

IoT Based Industrial Production Line Waste Management and Energy Management with Smart Machine Access System

R. Aishwarya¹, S. V. Sharanya², Shilpa H. Naik³, Manjula G. Hegde⁴

^{1,2,3}Student, Department of Electronics and Communication Engineering, Sambhram Institute of Technology, Bengaluru, India

⁴Assistant Professor, Department of Electronics and Communication Engineering, Sambhram Institute of Technology, Bengaluru, India

Abstract: Industries are one of the major factors responsible for economic growth of country and also provides huge employment opportunities for skilled labours. Power consumption of individual machine is monitored by control room using IoT which will also be helpful to machine health, efficiency and production output estimation as per power consumed per day. Thus, providing energy management solution to industry. Machine is operated by a operator and any physical damage to machinery will be under operators responsibility and it is difficult to maintain manual records of operator in large scale industries where thousands of employees are working, hence the proposed system maintains the automatic online record of operator by his id number who is operating the particular machine, hence the operator needs to scan his id to gain the access gain the machine operations and details will be uploaded to the cloud.

Keywords: IoT, Industrial production, Waste management.

1. Introduction

Due to increase in population the production of any production of any product is not meeting the demand hence to increase the productivity of products in large scale the industries are established where large no of machineries is installed on wide area campus and it is operated by hundreds/thousands of employees to meet the demands. Each machine produces hundreds of kilograms metal waste every day for recycling/melting. It is very important to manage the metal waste weighing in tones since metal waste theft is common in industries and it causes huge loss to industries hence the propose system provides solution to manage the metal waste by installing smart metal waste container which monitors the load of container and provides automatic alerts when it reaches maximum load so it can be replaced by Waste Management Authority and smart access to container provides RFID based access to unlock the container which will update the employ card details with the current weight of the container during unlocking of container. In busy days of industries which work 24/7 in a year and employees working on rotational shift timing, it is very difficult to maintain the record which keeps a track on

employee and the particular machine they are handling with. Since most of the time the machinery falls under damage due to human negligence or error and it is the responsibility of the operator to take care of the machine but due to huge no of operators working together it is difficult to maintain a track and to hire a monitoring person will be expensive and huge number of operators monitoring person will be required to do so. Hence the proposed system introduce the RFID based machine access where the operator can only start his machine by swiping his RFID card and the details of the operator will be updated to cloud keeping a track on employee and respective machine he is operating during his working hours. Power consumption by machine in industries are proportional to produced products hence it is very necessary to keep a note on power consumption by each machine to calculate the power produced per machine and also efficiency of machine ,if the machine is consuming lot of power and productivity is not up to the mark then it requires service or maintenance. most of the times an aid is delayed by control room when accident occurs inside industry during machine operation since the campus is wide and containing maintenance authority will be time consuming. Hence the proposed system contains emergency alert system to alert the control room using panic button used during accident by the operator and every machine will be installed with the same.

2. Literature review

1. "New trends in smart sensors for industrial-part-1" IEEE 2017 transactions on industrial electronics (volume 64, Issue: 9 sept. 2017) In this paper they have mentioned that in modern industry, productivity, quality reliability and safety heavily depend on the performance on the sensors employed. They form an interface between the production equipment and the surrounding environment providing feedback based on the results of the executed operations. Thus, sensors can be found in an extremely wide range of applications in an industry system in which they play a very important role, the first element in any control and

measurement system is the sensor itself. Sensor performance defines the performance of the control measurement system and that of the industrial system as a whole. It is not possible to distinguish between correct and incorrect information provided by a sensor, unless an additional information provided by the another sensor is used. This validates the statement; no machine can perform better than its sensors

2. Md. Kishwar shafin; kazi lutful Kabir; Nazmul Hasan; Ishrat jahan; Samina tasmia Ishan “development of an RFID based access control system in the context of Bangladesh “IEEE2015 international conference on innovative in information, embedded and communication systems (ICIIECS). In this paper the publisher has mentioned about RFID. Radio frequency identification technology utilizes the electromagnetic fields for data transfer in order to transfer automatic detection and tracking of tags or tags of objects. It can provide ways to design and implement relatively inexpensive systems particularly for security aspects, in this paper we have proposed a digital access control system to a protected area where no one but people with authenticated credentials can enter. In fact, we have implemented the system in the server room of an educational institute to test its efficiency as well as expenditure. The implemented system comprises of digital door lock which is unlock able in real time to ensure secured access specifying activation, authentication and validation of users prior to bringing the RFID card closed to the reader. The entire system is associated with a central client- server sub-system to ensure and maintain the overall system integrity. Associated sub-system also generates a log report to maintain check-in and check-out status of visitors in accordance with the primary credentials of each. This system will certainly provide idea about the design and installation of a relatively inexpensive security system which is suitable in the perspective of a developing country like Bangladesh.
3. “Design a smart waste bin for smart waste management” 2017 5th conference on instrumentation, control and automation Yogyakarta, Indonesia, august 9-11-2017. In this paper presents the smart waste bin that can manage the waste in smart city project. The system consists of sensors to measure the weight of waste and the level of waste inside the bin. The system also adapts with network environment to manage all information from waste management. The proposed smart waste bin system can be adopted into general waste bin and it consists of the sensing units a Bluetooth and GSM module for data transmission and a mobile application and web base monitoring and for interfacing and communication with a waste department for waste management. There are types of load cells but strain gauge is considered. This strain gauge is a transducer which converts force into electrical signal. The experiments are aimed to determine the response time between waste bin as a mode and web services. This paper intends to propose a technological process for waste management. Started from smart waste bin by using network environment the real time accurate data from the implemented system should n=be used for efficient solid waste management system. The level sensors also can be attached to common waste bin so the prototype used is suitable for using in conventional waste management infrastructure.
4. Analysis of industrial waste for energy generation with reference to Uttarakhand; INDIA-2015 international conference on technologies for sustainable [ICTSD-2015] feb. 04-06, 2015 Mumbai, India. In this paper the energy sector will have an important impact on India’s economic development. In the last decade the energy sector has certain global trends to support sustainable growth. The focus has been shifting from use of conventional sources of energy to solid and industrial waste for energy generation. In this the focus has been made on waste to energy scenario in the state of Uttarakhand and industrial waste assessment to arrive at a cost-effective solution to overcome neither challenges in waste management. This paper analysis the current waste to energy tech used in India. The cost of generation has also been estimated for different types of plants. Current concerns regarding project funding raw material availability have been addresses along with upcoming project details. This paper investigates the potential of waste to energy tech as a solution to India’s growing waste and energy problems. Other organic-rich solid waste animal and agricultural waste and even industrial waste includes like it generates aqueous and solid waste with a higher proportion of organic constituents representing a significant energy potential. Some aqueous industrial waste includes black liquor, spent wash, steep liquor etc. In future waste to energy is expected to be one of the major options for the municipal solid waste conversion to energy. The comparative cost analysis states that per unit cost generation is moderate from the waste to energy tech-based plant. Comparison of investment cost for various industrial waste-based plant including slaughter house, pharmaceutical, pulp and paper, sugar, fruit shows that the fruit and vegetables waste-based plant is the most economical
5. “IoT based waste management in smart city using IR”- international German of engineering research and advanced technology [IJERAT] Volume 4; issue 4 april-2018. IoT has expected infrastructure revision concept of smart city brings new possibilities for the city management visions introduce promising and economical solutions for massive data collection and its analysis which can be applied in any domain and so make them operate effectively. The efficient management of waste has a significant import on the quality of life of citizens. The reason is that waste disposal has a direct connection with negative impacts in the environment and thus on citizen’s health. The new era web and IoT paradigm is been enabled of the prefiltration of various

