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Research Paper

A review on industrial automation system

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Abstract

The prospect to build robust industrial systems & applications in the field of RFID, mobile &sensor devices, wireless, Internet of Things (IOT) has been provided. In very modern years many IOT applications have been increasingly developed and deployed. In our day to day life controlling and monitoring plays a major role now a days. Using advanced technologies we can monitor and control everything. Because of high speed internet a wonderful feature that came into picture is Remote access. The main objective of this proposed system is for those who are away from their industry and want to control devices by providing technology oriented and low cost system.

Keywords: *RFID; IOT; Wireless Devices; Mobile and Sensor Devices; Industry Automation.*

1. Introduction

Earlier way it was simpler to handle and operated machines which were used to be more mechanical type. But with the advent of the information technology and computing facilities new ways of controlling of the machines were introduced. At the finger tips we are able to accesses, good amounts of data with a buttons touch. Everybody tries to get their hands on to simple yet effective systems that can control their machines for the purpose of convenience. The people also tend to use the systems which are highly secure for controlling their machines from any smart device using the multipurpose internet as the means.

The technology which is helping us to realize the dream of controlling machines is known as IoT. The IoT is the technology in which the objects which are to be controlled are formed into a network which are loaded inside with electronics, sensors, software and connectivity which helps us to swap over the information between networks and physical machines to enhance the product value and service quality for the product. The data that has been collected from the sensors by the software present in the physical machine can be exchanged with the manufacturer as well to give him an insight in to the functionality of the product developed by him. With the use of the embedded systems it is also easy to identify and separate the faulty piece from that of the good condition ones which help to improve the reputation of the manufacturer. Embedded computing system help is in identifying each thing is uniquely to interoperate within the accessible Internet infrastructure.

The next big revolution of the world is digitalization of commercializing various modules/products of Internet of Things. Controlling and monitoring the parameters from anywhere is possible because everything is associated with the internet. Today's most buzz technology that stands flanking wearables and robotics is the Internet of Things (IoT).

A printed circuit board (PCB) is the major component in any electronic product or mechanical product with some degree of smartness associated with it. The main process of developing a PCB is etching. In etching machine, there will be boards of nozzles in which the etchant solution is distributed. The etching solution present in the machine is reticulated by the use of pumps. The controlling of etching rates and production rates can be achieved by controlling of the nozzle, the etching solution composition and etchant composition. It takes more time for production if the etching solution is at room temperature, so in order to speed up production rates, is heated upto 35- 40c temperature. At higher temperatures the etching performance decreases, so it is necessary to control the temperature of solvent. So the proposed system continuously monitors the machine and at a specific condition it will take necessary action.

2. Review of literature

Kemal Akkaya [1] et. al. surveyed the already present frameworks in the multi modal data technologies that are applied to the smart commercial buildings. The occupancy monitoring system that are being applied in the modern smart buildings were analyzed and different frame work used for this purpose were listed. They tried to emphasize the role of future work on this particular topic through their paper. They obtained the data trough its various IoT devices like RFID tags, surveillance cameras, temperature & humidity sensors, and that are being already used in smart commercial buildings and tried to use that data for their research on determining the occupancy rates and other information that was required.

Li Da Xu et. al. [2] reviewed the latest trends that were occurring in the pasture of IoT. He studied about latest technologies that are enabling the development of IoT in the industrial and home applications. It also tries to identify the present research status in the field of IOT. They also have listed out the possible challenges that this new technology is facing. In a concise manner the paper contributes in summarizing the current state of the new technology field of IOT in different industrial and other applications systematically.

Andrea Zanella et.al. [3] focuses their attention on the use of the IOT technology for urban environment. This is a very being a very wide category of IoT systems, their tried to characterize these

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technologies purposely by their specific application domain. The visions of smart cities are being supported by the Urban IoT technologies. This particular vision aims to exploit the usage of high advanced communication knowledge to provide value added services for the citizens of that urban by the city administration. They finally offered a ample survey of the technologies, protocols, & architecture enabling for an modernized urban IoT.

Alaa Alhamoud et. al. [4] presented the essential frameworks of the IoT technology for achieving smart homes with high energy efficiency. These are mainly stand on the wireless sensor networks detection of human activity. Their effort is dependent lying on the idea that major user activities at home are associated to a set of electrical devices which are necessary to perform these activities. Therefore, they show how it is possible to detect the user's current activity by observing his fine-grained device-level energy utilization. This association between activities and electrical devices makes it possible to detect devices which could be wasting energy at home. Our framework is structured in two components. On one hand, the activity detection framework which is responsible for detecting the user's current activity based on his energy utilization. On another hand, usage of wireless sensor networks.

