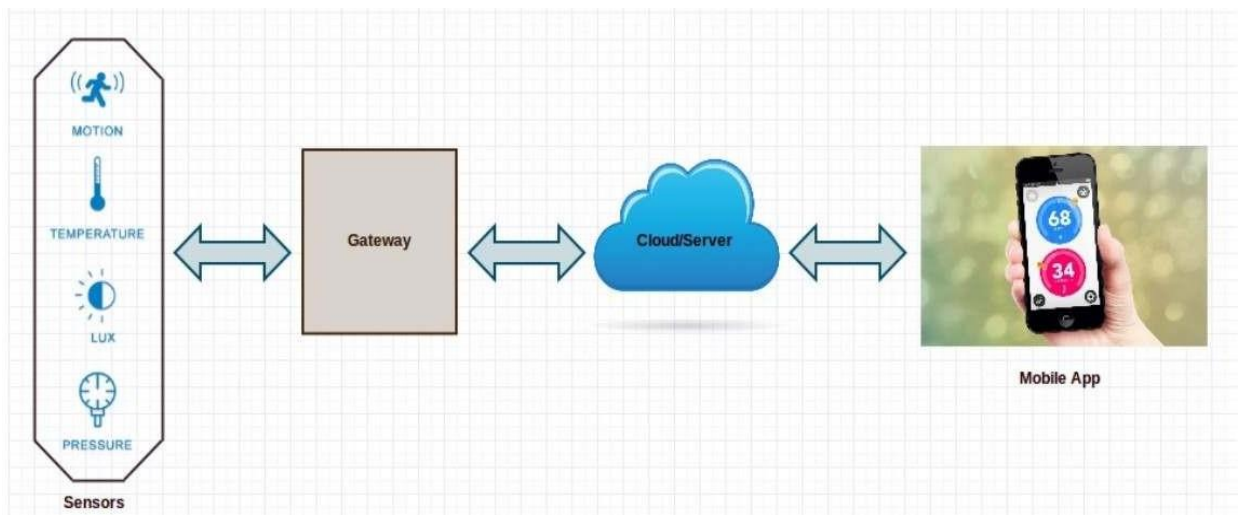


SCADA SOFTWARE SYSTEM

- SCADA stands for **Supervisory Control and Data Acquisition**.
- SCADA software system is a device monitoring and controlling framework. The supervisory control includes, taking action and control through remote locations for various control mechanisms and processes.
- Various kinds of data can be acquired from network of devices (connected through wireless/wired communication systems) for storage, processing and analytics to aid decision making.
- Frontend of a SCADA software solution is a graphical user interface (GUI/UI).
- A SCADA software solution is a real time monitoring, supervision and control system from remote and/or local physical location.

How does The SCADA software system work:

- The IoT gateway ensures compatibility between IoT sensor network and cloud server. Through the gateway, the sensor data is stored in the cloud server.
- The cloud server is the hosting spot for the algorithms that implement the business logic.
- The sensor unit detects the change in the environment like change in temperature, sound and also acts as a data accumulating unit.



SCADA System Working

The SCADA system performs the following functions

- Data Acquisitions
- Data Communication
- Information/Data presentation
- Monitoring/Control

These functions are performed by sensors, RTUs (Remote Terminal Units), controllers, a communication network. The sensors are used to collect the important information and RTUs are used to send this information to the controller and display the status of the system. According to the status of the system, the user can give the command to other system components. This operation is done by the communication network.

Data Acquisitions

The real-time system consists of thousands of components and sensors. It is very important to know the status of particular components and sensors. For example, some sensors measure the water flow from the reservoir to the water tank and some sensors measure the value pressure as the water is released from the reservoir.

Data Communication

The SCADA system uses a wired network to communicate between users and devices. Real-time applications use a lot of sensors and components which should be controlled remotely. The SCADA system uses internet communications. All information is transmitted through the internet using specific protocols. Sensors and relays are not able to communicate with the network protocols so RTUs used to communicate sensors and network interfaces.

Information/Data Presentation

The normal circuit networks have some indicators which can be visible to control but in the real-time SCADA system, there are thousands of sensors and alarm which are impossible to be handled simultaneously. The SCADA system uses the human-machine interface (HMI) to provide all of the information gathered from the various sensors.

Monitoring/Control

The SCADA system uses different switches to operate each device and displays the status of the control area. Any part of the process can be turned ON/OFF from the control station using these switches. SCADA system is implemented to work automatically without human intervention but in critical situations, it is handled by manpower.

SCADA for Remote Industrial Plant

In large industrial establishments, many processes occur simultaneously and each needs to be monitored, which is a complex task. The SCADA systems are used to monitor and control the equipment in the industrial processes which include water

distribution, oil distribution, and power distribution. The main aim of this project is to process the real-time data and control the large scale remote industrial environment. In the real-time scenario, a temperature logging system for a remote plant operation is taken.

The temperature sensors are connected to the microcontroller, which is connected to the PC at the front end, and software is loaded on the computer. The data is collected from the temperature sensors. The temperature sensors continuously send the signal to the microcontroller which accordingly displays these values on its front panel.

One can set the parameters like low limit and high limit on the computer screen. When the temperature of a sensor goes above-set point the microcontroller sends a command to the corresponding relay. The heaters connected through relay contacts are turned OFF and ON.

Advantages :

- The quality of service can be improved
- Reliability can be improved
- Maintenance cost is less
- The operation can be reduced
- Large system parameters can be monitored
- Manpower can be reduced
- Repair time can be reduced
- Fault detection & fault localization
- It stores a large amount of data
- As per the user requirement, it displays the data in various formats.
- Thousands of sensors can be interfaced with SCADA for controlling and monitoring
- Real data simulations can be obtained by operators
- Gives fast response
- It is flexible as well as scalable while adding extra resources.
- The SCADA system provides onboard mechanical and graphical information
- The SCADA system is easily expandable. We can add a set of control units and sensors according to the requirement.
- The SCADA system is able to operate in critical situations.

Disadvantages :

- It is complex in terms of dependent modules & hardware units.
- It needs analysts, programmers & skilled operators to maintain
- High installation cost
- Unemployment rates can be increased
- This system supports hardware devices and restricted software's

Applications :

- Generation and Distribution of Power
- Public Transport
- Water and Sewage System
- Manufacturing
- Industries & Buildings
- Communication Networks
- Oil & Gas Industries
- Power generation, transmission, and distribution
- Water distribution and reservoir system
- Public buildings like electrical heating and cooling system.
- Generators and turbines
- Traffic light control system