation. Most of the industries are facing these kinds of situation because of some manual mistakes. In that kind of harmful situations, again the manual power is required to control the parameters. Sometimes, if this control process may not be handled properly, it results in an occurrence of major accidents. So, every process in the industrial sector requires more manual power which is also having issues with the unavoidable manual mistakes. With the upcoming technologies, it is very easy to overcome the greater issues in the industrial automation by using IOT .

What is an IOT?

The Internet of Things (IOT) is a system of interrelated computing devices,mechanical and digital machines, objects, animals or people that are provided withunique identifiers and the ability to transfer data over a network without requiringhuman-to-human or human-to-computer interaction. IOT describes a system whereitems in the physical world, and sensors within or attached to these items, are connectedto the Internet via wireless and wired Internet connections. These sensors can usevarious types of local area connections such as RFID, NFC, Wi-Fi, Bluetooth, andZigbee. Sensors can also have wide area connectivity such as GSM, GPRS, 3G, andLTE.

LITERATURE REVIEW

Majority of the companies in INDIA have not implemented Automation practices in industry. Except few large industries majority of the companies cannot afford to invest huge amount of money in the existing costly setups to meet the requirements of Industrial Automation.

2.1 Existing Technologies

Existing methods widely use the following

technologies to communicate theinformation from one end to the other end of the company.

 Using Bluetooth-- But it is limited to short range.

 Using Zigbee/ IEEE802.15.4-- Range is up to only few Kms maximum.

 Using Wi-Fi -- Requires costly equipment setup and high power consumption.

All the methods discussed above are quite expensive and complex to implement and not very reliable.

2.1.1 Bluetooth Technology

Bluetooth Technology is a radio frequency (RF)-based, short-range connectivity technology that promises to change the face of computing and wireless communication. It is designed to be an inexpensive, wireless networking system for all classes of portable devices. The projected cost of the Radio chip was around $5. A complete Bluetooth system will require these elements:

 An RF portion for receiving and transmitting data includes short-range radio transceiver, an external antenna, and a clock reference (required for synchronization)

 A module with a baseband microprocessor

 Memory

2.1.2 Zigbee Technology

The Zigbee radio specification designed for low cost and power consumption than Bluetooth. The specification is based on IEEE 802.15.4 standard. The radio operates in the same ISM band as Bluetooth and is capable of connecting 255 devices per network. The specification supports data rates of up to 250Kbps at a range of up to 30m. These data rates are slower than Bluetooth, but in exchange the radio consumes significantly with low power with a large transmission range. The goal of Zigbee is to provide radio operation for months or years without recharging, thereby targeting applications such as sensor networks and inventory tags[10]. Industrial automation using ZigBee describe the transmitter section, the Zigbee module is configured in such a way that it receives the data collected from the microcontroller and sends it to the remote receiver. In this system, the microcontroller is programmed to collect the data from an analog to digital converter that continuously monitors temperature, voltage and current parameters. At the receiver side, the Zigbee module receives all the sent data from a Zigbee transmitter within the range of communication. This data is further transferred to the microcontroller using an embedded circuitry wherein the microcontroller program compares all these data parameters with predefined set limits. If any parameter exceeds its limit, then the microcontroller sends command signals to a relay driver IC, which is responsible to operate different loads such as motors, relays, circuit breakers, etc. All these parameters' information is also displayed on LCD display as a Human machine interface. In this way, industrial parameters canbe easily monitored and controlled

through the short range low cost and low powered Zigbee communication technology.

The benefits of this technology go far beyond, Zigbee applications include:

 Home and office automation

 Industrial automation

 Medical monitoring

 Low-power sensors

 HVAC control

 Plus many other control and monitoring uses.

