PRODUCTION MONITORING SYSTEM USING WIRELESS SENSOR NETWORK

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Abstract –*The objective of the work is to monitor the production lines in industry using wireless sensor networks. This work presents the benefits of an automated data collection and display system for production lines. It involves wireless sensor networks for monitoring the productions in industry. Condition monitoring reduces human inspection requirements through automated monitoring, reduces maintenance through detecting faults before they escalate and improves safety and reliability. This work can monitor productions using temperature, voltage and current sensors with support of microcontroller. The relay is acts like a switch to monitor the production lines. In this work, Global System for Mobile communication technique is used to transferring the collected data. The collection of data, it is transferred into computerize spreadsheet in the remote office by authorized personnel for reporting purpose. The system will generate an automated report which stays in place and the management only needs to act base on the results. This work is cost effective automatic data collection is the alternative to manual data collection. It significantly improves the accuracy of the valuable reports for the management. It also reduces the time for identifying the fault using this technique.*

Key Words: *Proximity Sensor, Global System, PCB, Node MCU, AWS Cloud.*

1. INTRODUCTION

In this modern world multinational business companies were increasing rapidly. The single businessman wants to monitor all the production status in each industry with manual presence. In this work the business man can monitors all the production status through PC or Mobile in the corporate office itself. Mobile phones have become a widespread means of communication. It becomes a part of everyday life with ever more people enjoying the service and extra freedom they provide. It works on the basis of Global System for Mobile Communication. A subscriber from any systems can access telecommunication services by using a subscriber identity module card in a handset suitable for the network on the visited system. The short message service allows text messages to be sent and received to and from mobile telephones. The text can comprise words or numbers or an alphanumeric combination. Because simple person to person messaging is such an important component of total SMS traffic volumes, anything that simplifies message generation as well as extended utility of the SMS being sent is an important enabler of short message service. Such extended utility of SMS fulfills certain important requirements. This system is developed to control the functions of a device from a remote area through the SMS of a mobile phone using microcontroller. The monitoring systems equipped with sensors and wireless communication can reduce the costs to a small percentage of conventional monitoring systems, and will increase its field of application. Due to the detailed information of the structural behavior of bridges obtained from the monitoring system, maintenance costs could also be reduced, since inspection methods can be applied more efficiently. Only after certain changes in the structural behavior have been identified, will inspection be necessary, and proper repair could be done immediately after the occurrence of the defect. This reduces the risk of further damage. The analysis of measured data and the knowledge of continuous changes of structural behavior will improve the life time prognosis of civil structures, and reduce the overall maintenance costs of buildings and transport networks. The data has to be continuously transmitted to the supervisor. Each sensor device which is itself a complete, small measurement and communication system has to be powered and cost optimized. Using multi-hop techniques, the data of the sensor network can be transmitted over short distances of some 10 m from each hop to a base station on site. At the base station the data items are collected and stored in a database for subsequent analysis. This data can then be accessed by a remote user. If the central unit detects a hazardous condition by analyzing the data, it raises an alarm message.

1.1 Problem Statement

To develop an IOT based industrial production monitoring system using wireless sensor network or analysing the data related to production.

2. LITERATURE SURVEY

P.Sumithra, R.Nagarjan have discussed the full working of the production monitoring system in this paper.The objective of the work is to monitoring the production lines in industry using wireless sensor networks. This work presents the benefits of an automated data collection and display system for production lines. It involves wireless sensor networks for monitoring the productions in industry. Condition monitoring reduces human inspection requirements through automated monitoring, reduces maintenance through detecting faults before they escalate and improves safety and reliability.

S. Suresh,R.Nagarjan have stated about the fault detection and location of fault on the transmission lines.The fault location detection has always been a goal of power system engineers, since the creation of distribution and transmission systems. Quick fault detection can help protect the equipment by allowing the disconnection of faulted lines before any significant damage of the equipment. The accurate fault location can help utility personnel remove persistent of the faults and locate the areas where the faults regularly occur, thus reducing the occurrence of fault and minimize the time of power outages. As a result, while the fault location detection schemes have been developed in the past, a variety of algorithms continue to be developed to perform this task more accurately and more effectively. The detection and location of faults on power transmission lines is essential to the protection and maintenance of a power system. Most methods of fault detection and location relate to the measurements of electrical quantities provided by current and voltage transformers. These transformers can be expensive and require physical contact with the monitored high voltage equipment.

J.Chandramohan,R. Nagarjan have dealt with the GPS tracking system. This paper provides the design method of fingerprint based student attendance with help of GSM. This system ignores the requirement for stationary materials and personnel for keeping of records. The main objective of this project is to develop an embedded system, which is used for security applications. The biometrics technology is rapidly progressing and offers attractive opportunities. In recent years, biometric authentication has grown in popularity as a means of personal identification in college administration systems. The prominent biometric methods that may be used for authentication include fingerprint, palmprint, and handprint, face recognition, speech recognition, dental and eye biometrics. In this paper, a microcontroller based prototype of attendance system using fingerprint sensor and face recognition module is implemented. The tracking module is used here to identify the location of the missing person.

