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A SURVEY ON INDUSTRIAL AUTOMATION BASED ON IOT WITH ARDUINO MICROCONTROLLER

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Abstract: Internet of Things (IoT) plays a key role in the new generation of industrial automation systems (IASs). Evolving IoT standards if effectively used may address many challenges in the development of IASs. where frameworks are associated with one another through the web and can speak with one another to take fundamental choices (additionally called as M2M correspondence). The authors are designed the device using Respberry Pi Microcontroller, instead of the Arduino microcontroller.

Keywords: Internet of Things, Industrial Automation, Remote operating, Arduino microcontroller.

I. INTRODUCTION

Industrial Internet of Things (IoT) is the most ideal method for interfacing mechanical hardware and sensors, to one another, over the web, permitting the approved client of the business to utilize data from these associated gadgets to process the got information helpfully. IoT-connected applications typically support data acquisition, aggregation, analysis, and visualization.

previously Bluetooth and RF (Radio Frequency) innovations were utilized to control and screen the mechanical applications yet were restricted to short separation. The administrator must be in the scope of the Bluetooth network or in the Radio Frequency territory. Answer for the short length correspondence is the IoT based industry computerization. Here we can have controlling and additionally checking from wherever on the planet. The following Fig 1 illustrates IoT based Industrial Automation [1].

Figure 1: IoT based Industrial Automation

II. HISTORY OF INDUSTRIAL AUTOMATION

First time computerization in businesses was done using steam and water control. As the headway occurred, power was presented and was utilized in enterprises for large scale manufacturing. Fig 2 shows the use of steam power in industries in olden days. This machine was used in the first safe and successful steam power plant introduced by Thomas Newcomen in 1712.

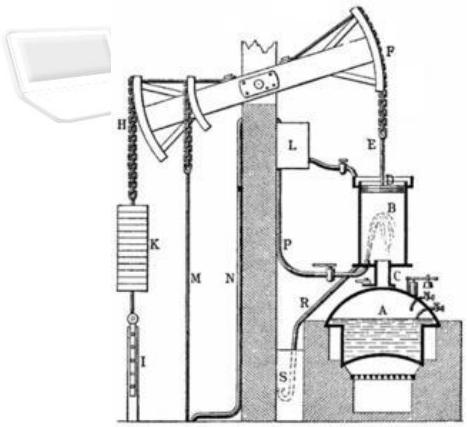

Figure2: Newcomen's Atmospheric Steam engine

When computers were invented, it was designed to perform multiple functions. As time went on, PCs ended up less expensive and afterward all ventures began utilizing it for robotization since it diminished a noteworthy outstanding burden experienced by the people and still it is considered as the best choice to control and screen an application. Computerization is done through the advances, for example, Bluetooth and radio recurrence which can be utilized for short separation correspondence [2].

III. INDUSTRIAL IOT

Industrial IoT has received a lot of research attention from the networking and embedded systems communities, which has produced some of the compelling solutions that underlie today's deployments. However, as indicated previously, broadening its adoption requires further research contributions, involving the experience of the distributed systems community.

Adopting a distributed systems perspective is rather natural considering what industrial IoT is about. More specifically, an industrial IoT system is a collection of largely independent interconnected computing elements that monitor or control some physical resources in a way that appears to the users of the system as an operation of a single facility realizing a certain business process. In other words, industrial IoT systems fit perfectly the classic definitions of distributed systems [3].

Among others, this definition emphasizes two aspects. First, it involves components that are interconnected, albeit largely autonomous. Second, it requires these components to appear to the outside world as a single coherent system. This combination implies that the autonomous components have to collaborate one way or the other. The principles and paradigms according to which such a collaboration can be established lie at the core of distributed systems.

What is more, such an approach to industrial IoT-emphasizing inter-component collaboration—complements the approaches taken by the networking and embedded system communities. The networking community typically focuses on methods of interconnecting the components so as to enable efficient and reliable communication. The embedded systems community, in turn, is concerned with the components themselves and their interfaces with the physical objects and the surrounding environment.

Although these interests frequently overlap with those of the distributed systems community, they do differ, and hence considering industrial IoT solutions as distributed systems with all their classic challenges has the potential to add value.

IV. IOT CHALLENGES IN INDUSTRIAL AUTOMATION

Consumer IoT and Industrial IoT have similarity in many senses, though there are key differences that are reflected in specific real-time and deterministic requirements of industrial IoT applications as well as severity of consequences if failure occurs in the industrial IoT applications where flawless operation is expected due to the huge capital of investment [5].

