Data Acquisition and Remote Monitoring Display

Ms. Pooja Bharajkar [1], Mr. Saurabh Bansod[2]

[1]M-Tech in Electronics Design and Technology, National Institute of Electronics & Information Technology, Aurangabad, Maharashtra

[2]Scientist 'B', National Institute of Electronics & Information Technology, Aurangabad, Maharashtra

---***---

Abstract - *In today's Industry era, every industry are changing from common working style to new working style i.e. it adopt the new working environment. So, for that purpose remote monitoring and data acquisition concept comes into the picture. This project tells you about how to acquire data from industrial sensor & remotely monitor or display the data in real-time. Parameters like level, temperature, percentage of filled area has been displayed on dashboard, and person can see the parameters of sensor from their location using wireless network. [1]*

Key Words: **Radar sensors, remote monitoring industrial device, wireless network**

1. INTRODUCTION

Data acquisition is method of gathering and organizing the information. In this, basically sampling signals has been collected from physical phenomenon and by using analog to digital converter these sampled signals are converted into digital form and these signals can be analysed, displayed and stored in computer. It is also process of measuring the physical or electrical terms like voltage, current, pressure, temperature, sound etc. with the help of computer. In this project, by using radar sensor we calculate the level, temperature and percentage of tank filled and distance of medium from sensor device, these distance can be calculated with the help of electromagnetic waves Emitted by sensor device, as a result of this we get an exact level of tank filled. Following are the components used in this project:

1.1 Radar Sensor 1

This is the first 80GHz radar developed according to international safety standard. This is basically radar sensor which uses the principle of reflection, but it is slightly different from normal radar sensor used in industry. It is based on frequency modulation continuous wave method. It measures the level by using frequency difference i.e. difference between emitting wave and reflected wave frequencies.

This type of sensors are mainly used in non-contact level measurement of liquids, pastes and slurries and because of its higher frequency it comes under W band. Therefore it is perfect technique for high frequency radar. It not get affected by medium changes, temperature variation, gas blankets and vapors.

This sensor works with the HART communication. Because of industrial sensor, it gives the output in the form of current i.e. in between 4 to 20mA. These data can be displayed on computer by using HART communication device. From that we can see the distance, level and temperature of the device.

1.2 Radar Sensor 2

This sensor works in K band i.e. in between the 6 to 26GHz frequency range. This comes under micropilot family, operating based on time of flight method. It works on 24vdc supply, and output in the form of 4 to 20mA i.e. in the current form and level, temperature and other parameter are displayed on the computer via HART communication. This device is used in water and waste water industry and utilities across all industries.

This is downward looking measuring system and based on time of flight method i.e. it is also called as TOF method. It measures the distance from reference point to the product surface. Radar impulses are emitted by antenna and strikes on product surface or media present in the reservoir and reflected back by the radar system.

Its measuring range are varies between 10m to 20m i.e. 33ft to 66ft, according to their antenna size. Also like radar sensor 1 these type of sensor also gives output in current form in the range from 4 to 20mA.

1.3 Remote Monitoring Industrial Device

This device specially designed for the remote monitoring For the radar sensor. Also this device is ideal remedy for places where power is not available. It can also be used as power supply for the field devices.

This device is also called as connect sensor, is fully integrated, battery powered cellular gateway with a inputs for connecting wide range of field devices. In this up to 4 device or single device we can connect to this sensor.it can remotely monitors the industrial environment and control system, such as inventory level, pipeline flow and air pressure.

It can used either internal battery or an external power source. If connect sensor is connected with the external power source then this will act as primary power source and the battery will act as backup power source. If the external

power source is unable to power a connect sensor then it automatically switches to internal battery as power source.

The internal structure of this device contains two types of slots one is 9 pin slot and another is 12 pin slots, from these the 9 pin slot is used for external power source and serial communication whereas 12 pin slot is used for analog sensor input and output where we can connect up to 4 analog sensor input.

2. Wireless commissioning

2.1 Cellular Network

As we know the remote monitoring device has battery operated and also externally powered. It also has sections like SIM card tray. So for commissioning first we need to activate the cellular network. First install SIM card. For registering cellular network USB type A to USB type B cable has used. When the remote monitoring device connected to computer via usb cable. It is necessary to install device drivers from ftdichip.com/drivers/vcp.htm

After installation of device drivers in device, then open terminal program on computer for connecting a device using some configuration like connection port, Baud rate, Parity, Data bits, Stop bit and Flow control. After configuration has done, press wake button from device. And set APN, which is provided by cellular service provider. If we required, set user name and password and pin for SIM card. After entering some command username and password has been set. Type activate at command prompt and press enter. So device make a change immediately and wakes up to report the FIS.