Table -1:
SUMMARY OF LITERATURE SURVEY

Sr.no	Paper Title	Author	Remarks
1.	"IoT Based Industrial Production Monitoring System Using WSN"	P. Sumithra, R. Nagarajan, M. Padmavathi, M. Malarvizhi	The main objective of production management system.
2.	"Transmission Line Fault Monitoring and Identification System by Using Internet of Things,"	S.Suresh, R.Nagarajan, L.Sakthivel, V.Logesh	This paper deals with the methods of detection and location of faults on power transmission lines.
3.	"Attendance Monitoring System of Students Based on Biometric and GPS Tracking System,"	J.Chandramohan, R.Nagarajan, M.Ashok kumar, G.Kannan	This paper deals with the monitoring process of the system.

3. OBJECTIVE AND SCOPE

The objective of this work is to monitor production lines in industry using WSN. The main aim of a PMS is to prevent small disturbances having large effects. In this way a PMS will decrease the number of unscheduled production stops, improve cost-efficiency and simplify the production planning. The task of a PMS is to collect and distribute real time data of events on the shop floor. To increase scalability of production. To minimize faulty/error product and maximize efficiency. In the modern world multinational business companies are increasing rapidly. A single businessman wants to monitor all the production status in each industry with manual presence. In this work, the business man can monitor all the production status through PC or mobile in the corporate office itself. It can keep a track of all the minute details of each department virtually.

4. SYSTEM ARCHITECTURE

The system architecture consists of:

1. NodeMCU

2. AWS cloud (Host)

3. Local database

4. PHP services

When the cycle will be completed the NodeMCU will start its working. The NodeMCU will call the AWS cloud for the URL and wait for the response. If the response is positive then the data will be stored in the AWS cloud. This Data stored in the AWS cloud is then stored in a local database. The data in the local database can be accessed using the MySQL. Now the PHP based functions and programs will come into the action. Using PHP functions the data will be accessible to the user (i.e. Product manager).There are some PHP services available in the backend to access the data from the AWS cloud. The system architecture is shown in fig 1.

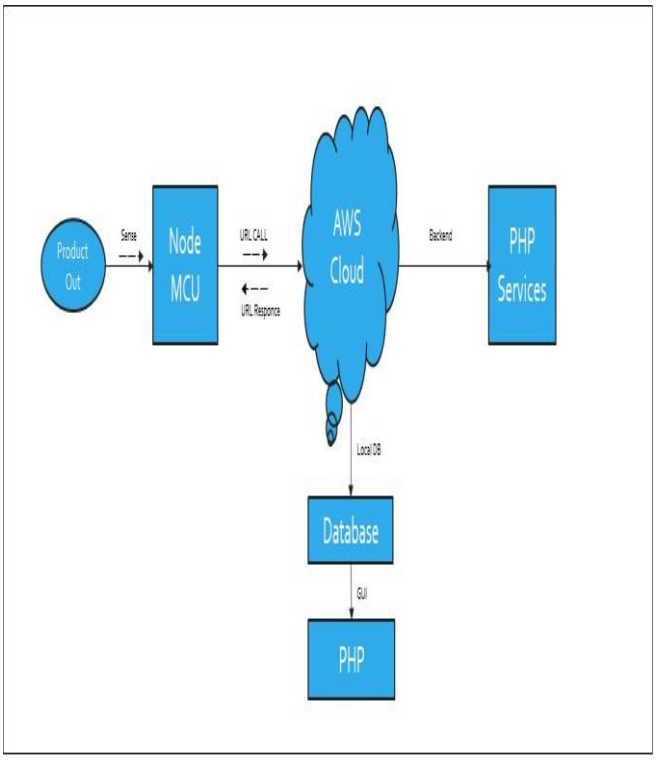

Fig.1 System Architecture

5. HARDWARE TO BE USED

The various kinds of hardware component that are going to be used in building up of this project are listed down:

5.1 NODEMCU :

NodeMCU is like an open source IoT platform.It ias also an microcontroller.It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espress if Systems, and hardware which is based on the ESP-12 module. The term ”NodeMCU” by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espress if Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS. The NodeMCU is shown in the fig.2

Fig.2 NodeMCU

5.2 PROXIMITY SENSOR :

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical intervention. A proximity sensor often emits electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive proximity sensor or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target. Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between the sensor and the sensed object. Proximity sensors are also used in machine vibration monitoring to measure the variation in distance between a shaft and its support bearing. This is common in large steam turbines, compressors, and motors that use sleeve-type bearings. A proximity sensor adjusted to a very short range is often used as a touch switch. The proximity sensor is shown in fig.3.

Fig.3: Proximity sensor

5.3 PRINTED CIRCUIT BOARD :

A **printed circuit board** (**PCB**) mechanically supports and helps electrically in connecting electrical or electronic components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. Components are normally soldered on the PCB so as to mechanically fasten their use and electrically connect them [7].

Printed circuit board can be even used in the simplest of electronic products. They are also used in some electrical products, such as passive switch boxes, etc. Alternatives to PCBs include wire wrap and point-to-point construction. Electronic computer-aided design software is available to do much of the work of layout in designing purpose [7].

