

Real Time Data Transmission for Weather Monitoring System

Prof. Satyashil Nagrale¹, Ms. Poonam Khetmalis², Ms. Sanika Doke³, Ms. Varsha Dherange⁴

¹ Professor, Department of Electronics and Telecommunication, PCCOE, Pune

² Student, Department of Electronics and Telecommunication, PCCOE, Pune

³ Student, Department of Electronics and Telecommunication PCCOE, Pune

⁴ Student, Department of I Electronics and Telecommunication, PCCOE, Pune

Abstract- Many organizations, scientific institutions and government agencies are installing monitoring stations to monitor weather data and tides data as raw data for weather forecasts. However these data are still scattered on separate systems. Therefore interested parties are still difficult to access all the data. This paper propose the design of data center for weather and tides monitoring located in several operational databases. As weather is the statement of the physical conditions at an instant, forecasting is related to all living creatures all over the world. In this 21st century, weather monitoring and forecasting have great importance and is used in several areas such as keeping track of agricultural field weather conditions to that of industrial conditions monitoring. Weather monitoring would help in keeping record of different climatic behaviors which includes wind speed, wind direction, temperature and humidity. Weather Monitoring System can either be wired or wireless one. Just in case of wireless communication, the connectivity will be more user friendly and weather monitoring would not require physical presence of the person at the remote location. Wireless communication is the transfer of information over a distance without the use of wires. The distances involved may be long. GSM module is the cheapest and the most convenient technology now being used for wireless communication. The wireless weather system fundamentally requires few basic modules such as GSM module, sensors and microcontroller module, display module..

wirelessly through GSM over a long distance. This system fundamentally requires few basic modules such as GSM module, sensors, transmitter and receiver module. One sensor measure six weather parameters which is input to data logger. Vaisala weather transmitter WXT520 sense the parameters like wind speed, wind direction, precipitation (rainfall), atmospheric pressure, temperature, relative humidity. Weather plays an important role in the operation of industries and various facilities in the world. As weather is the statement of the physical condition of that instant, so forecasting the weather is of related to all living bodies on the earth. Forecasting can be done in two ways globally or region based. The region based forecasting over a small area is much more accurate and of high resolution while global based are not much accurate but better forecasts for long-range. Meteorology had a close relationship with human survival and producing activities. With the development of economy and technology, and with the gradual implementation of national sustainable developmental strategy, it requests higher and higher standard of Meteorological monitoring and the demand is also growing. Automatic weather station can collect meteorological parameters near the specified place automatically, such as temperature, humidity, air pressure, wind speed, wind direction, visibility, etc., and calculates and saves these parameters and transmits to the central computer needless of the guard of person. GSM public networks can be popularly used, and the encryption technology is mature, so it can be used economically and practically. The system transmits data through [2]

Key Words: GSM, Base station.

1. INTRODUCTION

The main objective of this project is to transmit data from VAISALA weather transmitter sensor WXT520 to the control room for weather monitoring and forecasting. Wireless communication is the transfer of information over a long distance without use of any wired media. The distances involved may be long or short. GSM module is the cheapest and the most convenient technology now being used for wireless communication. In this we transmit real time data

2. SENSOR

WXT520 the Vaisala Weather Transmitter WXT520 measures barometric pressure, humidity, precipitation, temperature, and wind speed and direction. To measure wind speed and direction, the WXT520 has the Vaisala WINDCAP® Sensor that uses ultrasound to determine horizontal wind speed and direction. The array of three equally spaced transducers on a horizontal plane is a Vaisala specific design. Barometric pressure, temperature, and humidity measurements are combined in the PTU module using capacitive measurement for each parameter. It is easy to change the module without any contact with the sensors. The WXT520 is immune to

flooding clogging, wetting, and evaporation losses in the rain measurement.[5]