2.1.3 Wi-Fi Technology

WIFI is an alternative network to wired network which is commonly used forconnecting devices in wireless mode.Wi-Fi is the name given by the Wi-Fi Alliance to the IEEE 802.11 suite ofstandards. 802.11 defined the initial standard for wireless local area networks(WLANs). But because of its costly equipment setup and high power consumption thistechnology is not preferred. The logical and physical architecture of wireless networkswill be introduced. The logical architecture is introduced in terms of the 7 layers of theOSI network model and the protocols that operate within this structure, with anemphasis on the Network and Data Link aspects that are most relevant to wirelessnetworking — IP addressing,

routing, link control and media access. Physical layertechnologies are introduced, as a precursor to the more detailed descriptions later in thebook, and the physical architecture of wireless networks is described, focusing onwireless network topologies and hardware devices.

Elements of WIFI network

 Access Point (AP)- The AP is a wireless LAN transceiver or "base station" thatcan connection or many wireless devices simultaneously to the Internet.

 Wi-Fi cards-They accept the wireless signal and relay information .They can beinternal and external

 Safeguards-Firewalls and anti-virus software protect networks from uninvitedusers and keep information secure.

How a Wi-Fi Network Works

 A single access point can support up to 30 users and can function within a range

of 100–150 feet indoors and up to 300 feet outdoors.

 Many access points can be connected to each other via Ethernet cables to createa single large network

2.1.4 Can Protocols

Industrial automation using CAN protocol describe project is implemented tocontrol the industrial loads that are run by DC motor based on the temperaturevariations of the process. Various process control systems are depends on thetemperature. So this project achieves this with the use of CAN protocol which is highlyefficient andreliable low-cost. Two microcontrollers are used in thisproject, one for acquiring temperature data and the other for controlling the DC motor.CAN Controller MCP2515 and CAN transceiver MCP2551 are connected to bothmicrocontrollers to implement CAN communication for exchanging the data butdisadvantage practically it is limited to 110 nodes due to the hardware transceivers. Itsupports cabling up to 250 meters.

2. BLOCK DIAGRAM

To develop a system which will automatically monitor the industrialapplications and generate alert to take intelligent Decision using concept of IOT. Andalso design the system to Take Intelligent Decision and Control Devices.IOT or internet of things is a technology that deals with bringing control ofphysical devices over the internet. Here we propose efficient industry automationsystem that allows user to efficiently control industry appliances/machines over the internet. For demonstration of this system we use 4 loads as industrial appliances ormachines and a motor to demonstrate as an industrial motor. Our system uses amicrocontroller for processing all user commands. A Wi-Fi modem is used to connectto the internet and receive user commands. On sending commands through the internetthey are first received by our Wi-Fi modem. The modem decodes information andpasses it to the microcontroller for further processing. The microcontroller thenswitches loads and operates the motors as per receiver's commands. Also it displays thesystem state on an LCD display. Thus we automate entire industry using online GUI foreasy industry automation. Along with we monitor industrial temperature, humidity.
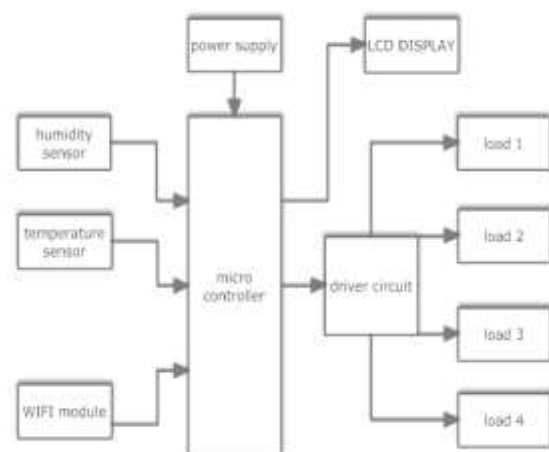

