Design & Development of Agricultural Parameters Based Weather Monitoring System

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Abstract - The measurement of temperature, light intensity wind speed and relative humidity remotely by using the appropriate sensors is not only important in environmental or weather monitoring but also crucial for Agriculture and many industrial processes. A device for weather monitoring based on agricultural parameter has been developed as described in this paper to monitor and display the temperature, light intensity wind speed and relative humidity of the atmosphere, using analogue and digital components. The analogue outputs of the sensors are connected to a microcontroller through an ADC for digital signal conversion and data logging. An LCD display is also connected to the microcontroller to display the measurements. For analysis and archiving purposes, the data can be transferred to a PC with a graphical user interface program through a USB link .The interface program allows sampling parameters such as the date and time of the data-logging operation to be configured. The device has many advantages as compared to other weather monitoring systems in terms of its smaller size, huge memory capacities, on-device display, lower cost and greater portability. This device has a greater use in today fast growing capital in order to match the upcoming fertilizer program .To sustain the problem in field while farming. Now a days there are anemometer available with different sensor and a memory card unit to measure its all sensing activities cordially light, pressure, wind speed, and temperature

Keywords: wind speed, radiation intensity, humidity, pressure, anemometer

I. INTRODUCTION

Sensors are essential components in many applications, not only in the industries for process control but also in daily life for buildings safety and security monitoring, traffic flow measuring, weather condition monitoring and etc. In weather monitoring, for instance, parameters such as temperature, humidity and pressure need to be measured thus sensors have always been given the task for doing so.

Weather or climate plays an important role in human life. The thermal comfort of human being is known to be influenced mostly by six parameters, i.e., air temperature, radiation, air flow, humidity, activity level and clothing thermal resistance The advancement in technology has made these small and reliable electronic sensors capable of monitoring environmental parameters more favourably. These systems, however, are quite expensive and complex in nature as some of them require the use of on-chip transmitter circuit and involve fabrication processes .This paper aims to build a low-cost, yet reliable, weather monitoring system capable of acquiring and recording data. The proposed system has three sensors that measure the temperature, relative humidity and pressure, respectively. The analogue outputs of the sensors will be converted to digital signals and further processed by a microcontroller, acting as data logger. The logged data can then be transferred to a PC having a graphical user interface program for further analysis or printing the measurements. Using easily-available components and simple circuitry, the system should be beneficial in providing a portable and low-cost remote weather monitoring system.
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Figure 1: Types of Technology Used in Monitoring Weather

1.1 WHAT IS WEATHER MONITORING?

To keep a continuous track of the various atmospheric factors which constitute weather at a place is called weather monitoring. These days, weather monitoring is done by using the satellites stationed in outer space. The satellites revolving in outer space are fitted with powerful cameras which take the photographs of cloud formations in the atmosphere at short intervals and then transmit these photographs to the earth. These satellites also carry a large variety of scientific instruments which keep on collecting weather-related data in the atmosphere and send this information to the meteorological center of the earth. The atmospheric photographs and other weather related data sent by the satellite is analyzed and processed at the meteorological center and then weather forecasting (or prediction) is done for the various regions of the country. That is, it is announced in advance whether a particular area is going to have rainfall, snowfall or a cyclone. In our country, the satellite technology has already proved its potential in collecting information about the various factors of the atmosphere which governs the weather and climatic conditions. These days, weather monitoring and forecasting in our country is being done with the help of "INSAT" satellite.

1.2 Anemometer

An **anemometer** or **wind meter** is a device used for measuring <u>wind</u> speed, and is a common <u>weather station</u> instrument. The term is derived from the Greek word *anemo*, meaning wind, and is used to describe any air speed measurement instrument used in <u>meteorology</u> or <u>aerodynamics</u>. Anemometers can be divided into two classes: those that measure the wind's speed, and those that measure the wind's pressure

Figure 2: Anemometer

1.3 Why it is required?

Weather monitoring station imported weather monitoring station model no. Ws-2350 professional wireless weather center with usb data processing . Automatic meteorological parameters can be monitor and recorded by this instrument. To measure: Indoor temperature ,Outdoor temperature ,Wind speed ,Wind direction ,Wind trends, Wind chill, Relative humidity , Barometric pressure, Rainfall, Dew point

