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IOT Based Industrial Parameter Monitoring and Controlling System

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***Abstract*—Today, smart grids, smart homes, smart water systems, intelligent transportation, are infrastructure systems that connect our world more than thought possible. The common vision of such systems is usually associated with a single concept, the Internet of Things (IOT), where through the use of sensors, the entire physical infrastructure is closely related to the information e- communication technologies where intelligent monitoring and management can be achieved through the use of integrated networks devices. These devices will connect to the Internet to share different types of data. The system uses the Blynk Server and detection applications for the internet of things for an industrial monitoring system. The system use of detection devices to check different parameters such as the production rate, current consumption, voltage fluctuation, remote control of machinery etc.**

***Keywords*—IOT, Energy Meter,Microcontroller.**

I. INTRODUCTION

Electrical power system is divided broadly as generation, transmission, distribution and utilization. In every field of power system, there is a use of electrical machine, so proper monitoring of electrical machine must be done. Electrical Machines have transformed the industrial growth from their inception. Every part of a power system from generation of power to its final utilization at the consumer end requires extensive use of various electrical machines, especially induction motors which form the backbone of all industrial processes. As a result, proper monitoring and its maintenance has been a topic of great interest for industries around the world. It is imperative that importance that must be given to the proper monitoring of the operation of those machines are not just from technical perspective, but also from commercial perspective, as it will reduce the losses. Furthermore, proper monitoring of machines helps to determine the performance of the and thus, proper maintenance can be done as and when required. This demand for a system capable of making those necessary observations for monitoring machine parameters and making the data accessible remotely.

The proper monitoring of the electrical machine helps us to determine the performance of the machine and thus proper maintenance can be determined. So, there is a necessity of measuring the electrical parameters of electrical machine. The paper composes a system that is capable to perform various tasks at a time. The proposed system is a bridge between the sensing of electrical parameters and IOT cloud computing. The hardware prototype includes sensing of electrical parameters like current, voltage, temperature, power factor and frequency. Measurement of current is done using non-invasive current sensor and voltage through using a step-down transformer. Only phase voltages are sensed and then using a level shifter, a dc shift is given to output of sensing circuit which will be fed to the MSP430 controller. By using algorithm, the frequency and power factor are calculated and obtained data is transferred to ESP32 by serial communication through MSP430. This data is stored in cloud and it helps to fetch data from cloud to any device.

The term industry 4.0 stands for fourth industrial revolution which is nothing but smart industry that adapts cyber-physical changes and improves the productivity. The main reason why industries can see considerable growth is because data driven approach towards business. Systematic analysis of data proves beneficial in many ways such as predictive maintenance, achieving goals as

per the targets etc. Focused on energy efficiency part and production monitoring part which naturally reflects in the top line and bottom line of balance sheet i.e., turnover and profits of the industry. Our focus is to minimize the power consumption and machinery damage and monitor the production rate which directly contributes to profit of the company.

The aim of this work was to design and implement a low cost and safe three phase measuring system and to design a smartphone application to monitor the data received from the three-phase measuring system. The Project has been designed to measure three phase voltages and currents for all three phase systems that have a line to ground voltage of less than 250 VAC with a current value of less than 30 A.

