

Real Time Monitoring and Controlling Data of Thermal Power Plant

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Abstract : In our country there are many power plants like Thermal power plant, Nuclear power plant, Hydro-electric power plant etc. We know there are many machines like boiler, turbines, and other big machineries use for generating electrical energy and all this machines need some control and monitoring. For this they used PLC and SCADA system. PLC is use for controlling the machineries and SCADA system is use for monitoring, controlling and visualizing data, for data logging etc. we can use this for small industry also but some limitations are there like security, and sometimes PLC with SCADA system is complex in terms of hardware units and dependent modules ,as the system is complex it requires skilled operators ,analyst to maintain SCADA system , installation costs of SCADA is higher and system supports use of restricted software and hardware equipments.so here our project is to take the inputs of thermal power plant which is generated by different machineries like boiler, turbine, PLC data , condenser etc. Here we use cloud platform for storing all the thermal power plant data. For storing the data on cloud we use JSON (JavaScript Object Notation).so all the data is store on cloud as the data of power plant is safe on cloud and at the one place . Then here we extract the data from cloud using python and visualize the data into different formats like Graph, Pie chart, Table etc. so we can easily analyzed the data and we also put the security alerts also (ex. if the temperature goes out of range alarm system should be there).At last we create one report with respect to whole data. Create one android application where all the data is extract, visualize & security alarms present for data, as per data generate report.

Keywords: PLC, SCADA, eNlight cloud etc.

I. INTRODUCTION

India is a country with huge number of thermal power plants. From those plants we did the survey for Eklahara thermal power plant. It is located at Eklahara village near Nashik in Maharashtra is one of the well-known and huge power plant station. At present 54.09% or 93918.38 MW (Data Source CEA, as on 31/03/2011) of total electricity production in India is from Coal Based Thermal Power plant. A coal based thermal power plant works by converting the chemical energy of the coal into electrical energy. This is done by raising the steam in the boilers, expanding it through the turbine and coupling the turbines to the generators which converts mechanical energy into electrical energy. These units provide different readings separately as shown in table I.

Table I. Installed Capacity

Stage	Unit Number	Installed Capacity (MW)	Date of Commissioning	Status
Stage I	1	140	August 1970	Stopped
Stage I	2	140	March 1971	Stopped
Stage II	3	210	April 1979	Running
Stage II	4	210	July 1980	Running
Stage II	5	210	January 1981	Running

PROBLEM STATEMENT AND SOLUTION

There are different power plants containing many types of machinery like boiler, turbine, condenser and also they use PLC for controlling the machines, so all the machines generate the data continuously. All the data need the storage, this data is store but cannot share between different system, security issues occurred, and data is store in scattered form not on place so it difficult to access and visualize. So there are many challenges so here we suggest project which takes the input from thermal power plant and store it on cloud where storage space is more, all the data is in one place, provide security to data, easy to access because data is on one place, and easy to visualize in different format.

RELATED RESEARCH REVIEW

Working: A thermal power plant is using steam as working fluid .A thermal power is a power plant in which the prime mover is steam driven. Steam is produced in a boiler using coal as fuel and is used to drive the prime mover, namely the steam turbine. Water is heated to turn into steam and spins a steam turbine which drives an electrical generator. After steam passes through the

turbine, it's condensed in a condenser and recycled to where it was heated known as Rankine cycle. In the steam turbine, heat energy is converted into mechanical energy which is used for generating electrical power. Generator is an electro-magnetic device that makes the power available in the form of electrical energy.

PLC Working: In thermal power plant the demand for higher reliability & efficiency is increasing. Power plant requires continuous inspection and also monitoring after regular intervals. There are chances of errors while measuring at various stages by human workers. Accordingly to increase reliability the automation is needed so that overall efficiency of power plant gets improved. The automation is developed by using PLC which reduces the errors caused by human workers. PLC is programmable logic control. It is used for implementing various functions such as sequencing, timing, counting, logic, arithmetic control through analogue and digital input output modules. In order to store the program in PLC it must be interfaced to computer via interfacing unit.

SCADA: A SCADA control centre performs centralized monitoring and control for field sites over long-distance communications networks, including monitoring alarms and processing status. It collects the data instantaneously of their sites and to transform them on numeric data. The PLC type plant controller combined with pc based SCADA system used for plant control and data acquisition. Most of the SCADA applications use human machine interfaces software that permits users to interact with machines to control the devices.

Features of SCADA:

1. Visualization
 2. Report generation
 3. Data logging: We can save the data of plant to data server and we can access it at any time.
 4. Networking of SCADA: we can connect different computers with each other for reducing complexity. It is easy for visualization.
- (Monolithic, distributed network (LAN or WAN), internet of things SCADA (using internet across country also))

Papers:

PLC based coal level sensing in thermal power plant: This paper refers to the PLC based automation that can be carried out in the coal mining area and thermal power plant where coal handling is of prime importance [1].

Industrial Data Communication: PLC and External Application: User application is responsible to create an interface between different mediums and is able to send and receive data. We are using unique solution from this research. Data communication can be done between any data bases, SCADA solutions and PLCs. Application allows the flow of data in any direction between these components. User application can be divided in two sections; first one is configuration and second is runtime part. Configuration part is responsible to take required input from user regarding source of data and provider of data. Based on configuration, runtime acts accordingly. As a result user application sends and receives data by communicating PLCs or other databases [3].

