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SMART REAL TIME DATA LOGGING SYSTEM

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Abstract - *This paper describes a brief information of a data logger for industrial purpose. It aims to develop a low cost, data logging system which can store data for future use which would easily integrate with the available PLC based machines so that it could be used with the same machines available in the industries. Various sensors work together making the data logger system capable of monitoring the production and other parameters in industry with the real time interval which can be used further. The system deals with monitoring and recording physical parameters and sends the information to the cloud e.g. google sheets which can be accessible using the internet from anywhere around the world.*

The system proposed in this paper is an advanced solution which can be used to improve the productivity and efficiency of today's manufacturing industries with its ability to avoid data loss. Easy ways of monitoring help various departments of the industries (marketing, production and planning) a direct access to the data from anywhere, at any time.

Key words: Internet of things (IoT), Embedded systems, Data logger, Real-time clock (RTC)

1. INTRODUCTION

This system works on the basic principle of Internet of Things (IoT). The Internet of Things is a network of smart sensors that can control and monitor things from anywhere around the world using network connectivity such as Wi-Fi, Bluetooth etc. Data loggers are electronic devices which automatically monitor and record physical parameters over time, allowing conditions to be measured, documented, analyzed and validate. It involves a logger which records data from one or more inputs (sensors) and displays or feeds the collected data to a computer to be viewed, analyzed and stored by special software. In today's world there are many systems whose data is needed to be continuously monitored or collected. This data should be in form such that the time, occurrence and other specifications can be collected and viewed at one place.

Data logging can be done manually by constant human observation. However, using an electronic data logger is much more effective, accurate and reliable than taking periodic manual readings. It does the job of all the tools mentioned above, saving time and expense.

In this research, we have developed a system of monitoring the data of production in manufacturing industry and saving it on a cloud storage for example the google sheet. Also there is a continuous updating in the sheet which helps in monitoring.

2. HISTORY

The earliest form of data logging involved manual method of data collection in which the data is recorded in different sheets of paper after a particular interval of time. At the start of a business, manual document filing is felt to quick, easy and necessary. However, as your business grows manual filing can become a very cumbersome practice. In a busy business world, it is important that you can file, find, and store documents in a quick and effective manner or it will surely affect the efficiency and productivity of an industry. The manual data takes up a lot of space and it is prone to error and damage. It could also be lost or Misplaced. If this data lands in wrong hands it could cause huge loss to the industry. Also the company –client relationship is at stake as a client prefer companies where their data is secure. It is hard to make changes in this form of data. When the previous data is to be accessed for improvement it is difficult to locate. Thus this method is being replaced with storing the data on an On-board memory which could be further accessed. On-board memory included Random access memory (RAM), Flash Memory, Erasable Programmable Read-Only Memory (EPROM). This is easy to access but the data cannot be changed or analysed using software. Hence decreasing the time efficiency. Also the memory unit needs a proper care so that the data is not lost. Further a wired network method was developed which stored all the data onto a single device. This method required a high maintenance of wires as a single error could lead to loss of data. This system is very costly to be used.

3. APPLICATION

This device is developed for monitoring various parameters that are to be maintained or recorded in a particular industry. The device helps in calculation of the number of products produced, the faulty products among them; which further helps the industry to calculate the

productivity, helping them improve work efficiency. It is capable of recording parameters such as temperature using the dth sensors or the LM35 sensors, humidity using the humidity sensors (such as hygrometer), level monitoring using the proximity sensors, IR sensor or ultrasonic sensors, pressure monitoring using barometer, gas level monitoring which include monitoring of oxygen level (medicine industries and others) using universal exhaust-gas oxygen (UEGO) sensor, chlorine level, and others, fire detection using the optical smoke detectors is possible. Thus, this device is can of being used in various industries such as the Plastic Molding Industries, Textiles Industries, Iron and Steel Industries, Chemical Industries, Pharmaceutical Industries, Whether Monitoring, Agriculture based industries etc. It can also be used in Warehouses or Cold storages. Also actuators can be interfaced with the device for auto correction of parameters such as temperature.