Wind speed measurement

$$V_m = 0.5 * L * (1/T_f - 1/T_r)$$

V_m = Wind speed

L = Distance between the two transducer

T_f = Transit time in forward direction

T_r = Transit time in reverse direction

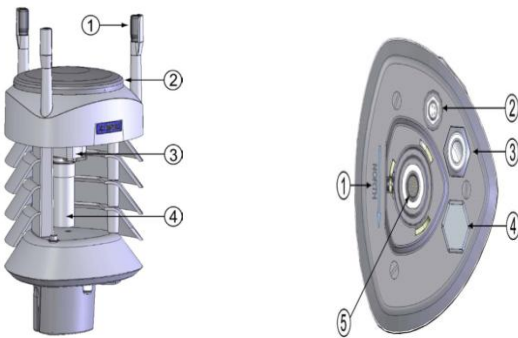


Fig: Main components Fig: Bottom of Transmitter

3. DATA LOGGER

In this project we are using 3000C series data logger for storing data coming from sensor. The 3000C Series has three versions with 8, 16 or 24 Analog Input Channels, corresponding to Models 3008CM, 3016CM and 3024CM. It consists of following basic elements: microprocessor, protection circuits, communication modem, Power Source, Display and keyboard, Terminal Strip for external connections.. Connections with the sensors and other external components such as the communication antenna, the solar panel, a radio-modem etc., can be made using specific accessible connectors on the outside of cabinet, which permitting a quick connection that is useful when working with transportable stations. It has also has provision of RS232 serial connection for transmission and reception of data. The 3000C remote units were designed using the electronic components with a high level of integration, combining the following in a single 6 layers circuit board, SMD technology which are necessary for the specific required functions.[]

4. GSM SYSTEMS

To transmit weather parameters from remote location to control room GSM wireless standard is used. The GSM used in the proposed system is SIM900 which is a complete quad band GSM/GPRS solution. It delivers 850, 900, 1800, 1900MHz performance for voice, SMS, data, and fax in small factor in low power consumption. In the proposed system, SMS facility is used; therefore 900MHz

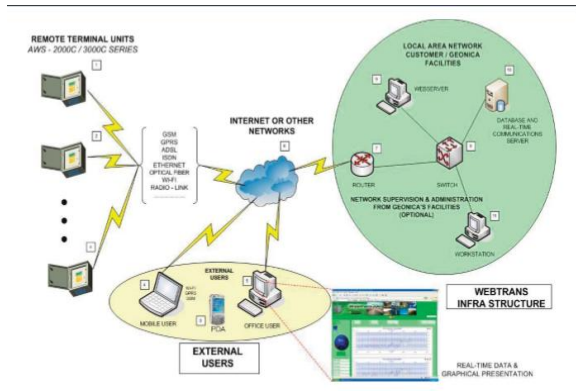
frequency is used. The Modem is designed with 3V3 and 5V DC TTL interfacing circuitry, which allows User to directly interface with 5V Microcontrollers (PIC, AVR, Arduino, 8051, etc.) as well as 3V3 Microcontrollers (ARM, ARM Cortex XX, etc.). The baud rate can be configurable from 9600-115200 bps through AT (Attention) commands. This GSM/GPRS TTL Modem has internal TCP/IP stack to enable User to connect with internet through GPRS feature. It is suitable for SMS as well as DATA transfer application in mobile phone to mobile phone interface. The modem can be interfaced with a Microcontroller using USART (Universal Synchronous Asynchronous Receiver and Transmitter) feature (serial communication).

5. LITERATURE SURVEY

We will survey briefly in this section on the various literatures making the use of GSM and other technologies for weather monitoring usage.