Data and service security Substantial scale applications and administrations in view of IoT are progressively defenseless against disturbance from assault or data robbery in light of the fact that having more gadgets, frameworks, and advances associated prompts more decentralized passage focuses for these security interruptions.

Trust, data integrity and information privacy. The interconnected gadgets and the clients of the framework need certainty that the data and administrations being traded can be depended upon.Therefore, trustmechanisms need to be able to deal with humans andmachines to ensure trustworthy access to data andproper authorization of service.

Scalability (i) naming and addressing-the adaptability of the gadget address of the current system must be feasible; (ii) data communicationand networking –the association of new systems and gadgets ought not endanger the execution of existing systems, gadgets, and information transmission regardless of the abnormal state of interconnection among an extensive number of gadgets and framework parts; and (iii)service provisioning and management – because of the huge number of administrations/benefit execution choices accessible and the need to deal with heterogeneous assets.

Interoperability Industry is dominated by proprietaryinterfaces and solutions. The amount of devices andsystem components from different vendors and differentdomains poses challenges in terms of multipleplatforms, numerous protocols and large numbers of APIs. As indicated by, the immense assortment of gadgets, applications, and executions inside the mechanical IoT will result in a hugely heterogeneous arrangement of information with variety in organization and understanding of information, quality, recurrence, and timing of the information.

V. LITERATURE SURVEY

[1] Prof. Natrajan M, 2017 - In this paper,he planned a framework which will consequently control and screen the mechanical applications and furthermore enabled the client to control the application from anyplace on the planet. Having control over the applications over the internet is one of the best ways to deal with the industrial applications.

[2] Gopinath Shanmuga Sundaram,2013 - By using Radio Frequency Communication protocol we were able to establish Bluetooth transmission in Raspberry Pi controller board with utmost accuracy. Also when there is a mismatch between the sent and received data, we were able to detect it at all instances and notify the client system.

[3] Konrad Iwanicki, 2018 – Industrial IoT systems indeed pose a number of challenges. They have to interoperate with existing infrastructures and integrate highly heterogeneous hardware-software platforms. They also have to be prepared to scale a few orders of magnitude in size, diameter, and/or density, as well as to enable management by different entities. Moreover, they have to be dependable, that is, reliable, safe, available, maintainable, and secure, all at the same time. What is also important is that this list of requirements is by no means complete.

[4]. Kallappa, B. B. Tigadi, 2016- In this paper, he depicts an IOT Based Reconfigurable savvy WSN unit for modern security parameters observing. The framework can gather sensor information keenly. It was composed in light of utilization of remote correspondence. It is exceptionally appropriate for constant and powerful necessities of the fast information securing framework in IoT condition. The application of ARDUINO UNO greatly simplifies the design of peripheral circuit, and makes the whole system more flexible and extensible. Different types of sensors can be used as long as they are connected to the system. Fundamental outline strategy for the reconfigurable keen sensor interface gadget is depicted in this paper. At long last, by taking modern wellbeing parameters observing in IoT condition for instance, we checked that the framework accomplished great impacts in functional application. Nevertheless, many interesting directions are remaining for further researches in the area of WSN in IoT environment.

[5]. Hongyu Pei Breivold, 2015 – Internet-of-things allowsorganizations to become more agile and aggressive in pursuing new revenue streams and new business models.It has the potential to change the traditional way of spending investment on building, maintaining, and upgrading respective infrastructures for multipleunconnected products. Through conveying new end client programming administrations that depend on data removed from different associated items, Internet-of-things gives another method for acknowledging business nimbleness and quicker pace of advancement.We have started to witness these IoT innovation deployed in many industries such as smart city, smartenergy, healthcare, logistics and retail, transportation,etc. However, scarce information is available for IoTusage in industrial automation domain for reliable and collaborative automation. In this paper, based on thespecific constraints that we have seen in the industrialautomation domain, we have described relevantchallenges that we need to cope with when deployingindustrial IoT solutions in automation domain, andidentified relevant technical solutions that potentiallyaddress these challenges.

[6] Wu He, Shancang Li, 2014 – As a complex cyber-physical system, IoT integrates variousdevices equipped with sensing, identification, processing, communication, and networking capabilities. In particular, sensors and actuators are getting increasingly powerful, less expensive and smaller, which makes their use ubiquitous. Industries have 2240 IEEE Transactions On Industrial Informatics, Vol. 10, No. 4, November 2014 strong interest in deploying IoT devices to develop industrial applications such as automated monitoring, control, management, and maintenance. Due to the rapid advances in technology and industrial infrastructure, IoT is expected to be widely applied to industries. For example, the food industry is integrating WSN and RFID to build automated systems for tracking, monitoring, and tracing food quality along the food supply chain in order to improve food quality.