Raspberry pi based industrial process monitoring using wireless communication: Wireless communication is the best technology and it is widely used in industry for automation purpose [2]. For industrial automation, a remote laboratory is also used to comprising different programmable logic controller (PLC) manufacturers. Wireless communication means transfer of data between two or more points that are not connected to each other.

Cloud Computing: Issues and Challenges: This paper discussed the problems and challenges in Cloud computing. They articulated the relationships amongst Cloud computing, Service-Oriented Computing and Grid computing. They analyzed a different challenges to use Cloud computing. The interoperability issue was highlighted and also gives the solution to all problems.

A JSON Token-Based Authentication and Access Management Schema for Cloud SaaS Applications: Many researches are aimed at addressing the challenges of verification and protection of credentials, account hijacking issues, breach of data [6], and simultaneously also, the inherent challenges that arises with increased user access to cloud. Users can be authenticated to access resources via passwords, biometric, token-based or through certificates. JWT is a form of standardized tripartite (Header, Payload and Signature) token structure that is encoded in a compact JSON serialization format (using Base64-URL) consisting of JSON Web Signature (JWS) and JSON Web Encryption (JWE) [10].

A Cloud Computing Solution for Patient's Data Collection in Health Care Institutions: Existing system use for storing the data of patient is great deal of labor work to collect input and analyzed the information. This process is sometimes very slow and sometimes error occurring. They propose a solution to automate this process by using "sensors" attached to existing medical equipment's that are inter-connected to exchange service. This proposal is based on the concepts of utility computing and wireless sensor networks. All the information of patient is store on cloud and it is access easily and gives the security to the data.

PROPOSED SYSTEM

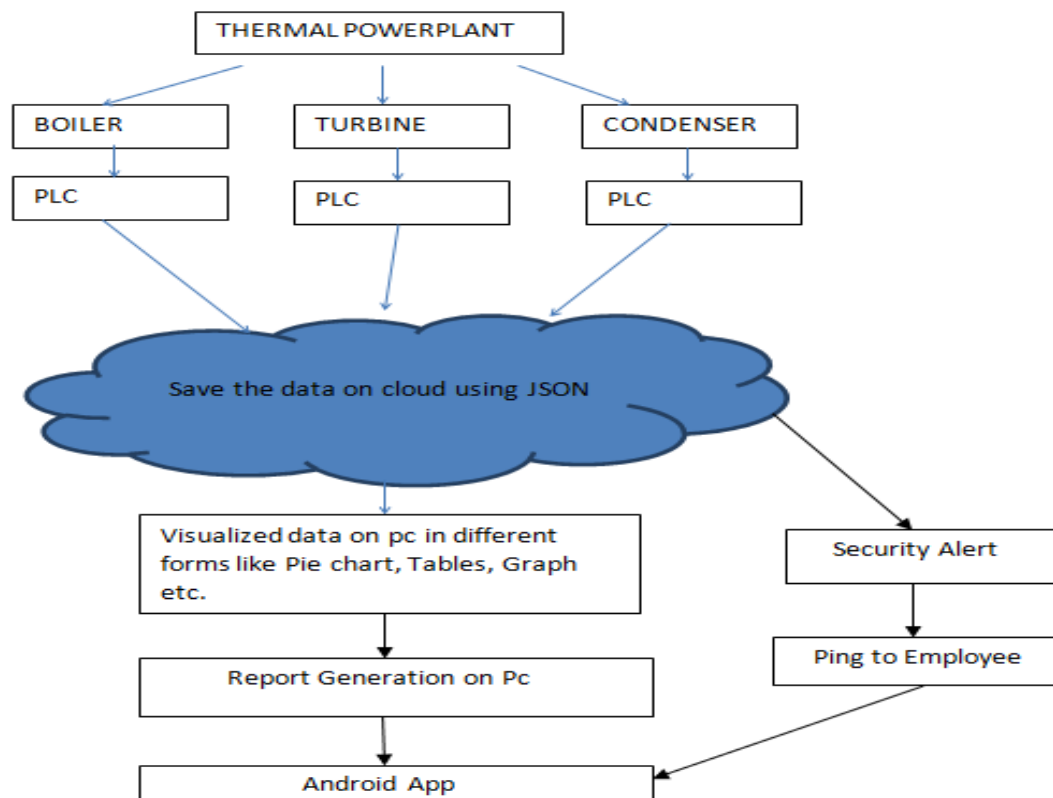


Fig 1. System Architecture

ADVANTAGE

- Data will store at one place
- Data will be easily accessed as it is at one place
- Data will be secure on cloud
- Visualize data in different forms so easy to manipulate it

CONCLUSION

In this paper we use cloud platform for storing all the thermal power plant data. Storing the data on cloud is safe and put all the data at one place. For storing the data on cloud we use JSON (JavaScript Object Notation).which is generally considered easily readable and writable. And it uses convention similar to other language like c,c++,java, python which making it ideal data exchange language. Extracting the data from cloud using python and visualize the data into different formats like Graph, Pie chart, Table etc. so we can easily analyzed the data, easy to make conclusions or decisions and we also put the security alerts also (ex. if the temperature goes out of range alarm system should be there).Creating android application which display all the data into different formats and also generate report. So this is good to use cloud for storing data and it is safe also and visualization of data and final report in on our hand as android application.

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