



Industrial automation, monitoring and control using mobile SCADA

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Abstract

SCADA is jotting for 'Supervisory Control and Data Acquisition'. Nowadays SCADA is used widely in large-scale industry for process automation. Process automation is in the sense of data acquisition as well as monitoring. Traditional SCADA system working with PC, and some other operating system based mobile phones as a client. This paper represents an android phone. As supervisory controller and PC used as a base station to store the data and for further processing. The wireless communication between mobile phone and the base station is performed by using Bluetooth application protocol. The test result has betokened that any basic operating system using SCADA integration and Bluetooth transfer scheme could enhance the performance of plant and machinery in a day without causing an increase in the feedback time of SCADA functions. The supervisor of the plant can see the status of the framework without visiting the site. Therefore, this system reduces the maintenance cost and requirement for continuous monitoring. Therefore, this system increases the efficiency and performance of the plant.

Keywords: industrial automation, SCADA, android smartphone, bluetooth, sensors, remote monitoring system, microcontroller

1. Introduction

Supervisory Control and Data Acquisition (SCADA) is a technique to control system used in industrial automation. It allows the site operator to monitor and control processes which placed at remote locations. A perfectly designed SCADA system reduces the complexity and avoids the complete failure of the desired industries. It is well suited for reducing the time and costs. It eliminates the need for personal attention to visit each site for inspection, make adjustments or data acquisition. SCADA system having computers, controllers, actuators, networks and interfaces that allows controlling and allows data analysis through data acquisition. SCADA has wide applications. SCADA can be used in operation such as data acquisition as well as supervisory control. Mobile supervisory control and data acquisition (referred to as mobile SCADA) is the use of SCADA with the mobile phone supervisory control. There are many types of wireless communications such as Wi-Fi, Bluetooth, RF, infrared. Wi-Fi is most commonly used for the reliable connection. Bluetooth is chosen for short distance communication without any time-based charge.

The term SCADA was first coined in the 1960s at Bonneville power administration and first published in power industry computer application. The SCADA system established to solve the issues regarding the data monitoring and controlling in the process automation. However, it can be used in different

varieties of the platform to solve the problems regarding costs, security, accessibility system integration and data integrity. The SCADA system having real-time data accessibility with different varieties of data communication protocol. Nowadays SCADA system equipped with rich Graphical User Interface (GUI) which makes easy access and controlling of the system. SCADA system requires both hardware and software for profitable operation. This paper considers the use of Android mobile phone as a supervisory controller and PSs as base station client. Test results have betokened that the android phone based SCADA system using Bluetooth data transfer scheme could increase the integrity of the whole system.

1.1 Overview of Smartphone Based SCADA System

With the enormous development in technology and advanced development in software the supervisory control and data acquisition system widely used in industrial process automation. It provides credibility and effective way to monitor and control the manufacturing process. The SCADA system has various application in industrial automation such as signal sensing, control, human-machine interface, management and networking. It is highlighted that with some basic knowledge of design consideration, it is easier to take the right automation approach and chose the right equipment for the task considered.