II. RELATEDWORK

A. LITERATURE REVIEW

B. Slusarczykthe concept of Industry 4.0 is a new reality of the modern economy, because innovation and technological development play an important role in each organization. Industry 4.0 significantly changes products and production systems concerning the design, processes, operations and services. Certainly, the implementation of this concept has further consequences for management and future jobs through creating new business models. [1] B. Gajdzik, S. Grabowska and S. Saniukin the main aim of the paper is to present the concept of the theoretical framework for Industry 4.0 implementation basedonselectedschedulesoftheIndustry4.0 implementation.[2] P. Verma and J. Kushwahaauthors presented with an increase in research on Industry 4.0 and its implication in Logistics 4.0, is evidence that it is the subject of interest and need for growing industry. Industries of many Countries and its Government have accepted the approach which will enhance the acceptance "Industry 4.0" concept. As an example, Czech Government has agreed to "Initiative Industry 4.0" document and assigned help related to such projects of research. On the other note, the experimental problems are how to devise the industry 4.0 concept.[3] E. Kamber and G. S. Bolatanthe author Announcing its name at the hannover fair in germany for the first time in 2011, industry 4.0 has been a considered subject by academics, practitioners, politicians and government officials worldwide since then. Kagermann (2013) defines industry 4.0 as a new trend for automation and data transfer in manufacturing technologies. cyber physical systems (CPS), internet of things (IOT), cloud systems and smart factories are the main components that make up the concept of industry 4.0.[4] H. K. Mohajanthe author had shown that during the IR Britain's borrowing boom was beneficial for agricultural improvements, enhancement of textiles and iron industries that accelerated structural change of business and massive social change. Vijjika Singh has enlightened on technological advances through machines during the IR.Robert C. Allen has stated that the IR has started in britain and the new inventions and technologies have changed the world.He stated that wages were remarkably high and energy was cheap in britain than the other continents. Living standards of britain rose generally due to economic developments.[5] S. Kumar, B. E. Narkhede and K. Jainthe purpose of this paper is to investigate the existing literature of Industry 4.0 and to seek the various development happened in the domain of industry 4.0.Future research direction of this paper can be used by researchers to focus on specific research areas and will be helpful in developing a generalized framework.[6] M. A. Soomro, M. Hanafiah and N. L. Abdullahthe top-down approach was first coined by IBM in 1970 with software development protocol which focused on steps ranging from wider to narrower perspective. Later, this approach got popular in many other fields including psychology and business. In reviewing theliterature, this paper identifies a total of 61 major terms, trends or keywords as recurring in connection with the topic of IR 4.0,the topic is of importance to governments, regulators, businesses, producers, competitors, customers, consumers andemployees.[7] R. Kumar, R. K. Singh and Y. K. Dwivediindustry 4.0 comprises of different technologies like internet of things (IOT), cloud computing, additive manufacturing, cyber security with blockchain, augmented reality with artificial intelligence (AI), big data, system integration, simulation and autonomous robot. Techniques of Industry 4.0 have capacities to improve the energy, equipment, and human resource utilization. Industry 4.0 is a futuristic construct that nurtures the evolution of autonomous production systems with the application of IOT, CPS, and AI. New sensor-based technologies help SMEs in continuously monitoring machine utilization, energy needs, and staff training.[8] A. Sharma and B. J. Singh the time computers were already a big development. They were first introduced in the textile industry, where each technological development presented a further obstacle for the whole enterprise, resulting in a series of changes. Such technologies extend across multiple industries. The economic condition was the right one. Two hundred years of relatively uninterrupted growth have turned Britain into a fertile ground for the industrial

revolution.[9] T . S. Teck, H. Subramaniam and S. Sorooshianthird networks. Information technology based on infrastructure and technologies are important in productive adoption of The IR 4.0 concepts.These challenges are also strongly agreed by said that lack of infrastructure and internet-based networks is not helping many other manufacturing industries to adopt the IR 4.0. Insufficient network stability stated by in his article.[10]

III. METHODLOGY

Block diagram of the system. In this system, we will monitor and control the following industrial parameter on the IOT platform. Production of jobs, voltage measurement, current measurement, industrial load (conveyor belt). All the parameters will be detected using sensors, IR sensor, voltage sensor ZMPT101B, current sensorACS712, relay (ON/OFF Controller). The sensor senses the real-time parameter and signals the microcontroller to which a ESP32 is connected. ESP32 words on cutting edge platform where edge computing is sent to send the data to cloud and action can be taken form a remote location. Here we are going to monitor four parameters accordingly experimental setup for industry 4.0.