devices like RFID's, sensors and actuators. IoT as an enable of various applications including waste management specifically it aims to present a large set of models dealing with the efficient waste management. Special attention is paid on the waste collision. The article introduced the upcoming IoT infrastructure for smart cities the solution is based on the idea of IoT infrastructure should provide enough information to handle this smart city issue efficiently.

6. IoT based waste collision management systems-proceedings of the third international conference on computing methodologies and communication [ICCMC 2019]. This paper is a way to deal with achieve this incredible inspiration. In this paper smart bin is built on a microcontroller-based platform, raspberry pi, UNO board which is interfaced with GSM modem and ultrasonic sensor and also the waste sensor which is used for calculating the weight of the dustbins. When the junk achieves the limit level ultrasonic sensor reveals the GSM modem which is persistently caution the required expert until the rushing the dustbin is squashed. As indicated by the area expert will send the msg to separate administrator waste vehicle can gather the refuse which is finished with the assistance of robot component. In this paper have a tendency to inspire and proper iot enabled systems designed to attain dynamic waste assortment and delivery to process plants on special garbage tips. Plan of smart waste administration mostly concentrate on monitoring the waste administration. Given a smart technology used for waste system avoiding human interference, troubling human time as well as the effect also which outcomes in healthy and waste ridden surroundings.

3. Conclusion

The proposed system introduces a smart metal waste container which will monitor the load/weight of metal waste inside container and automatic alert is provided to app when the weight exceeds the maximum limit, also an RFID based container access system implemented to maintain a security for theft of metal and RFID details are updated to cloud including the current weight of metals when container is accessed/unlocked via RFID card. The system is implemented with RFID based machine access where the operator can only

start the machine by swiping his RFID card and the details of operator will be updated to cloud keeping the track on employee and respective machine he is operating during his machine hours Power consumption of machine in industries are proportional to produced products hence it is necessary to keep a note on power consumption by each machine to calculate the product produced per machine and also the efficiency of machine, if the machine is consuming lot of power and productivity is not up to the mark then the machine is inefficient and requires the maintenance. Hence the proposed system has power consumption monitoring per unit machine and it can be monitored from control room unit. Most of the times an aid is delayed by control room when accident occurs inside industry during machine operation since the campus is wide and contacting machine authority will be time consuming. hence the proposed system contains emergency alert to alert the control room using panic button used by the operator and every machine will be installed with the same. Industrial campus is spread on wide area and hence the maintenance of the campus and infrastructure is very important to provide a hygienic campus environment for employees and the machine operators should also have easy access to raise complaint when machine has fault hence the proposed system provides an app which will help the operator to provide feedback and raise the complaints by selecting the necessary options and submitting in app which will be updated on cloud and instant solution will be provided by maintenance authority.

References

- [1] Aksan Surya Wijaya; Zahir Zainuddin; Mohammad Niswar "Design a smart waste bin for smart waste management" IEEE 2017 5th International Conference on Instrumentation, control, and Automation (ICA).
- [2] Md. Kishwar Shafin; Kazi Lutful Kabir; Nazmul Hasan; Israt Jahan Mouri; Samina Tasnia Islam "Development of RFID based access control system in the context of Bangladesh" IEEE 2015 International Conference on Innovations in information, Embedded and communication systems (ICIIECS).
- [3] "New Trends in smart sensors for Industrial Applications – Part I" IEEE 2017 IEEE Transactions on Industrial Electronics. (Volume: 64, Issue: 9, Sept. 2017).
- [4] Megha S. Chaudhari; Bharti Patil; Vaishali Raut "IoT based Waste Collection Management System for Smart cities: An overview" IEEE 2019 3rd International Conference on Computing Methodologies and communication. (ICCMC).