2.2 Commissioning from server

When cellular connection has done. Check the cellular network provides adequate signal. After checking, next step is to connect device with FIS (Field Information Server).this is web-based operating portal used for diagnostics of applied gateways in inventory management system. Open portal and login with your username and password. When home page appears, do the setting like in step first add gateways, tab present in gateways section. Inside the add gateway, select gateway variant. Depending on device, gateway variant must be selected and then go to next. further completion of above steps, go for gateway activation, under this section check the information about model, contract ID, code are correct for the gateway you want to add. Then recognize the gateway by entering the IMEI number of the gateway. This number can be found for example on the front of the gateway. Add the server name by dropdown list. Click to next .then it goes to gateway monitoring section, by default gateway monitoring is pre-configured for the gateway data send interval. If reconfiguring data send interval has changed, then it must change the monitoring interval inside gateway monitor menu. When clicked on finish tab, the gateway wizard is closed. And gateway is fully ready for client application like supply care hosting.

3. System development

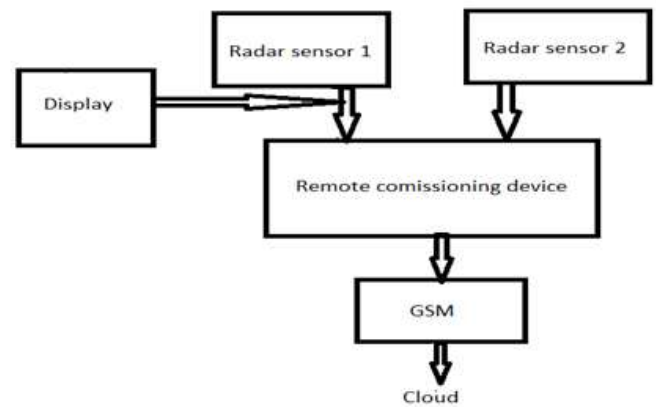### 3.1 Proposed System block Diagram

Fig 1. Block Diagram of system

Above fig. shows system block diagram of proposed model. In this, there are three measure devices used for the purpose of data acquisition and remote monitoring system. These are all industrial device only used for industrial purpose. We cannot used these devices for experimental purpose because these are high cost devices, so it needs to be handle carefully.

There are basic two radar sensors used, in which data from these sensors will monitored remotely. For remote monitoring purpose we have used remote commissioning device. Which is also manufactured by industry itself for monitoring data.

Remote monitoring device has different features like, it includes SIM card, in build battery which is used where power supply facility will not available. So this device can monitor data comes from industrial sensor and pass this data to gsm and then it goes to cloud, where data can be seen by any person from any location.

Table -1: Comparison between two technologies

Comparison between ultrasonic and radar sensor		
Comparison points:	Ultrasonic sensor	Radar sensor
Wave used	Mechanical	Electromagnetic
Principle used	Works on principle of speed of sound	Works on principle of speed of light
Suitable for	Not used in vacuum and high pressure	Suitable for working in vacuum and high pressure.
Affected by	Temperature so does not give accuracy and consistency	Less affected by temperature, improving consistency and accuracy.

Above comparison shows that ultrasonic and radar technologies with different parameters. Also this comparison indicates why we have not used ultrasonic sensor instead of radar sensor. It shows radar sensors are more accurate and advantageous compare to ultrasonic sensor.

4. CONCLUSION

In this paper, we have discussed the hardware part of the data acquisition and remote monitoring system. By using these types of sensor we get higher accuracy and consistency for proper monitoring of system. This is very much suitable for large scale as well as small scale industries, where these sensors are used. Also used in industries like chemical, food etc. and with high temperature and vacuum conditions.

ACKNOWLEDGEMENT

REFERENCES

[1] Raval meet, Vivek Sharma, Alpesh Patel 2018,"Remote Data Acquisition", volume:5 Issue:12, Dec 2018,IRJET

[2] Suyash Lad, Bhushan Mahajan, Roshan Mandkulkar, Vishal Pugaonkar, Mrs. K.Sailakshami 2017,"Data Acquisition system using LABVIEW", volume:4 Issue:4,Apr 2017,IRJET

[3] Deepak Patil, B.T.Salokhe, Mayuri Parit 2015, "Design of remote data acquisition system based on 3G",volume:6 Issue:9, Sep 2015, IJLTEMAS

[4] Neelam V Tambe, Prof.R.R.Itkarkar 2015, "Remote data monitoring system with android application", e-ISSN: 2278-2834, (NCIEST-2015),IOSR-JECE.

[5] Pratiksha Sarma, Hidam kumarjit Singh, Tulshi Bezboruah 2018, "A real time data acquisition system for monitoring sensor data", volume: 6 ISSUE: 6, June 2018, IJCSE.

[6] https//google.com