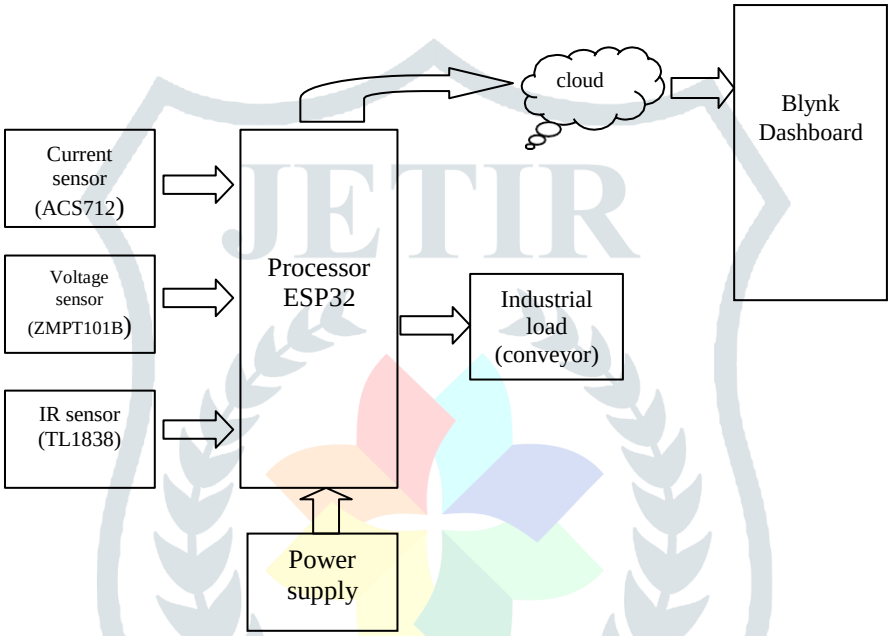

Fig 1: Block diagram of the system

Hardware includes

Hardware ESP wifi microcontroller, IRsensor, voltage sensor ZMPT101B, current sensor ACS712, relay (ON/OFF Controller).

Software requirements

ARDUINO IDE:The Arduino Development Environment (IDE) is a cross-platform application (for Windows macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, butalso, with the help of third-party cores, other vendor development boards Blynk: A typical program usedby beginners, akin to Hello, World!, is "blink", which repeatedly blinks the on-board LED integrated into the Arduino board. This program uses the functions pin Mode (), digital Write () and delay (), which areprovided by the internal libraries included in the IDE environment.The method for making the industry 4.0 is firstly choose the components which measures current and voltage level in the industry. IOT is also a very essential part now days so blynk dashboard which is one of the platforms is used. Microcontroller is the brain of the project it acceptsthe inputs from sensors and take action according tocode entered in embedded c language. Programming software used for it is Arduino IDE the current andvoltage level measuring components are voltage andcurrentsensors. The IR sensor monitor the production rate of the industrial production, IR (Infrared sensor) sensor count their product manufactured. the monitoring result display on blynk dashboard using clouds, IOT (internet of things) and ESP32 microcontroller.The industrial parameter monitoring using sensors, if there is any fluctuation in parameter as the given condition then the parameter control by using relay and this whole circuit control microcontroller ESP32.

IV. EXPERIMENTATION

The below flowchart gives a logical flow of project experimentation, starting from blynk dashboard.

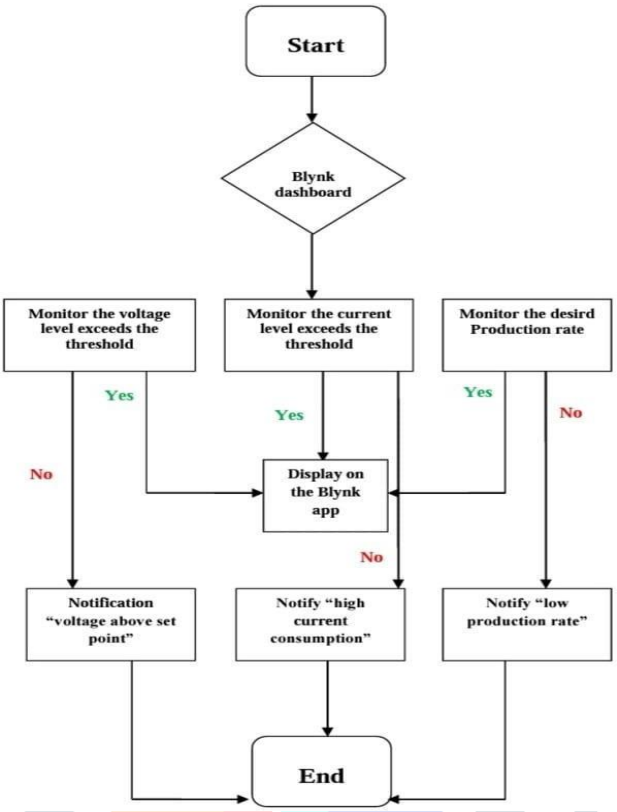

Fig 2: Flowchart of the system

The proposed system consists of

Monitoring using IOT (Internet of things).

Controlling limit stages which are explained below.

Monitoring includes

Industrial parameters monitor using voltage sensor, current sensor, IR (Infrared sensor). The voltage sensor monitors the voltage, current sensor monitors the current across the industrial load.

The IR sensor monitor the production rate of the industrial production, IR (Infrared sensor) sensor count their product manufactured. the monitoring result display on blynk dashboard using clouds, IOT (internet of things) and ESP32 microcontroller.

Controlling limit consists of

The industrial parameter monitoring using sensors, if there is any fluctuation in parameter as the given condition then the parameter control by using relay and this whole circuit control microcontroller ESP32.