4. OPERATION

Figure 1 is the basic block diagram for this system. Various sensors work in coordination to perform their specific functions which help in monitoring. For the better understanding purpose let us consider the monitoring of production in a plastic moulding industry. The sensors need to be fit in the moulding machine used by a particular industry. These sensors perform together to give the output of each and every product produced. As soon as the output from the sensor is received by the embedded system the Real time is noted from the Real Time Clock(RTC). This data is send to the cloud, taking for example the google sheets for recording purpose using the Wi-Fi.

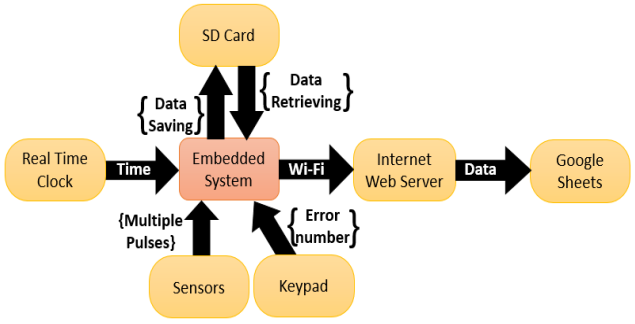

Fig- 1: Block diagram

Now consider that the user of the machine has found a faulty piece. He/she has thus press the corresponding key for the particular fault detected on the Keypad. As the key on the keypad is pressed the error and the time at which it was found is sent to the google sheets. The google app script needs to be programed to receive this data. This complete process is being completed using the Wi-Fi network

In the case if the Wi-Fi is not accessible for a certain duration of time, the data can be stored in the SD card which is interfaced to the embedded system. This process would continue until the Wi-Fi is accessible. As soon as the Wi-Fi is back to access the data stored in SD card can be read and updated on the google sheets. This thus avoids the smallest possibility of data being lost. This data is saved in a structured format which is very easy to read.

5. ADVANTAGES

The biggest advantage this device would be its Online Real time data recording which makes the data easily accessible at any time, from anywhere. Also the real time at which the unit produced helps the user to take up effective measures increasing the time efficiency. The basic model of online electronic based data logger system costs more than 1.5 lakh rupees if we purchase it with the molding machines, and if we use a wired data logger it costs more than 75 thousand, excluding the cost of maintenance. Thus this device is a very cost effective and maintenance free as compared to above. Overall data is sent to cloud storage (google sheets), keeping it secured and making it accessible to roaming executives and staff. After all there are endless advantages of choosing online storage over conventional options. The faulty unit count uploaded helping the concerned authority to take effective measures to increase productivity and decrease the fault rate. It also helps in minimizing wastage of raw material, helping save nature and natural resources. The tally of the total units, faulty units, quality checked units helps the industry know their productivity rate helping them taking needful measures to improve it. Graphical representation is one of the many advantages of this data logger which gives a complete insight of the production. Data loss is completely avoided due to the use of SD card. This data can easily be synced with the excel sheet which is used by various data analytics softwares. Thus our device serves the need of the hour giving a kick boost to the current industry pattern.

6. RESULT

Fig- 2: Google sheet

Figure 2 gives a complete view of the final google sheet view. It displays the total output count, the faulty unit count (named as error 1-8). It also displays the time for which the machine was off which would help in improving the time efficiency. The date, and real time stamp, will give a better user interface. Graphical representation gives a complete understanding just at a look.

7. FUTURE SCOPE

This device could be further used with integration of Artificial intelligence (AI) where we can make a direct detection of fault using camera. It will make the system more efficient and reliable. It would also reduce worker interference with the machine helping the industry use its human resource efficiently. Development of data analysis software can be done which can further be interfaced with a mobile application giving a better user interface.

8. CONCLUSIONS

Embedded data loggers are those solutions that are designed to work as part of the control system network with direct access to controllers and actuators in the production network. These loggers provide simple functionality and can serve a number of purposes including tracking downtime, monitoring performance, saving product genealogy, monitoring quality indicators, and troubleshooting process upsets.

For most manufacturers, especially smaller ones, none of this necessitates the cost and complexity of cloud computing. None of it requires complex mathematics, running machine learning applications on terabytes of data storage, or using any of those sophisticated and elaborate cloud applications.

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