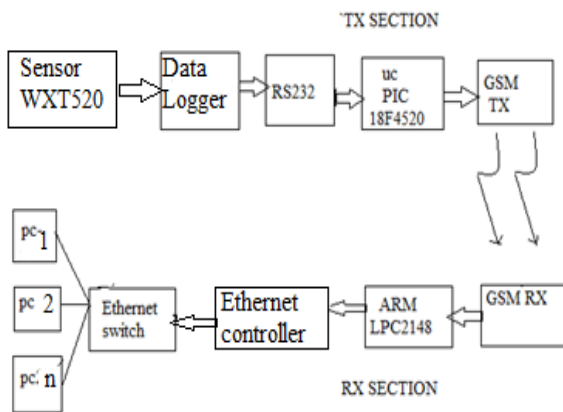
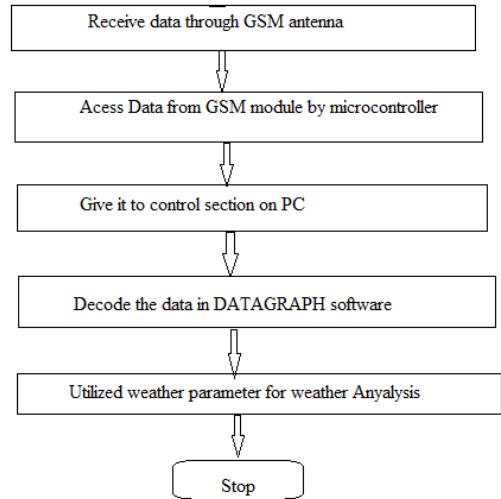
In existing system the data from data logger is collected by pen drive and from pen drive it will take once in one month or once in two month, so it is necessary to continuously take data for day to day analysis purpose during forecast. For taking data manually go to the forest area & copy that data from pend drive to avoid this we have design a system which wireless transmit data continuously to control room from sensor located at forest area.(ref 1,2)





6. PROPOSED METHODOLOGY

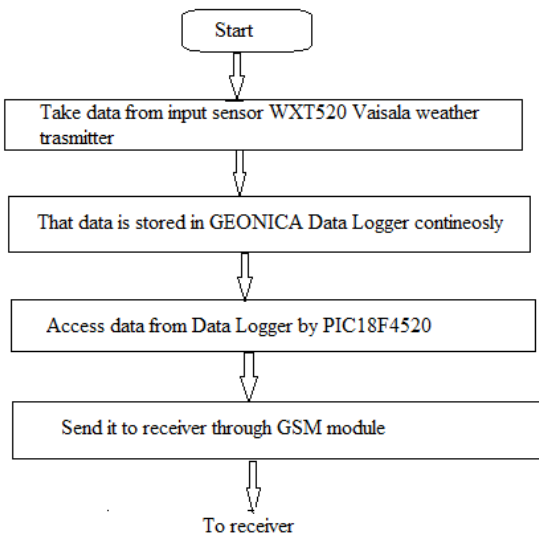
The proposed system is consisting of the two modules, one from which will be at remote location and the other will be in the control room. Following block diagrams are of these modules.



SOFTWARE USED FOR WEATHER FORECASTING

Datagraph software used for analysis of data coming from transmitter module. This software gives output in the Excel sheet format and also shows graphical format of various weather parameter like wind speed, wind direction, temperature, humidity, barometric pressure, precipitation (rainfall).

Data Consultation in Graphical form



Data Consultation in Chart form



The screenshot shows a software window titled "Weather station data logger" with a menu bar (File, Edit, View, Help) and a toolbar. The main area contains a table with multiple columns representing various weather parameters and their recorded values over time. The table has a header row and several rows of data, with some cells highlighted in grey. The status bar at the bottom indicates "Data logger v1.0.0.0" and "Copyright © 2015 by Vaisala Oyj".

CONCLUSION

In this project work we have studied existing system and working on this module using a PIC microcontroller and ARM. This work includes the study of sensor (WXT520) and data logger (GEUNICA CM 3000C series) along with their operating principle, working and features.

This module is not limited for any particular application, it can be used anywhere in environmental forecasting industries with little modifications in software coding according to the requirements. This concept not only ensures that our work will be usable in the future but also provides the flexibility as needs change.

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