2. System Outline

2.1 Hardware Platform

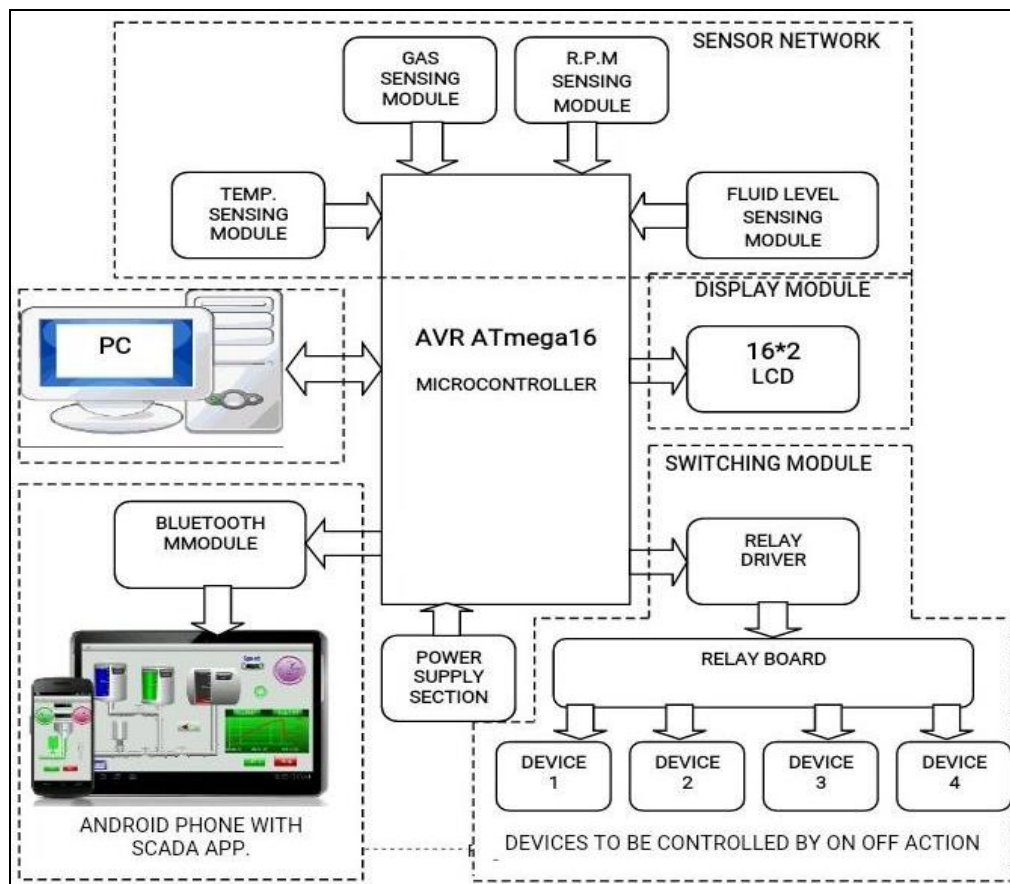


Fig 1

The block diagram of the intended system has shown above. The intended system has four main components.

1. Master unit: Master unit consists of PC and microcontroller. It is the main part of the system and placed at the centre of the system. It is equipped at the site of the plant where an actual process is running.
2. Remote unit: This unit is located in the desired area from where we can monitor and control the actual process. Remote unit compiles the required data about the process and transfers it to master unit.
3. Communication mode: It works as communication means between the master unit and the remote unit. It broadcast required data between this two unit. The intended system uses Bluetooth as a communication medium.

2.2 Software Platform

Nowadays, most mobile devices have an Android operating system introduced system having smart-phone with the Android operating system through which we can access production and process data using Bluetooth module. Smart-phone has many others features like Wi-Fi, infrared, RF, 3G-4G connectivity which makes them really smarter, faster and

reliable. Our intention is to do a smart conception of industrial parameters such as temperature, pressure etc. between smart-phone and remotely located industrial devices. Android is one of the world's most widespread and fastest growing platform. Android gives us freeware tools to the established application and also E a powerful developing framework. The important features of Android operating systems are:

1. It is a very fast OS having fast as well as reliable connections to the other peripherals.
2. It has the competence to support the entire event designated under the system.
3. It has the expertness to support events.
4. Android gives you a facility to monitor your project directly from your smartphone.
5. It has the multiprocessing capabilities.

2.3 Implementation of Mobile SCADA System for the Process Automation

The major overcome of implementing SCADA over other platform is the adaptability of design, any process can be controlled and monitor using android smart-phone. It does not require any extra development environment.