[7] Da-Hye Kim, Ha-Yeon Lee, 2015 - This paper describes MMS with MQTT scheme of industrial application for IoT. Through the results, proposed message protocol is highly applicable according to RTT to the IoT platform and is particularly effective for large-scale platforms. In future works, the study to meet real-time requirements of real-time industrial IoT platform with increasing QoS level of MQTT will be researched.

[8] FoivosChristoulakis, KleanthisThramboulidis, 2016 - The use of IoT in industrial automation systems as a glue for the integration of their constituent parts has been presented in this work. Evolving IoT M2M protocols have been adopted to transform the cyber-physical (mechatronic) component to an IoT Thing. A UML profile is used to mark the interface of the mechatronic component in the UML notation if any, otherwise the 61131 code is annotated with the constructs of the UML profile. The annotated code is used to semi-automate the development of the IoT wrapper that is required to transform the cyber-physical component to an Industrial Automation Thing able to interoperate in the next generation of IoT based industrial automation environment. The proposed approach applies on new as well as on legacy components.

[9] Elizabeth Kadiyala, ShravyaMeda, RevathiBasani, S. Muthulakshmi,2017 –This paper, presents the advancement of a modern checking system in view of internet technology. The system is suitable for real time industrial monitoring. The design is implemented on Atmega board. The client collaborates with the system to send all the commands from various sensors over the internet and shown in the LCD. The outline was tried, actualized and the accuracy and working of the system was verified.

[10] H.S.Raju, SanathShenoy, 2016 - The proposed solution was tested on a limited number of physical devices. It was found that for 2 physical industrial devices connected to network at real-time could be monitored and operated without any glitches.

[11] Ashwini Deshpande, PrajaktaPitale, Sangita Sanap-2016.In this paper, they are building up a framework which will naturally screen the mechanical applications and produce Alerts/Alarm by using the IoT. By using wireless devices, Android, and sensors IoT is build powerful industrial systems and applications. A main think of this review paper is summaries the uses of IoT in industries with Artificial Intelligence to monitor and control the industry. In this paper five type of sensors used. When the threshold values is raised, it generate the alert message to the Admin.

[12] BhosaleKiranUttam, GalandeAbhijeetBaspusaheb, JadhavPappuShivaji, Prof.Pisal.R.S.-2017.In this paper, they are developing a device which is automatically monitor the industrial application through the IoT. Apart from the automation safety is considered in this concept, for that they are using temperature sensor(LM35) and Virtinuo Application.

[13]Sadeque Reza Khan, Dr. M. S. Bhat -2014. In this paper GUI is used to monitor and control the industrial application. GUI is also used to monitor multiple number of sensors, run number of machines and ability to control the motor belt. They are developed the device using PIC microcontroller, temperature sensor, humidity sensor, DC motor.For developing code for PIC FlowcodeVer 5 is used. Using this system different industrial machines and also any number of machines can be maintained.

[14] Prachi H. Kulkarni, Pratik D. Kute,
V.N. More-2016.In this paper, system is designed for automate industrial meter reader and upload the data to the cloud for centralizing. It uses the Respberry Pi microcontroller as a main hardware. Digital image processing is also act one of the main role. This device follows four steps i) image Acquisition ii) Optical character Recognition iii) Google Form iv) Google spread sheet.

In this device Respberry Pi 5MP camera is used for capture the seven segment LED or LCD meter reader. After that the LCD meter image is recognized using feature extraction techniques. Google Form is used to collect the date and upload that data into the google spread sheet. These whole process is done within 35 seconds.

[15] Pavithra.D, Ranjith Balakrishnan-2015
Main aim of this project is controlling the home appliances through the smart phone. Wi-Fi is used for communication protocal, RespberryPi is act as a server.

In this paper, IR(infra red) sensor is used to identify the humans or animals. LDR (Light Dependent Resistor) is used to detect when fire is detached. When fire is detect the camera is take a snap short and send to the owner's smart phone, so that the will take immediate action for the accident.

VI. CONCLUSION

In this paper, I have tried to design a system which will automatically control and monitor the industrial applications and also allow the user to control the application from anywhere in the world. Having control over the applications over the internet is one of the best ways to deal with the industrial applications. Comparing the existing remote monitoring using RF, Wi-Fi, Profibus & Ethernet etc., has a limitation in range of distance with operator & plant. IoT is helps us to overcome the limitation of operating distance and also protects the operator from Hazards atmosphere inCryogenic plants, Toxic/flammable chemical plants & etc.,
The authors are use Respberry Pi microcontroller. In my future work why we use Arduino as a controller.

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