Ala Al-Fuqaha et. al. [5] presents a summary of the IoT with prominence on enabling technologies, protocols, and application issues. The IoT is enabled by the most recent improvements in RFID, smart sensors, communication technologies, and Internet protocols. The basic idea is to have smart sensors work together directly without human involvement to convey a new class of functions. The recent insurrection in Internet, machine-to-machine (M2M), and mobile technologies can be seen as the first stage of the IoT. In the imminent years, the IoT is expected to link different technologies to enable new applications by connecting physical objects together in support of intelligent decision making. This paper provides a horizontal outline of the IoT. Then gives an impression of some technical details that pertain to the IoT enabling technologies, protocols, and applications. In contrast to other survey papers in the area, our intention is to provide a more thorough review of the most pertinent protocols and application issues.

3. Proposed technology

An IoT system for controlling and monitoring of the etching process of manufacturing PCB's has been proposed based on the previous literature. The above figure shows a simple layout of the proposed system. The IoT system that is being proposed consists of two parts: 1. Client and Server. When the power is switched on the corresponding sensors stats to record the data of the corresponding parameters. The data that was generated by the sensors will be conditioned and amplified using the Raspberry- Pi system. The values of the sensors will be continuously will be uploaded onto webpage. Any authorized person with the right credentials will be able to the required data from any place at any time, monitor and control the load through IOT successfully.

The authorized person will be given permission through a login by using username and password. If username and password is correct, the user will have access to monitor the required parameters and then control them through web. Different types of sensors such a current sensor, voltage sensor, temperature sensors, raspberry pi system will be used to realize the system. The important parameter of the induction motor is voltage and the current that will be monitored by using a voltage sensor and current sensor.

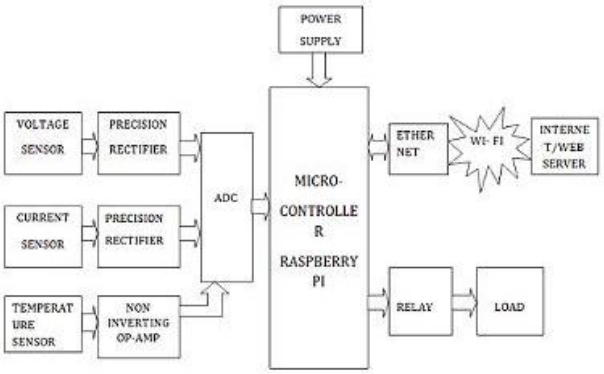


Fig. 1: Layout of the Proposed System.

By using both of these critical parameters, power consumption will be calculated accordance to which an indication of the suitable type will be given. If no maintenance is required a green signal will be appearing. If the system requires maintenance within a couple of days the light will be indicating orange color. If urgent maintenance is required the light indicates the red color. When power exceeds particular level then the motor gets automatically turn off. The solvent temperature and the controlling of the heater in the machine will be typically by using a temperature sensor. The automatic on and off will be controlled by the temperature sensor, which will be automatically turns off the heater when it cross beyond a particular temperature. The information that will be monitored and the controlling of the specific manufacturing machine and the data collection from all of the sensors will be performed by The Raspberry Pi platform.

Temperature Sensor: The temperature of the chemical used for etching purpose will be monitored and controlled by a Temperature sensor. It will be used to automatically switch on and off the heating system based upon the temperature sensed.

Voltage sensor: to linearly stepping down the voltage to a lower level compatible with the instrumentation and manufacturing process using a Voltage transformer. The step down ratio of the voltage in the measured lines that will be dictated by the number of wire winding around the core.

Current sensor: Sensor used to linearly step down the current to a lower level compatible with measurement instrumentation will be achieved by the use of a current transformer. The core of a current transformer is toroidal , or ringed, with a opening in the center. The current output and the step down ratio connected to the instrumentation is dictated by the number of wire winding around the core dictates the step down ratio, by the coils in the transformer core.

Relay: a device which is going to control the low power circuit to switch between a relatively high current/voltage and controlling the performance of the circuit will be achieved through a relay. We are going to design a PCB for connecting the appliances like the fridge and other things like DC motors.

Webpage: the universal language that will be used for designing and organizing the data for monitoring and control of the machine through the use of internet is through the use of HTML language which stands for Hypertext Markup Language. Hypertext language will be utilized with different type of setup specifications for extra graphic elements and formatting the text and image multimedia…etc.

4. Conclusion

One of the major problem that is facing the industries is how to effectively monitor and controlling of the machines in the industry. With the use of the above research papers, it was observed that most of the work is done on the use of the IoT Technology in terms of the home automation. An IoT system for controlling and monitoring of the etching process of manufacturing PCB's has been successfully proposed based on the previous literature. Form the literature a few parameters that are will be used for the indus-

try and try to propose automation useful for the industry. With the application of the proposed system will be enabling us for monitoring and controlling of the machines from remote places and also give us the sensitive information about the maintenance. Information about the maintenance will be helpful for increasing the profitability and the up time of the machine. These types of automation systems will reduce the mistakes that will occur due to the intervention of humans and increase productivity.

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