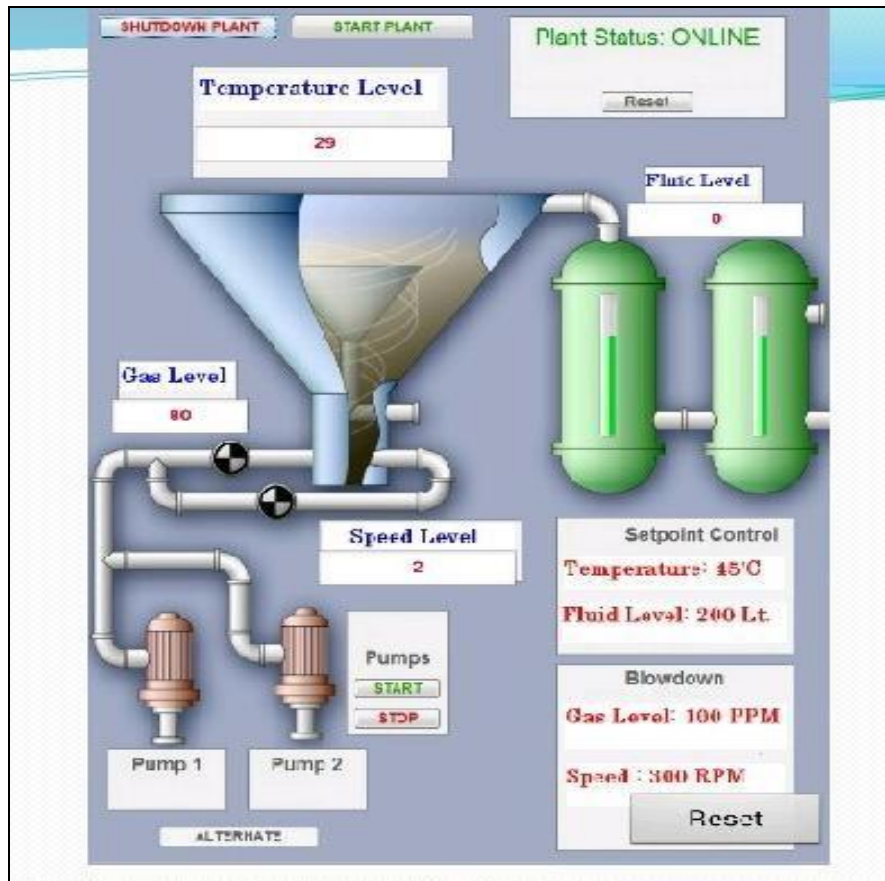


Fig 2

2.4 Bluetooth Module

We can use it as a primary communication device between primary Master Control Unit and Personal computer for data communication.

The feature of the module is as follows

1. Required power for its operation –
2. Carries features of USART.
3. The range is between 10-15 m depending on Bluetooth module.
4. Required minimum components.
5. Use with Led is always entertained.



Fig 3

3. Hardware Implementation

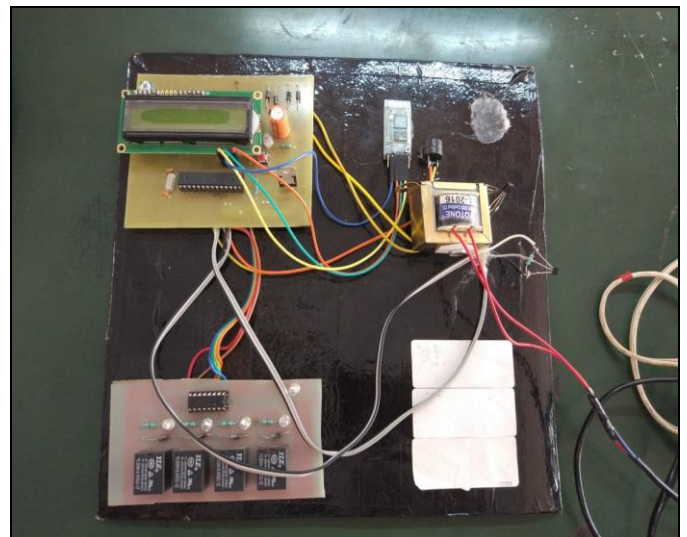


Fig 4

4. Advantages

1. Response time is very quick.
2. Easy to install and use.
3. Authorization should be configurable and fast.
4. The proper quality equipment provides as excellent lifetime for an overall increase in performance.

5. It is extremely helpful in a hazardous condition.

5. Limitations

1. Bluetooth or wired connection does not have very long range.
Solution – This problem can be overcome by using internet connectivity and long-range infrared system.
2. Battery problem can occur.
Solution – Authorization can be provided to more than one device in case of emergency.
3. Maintenance is required in every now and then.

6. Result & Conclusion

This project effectively demonstrates and android smart-phone has been integrated into SCADA system as a supervisory controller. Therefore, it is not mandatory SCADA must be used along with a Personal Computer. The data computing, monitoring and controlling process of a plant are performed. In industrial automation wireless communication is more cherished over wired one because of its lack of complexity and damage rate.

Android SCADA consisting Wi-Fi or Bluetooth is mostly used nowadays.

7. Acknowledgement

We are deeply in debt to the expert who has contributed towards the development of the proposed system and also to Department of ELECTRICAL and ELECTRONICS ENGINEERING, B.I.T. Durg College of engineering for their unconditional support and encouragement.

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