Fig 1. Block Diagram

3. HARDWARE DESIGN

This section is meant for supplying Power to all the sections mentioned above.It basically consists of a Transformer to step down the 230V ac to 12 ac followed bydiodes. Here diodes are used to rectify the ac to dc. After rectification the obtainedrippled dc is filtered using a capacitor Filter. A positive voltage regulator is used toregulate the obtained dc voltage.The power supplies are designed to convert high voltage AC mains electricity toa suitable low voltage supply for electronic circuits and other devices. A power supplycan by broken down into a series of blocks, each of which performs a particularfunction. A DC power supply which maintains the output voltage constant irrespectiveof AC mains fluctuations or load variations is known as "Regulated D.C PowerSupply" For example a 5V regulated power supply system as shown above

Fig2:Model Photo

1.
2.
3. SYSTEM DESIGN AND IMPLEMENTATION

The Internet of Things (IOT) describes a network of physical objects that connect to each other through the internet. Objects or 'things' can transfer information wirelessly without requiring human interaction.A 'thing' can be any object that can be assigned an IP address and provided with the ability to transfer data over a network.
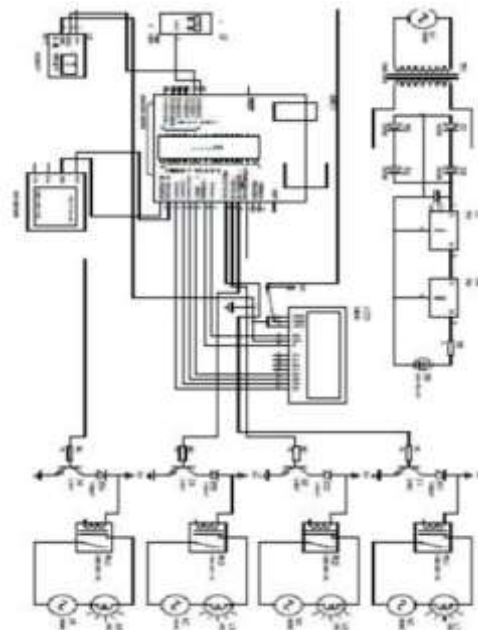

Fig3:Wiring Circuit of IOT based Industrial Monitoring and Controlling.

4. SOFTWARE IMPLEMENTATION

SKETCH Embedded C software for programming of IOT module. Dip trace PCB designing software. BLYNK IOT app for mobile.Imagine a prototyping board on your smartphone where you drag and drop buttons, sliders, displays, graphs and other functional widgets. And in a matter of minutes these widgets can control Arduino and get data from it.

RESULT

It can be used in industries for automation purpose.It transmits the message to the control department.It detects the furnace over heat as well as generator diesel. It can be employed in defense security with a change in sensing circuits.WarmerControllerSystems.(Controllingp arameters of incubator).In domestic applications like controlling room temperature and humidity.As water Heating system for

aquarium.To control precise temperature in medicine and chemical industries.In textile industries (for silk production).In air conditioning and water cooler system to make system automatic and independent.Increases throughput or productivity.Improve the quality or increased predictability.Improve the robustness (consistency), of process or product.Reduce direct human labor costs and expenses.

FUTURE SCOPE

Replacing human operators in tedious tasks. Replacing humans in tasks that should be done in dangerous environments (i.e.Fire, space, volcanoes, nuclear facilities, under the water, etc)Making task that are beyond the human capabilities such as handle too heavy loads, too large objects, too hot or too cold substances or the requirement to make things too fast or too slow.Economy improvement. Sometimes and some kinds of automation implies improves in economy of enterprises, society or most of humankind. For example, when an enterprise that has invested in automation technology recovers its investment; when a state or country increases its income due to automation like Germany or Japan in the XX Century or when the humankind can use the internet which in turn use satellites and other automated engines.

CONCLUSION

Nowadays we need everything computerized. Earlier we can only monitor the situations with the help of cameras. In industries to reduce manual overhead we have implemented Internet of Things (IOT) in Industry to monitor as well as to inform the responsible person to take appropriate measures, but this will partially fulfill our requirement. As sometimes it will be late in this process and it will harm to property as well as life. For this purpose we are developing a system for Industrial Automation using IOT with the help of Artificial Intelligence to make system automated which will take intelligent decisions.

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