V. RESULT

As Industrial IOT is on a boom, almost every industry is implemented IOT services for monitoring and controlling the parameters of over the internet. In this system, we will monitor and control the following industrial parameter on the IOT platform. Production of jobs, voltage measurement, current measurement, industrial load (conveyor belt). All the parameters will be detected using sensors, IR sensor, voltage sensor ZMPT101B, current sensor ACS712, relay (ON/OFF Controller). The sensor senses the real-time parameter and signals the microcontroller to which a ESP32 is connected. ESP32 words on cutting edge platform where edge computing is send to send the data to cloud and action can be taken form a remote location. Here we are going to monitor four

parameters accordingly in blynk dashboard.

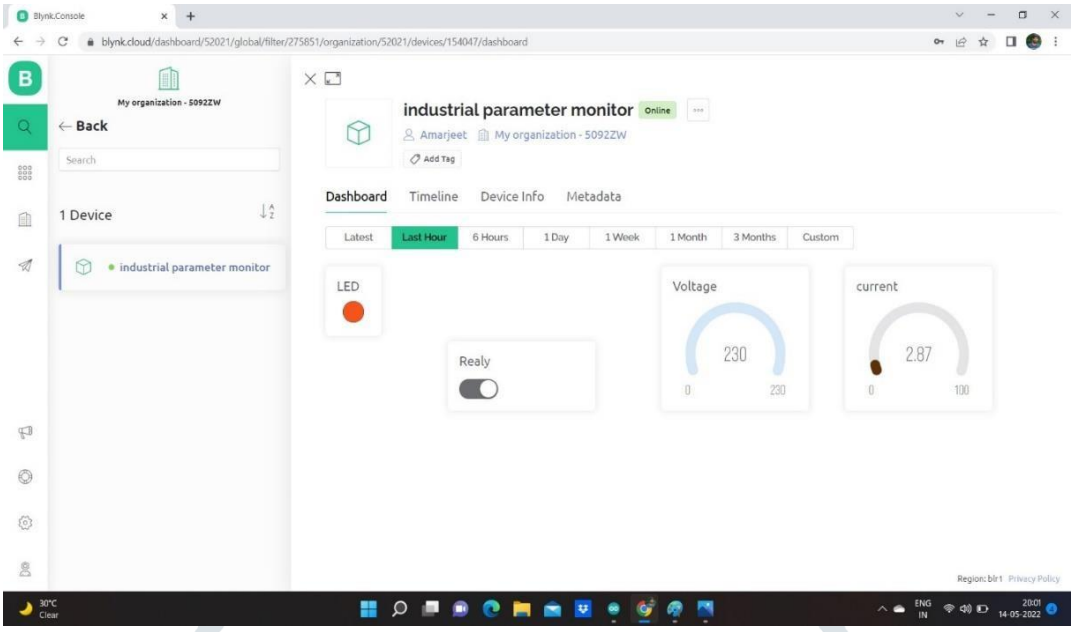

Fig 3: Results show on blynk dashboard

Experimental setup for industry 4.0

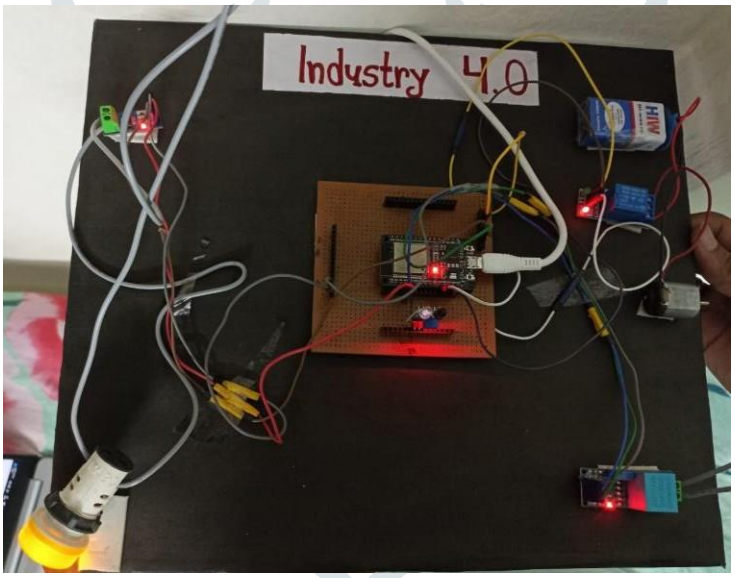

Fig 4: Experimental setup for industry 4.0

VI. CONCLUSION

IOT based industrial parameter monitoring system gives real time app to monitor continuously the production rate. Voltage fluctuation is monitored to prevent machinery damage. The system reduces power consumption. The system control and monitor industrial load.

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