PCBs can be single-sided (one copper layer), double-sided (two copper layers on both sides of one substrate layer), or multi-layer (outer and inner layers of copper, alternating with layers of substrate). Multi-layer PCBs are basically used for much higher component density, because circuit traces on the inner layers would otherwise take up surface space between components and this could lead to some defects in the sensor as well as the product or the machine [7].

A basic PCB consists of a flat sheet of insulating material and a layer of copper foil, laminated to the substrate [7].

In Our project, PCB will play a vital role it will be situated on the conveyor belt of the machine so as to keep a track of the movement of product in and out of machine and there be help in generating the results. Node MCU, a microcontroller will be situated or connected on the PCB board with a proximity sensor connected with it which will be used to track the movement. Once data of product is traced its then send to cloud with the help of microcontroller that is situated on the PCB. Thus it utilizes most of the benefits of PCB by mechanically means and electrically means with the help of microcontroller. The PCB is shown in the fig.4.

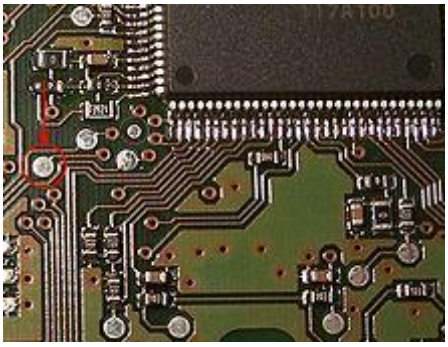

Fig.4 PCB [7]

6. ALGORITHM :

Step 1: Owner assigns goal to the product manager.

Step 2: Product manager setups the goal in the product manufacturing machine.

Step 3: Controller i.e. Proximity sensor takes into consideration 1 cycle as count 1 cycle comprises of movement of the product in and out of the machine.

Step 4: Controller then sends the data related to count over Cloud.

Step 5: From Cloud data is accessed by the system.

Step 6: System then sends the data in the form of notifications to the owners mobile using SMTP.

Step 7: System then analyses data and generates reports and various graphs related to the production.

Step 8: System then stores this data for future analysis and sends report to owner.

Step 9: End.

7. ADVANTAGES

1. The PMS system reduces the paperwork automation reduces human efforts.
2. Faster actions.
3. Transparency.
4. Proper Utilization
5. Time Efficient.
6. Cost Efficient.
7. Easier Controlling.

8. LIMITATIONS

1. Requires Internet Connectivity.
2. Can work only in the environment where transmission lines are used.
3. Less Versatility.
4. Large initial investment.
5. Increase in unemployment.
6. Large amount of memory space will be required.

9. EXPERIMENTAL RESULTS

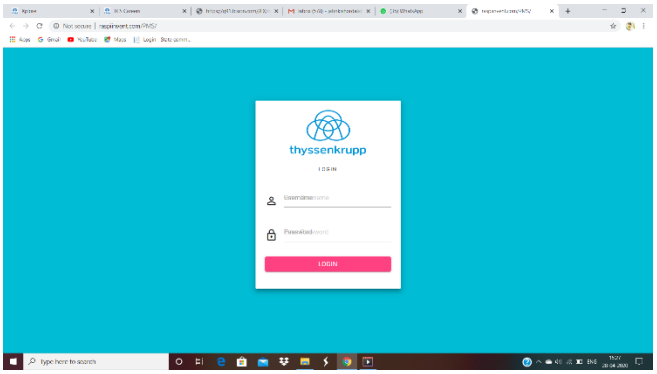

Fig 5: System Login page

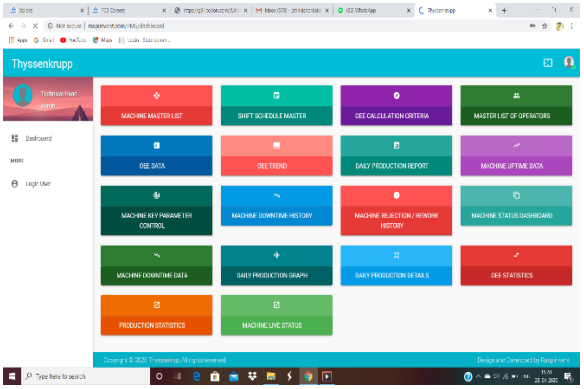

Fig 6: System Dashboard

10. CONCLUSION

The production monitoring system developed is an essential production tool in industries for both the management and the production team. The production monitoring system captures and distributes unadulterated production information at all levels along the production process without human intervention. The data collected is crucial and this could be collected by using a real time production monitoring system. With the collected data, realistic production goals can be achieved when proper analysis is done and implementation is practiced. Events occurring can also be displayed with the help of a production monitoring system. Production faults can be rectified instantly. A production monitoring system enables the production team to operate efficiently optimizing all available resources towards a better production in the above sequence that it is clearly production monitoring system along the production of the human intervention data information of real time production hardware modules collected data.

11. ACKNOWLEDGEMENT

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12. REFERENCES

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