Figure 3: Weather Monitoring Meter

1.4 Basic Hardware And Software Requirements
Power supply ,LED, Transformer , Relay , PCB , Microcontroller ,Pump , at89c51 micro controller, mt 8870 (dtmf decoder ic),7805 three terminal voltage regulator, 230/12V step down transformer ,relay driver circuit, 3 loads +pump motor, cell phone ,one 100 micro farad and one 1000 micro farad electrolytic capacitor ,two 22 pico farad ceramic capacitors, six p-n junction diode, quick switch , one 3.57 megha hertz crystal oscillator , orcad for pcb designing , pic c compiler , tiny boot loader program burn
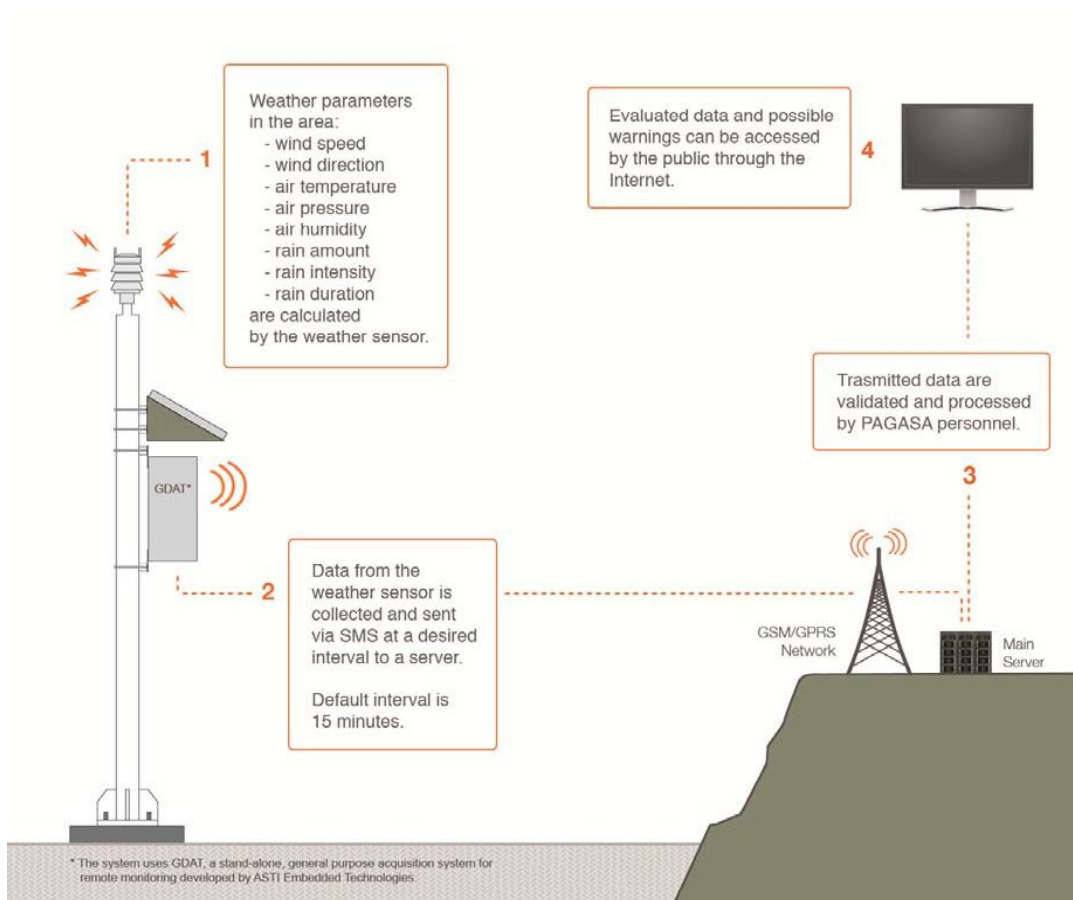
Figure 4: Weather Monitoring System Working

II. FEATURES OF WEATHER MONITORING

- Easy-to-use and economical
- High quality, rugged, industrial grade sensors for monitoring, alarming, andreporting
- Wind Direction, Wind Speed, Humidity, and Temperature Sensor electronics are fully encapsulated in marine grade epoxy for complete environmental protection and a long operating life

III. BLOCK DIAGRAM AND LAYOUT

Figure 5: Block Diagram of Weather Monitoring System

Figure 6: Circuit Of Weather Monitoring System

Figure 7: Actual PCB of Weather Monitoring System

IV. ADVANTAGES

All current weather readings can be seen from indoors .AWS stations can automatically record maximum and minimum values for a range of weather parameters through each day and keep track, for example, of total monthly and yearly rainfall.Readings can be easily taken direct from the display .A data measures and PC can be readily linked to the station so that all weather data is automatically measured.

Automated systems can run for weeks and months without attention whilst continuously recording all details of the weather; Much greater within-day detail is available eg the complete pattern of wind speed & direction through the day can be logged; Comprehensive statistics can be automatically calculated and analyzed . Impressive visual graphics can be displayed; Detailed weather conditions may be viewed at any distance from the station itself, for example over the Internet. The application of design has various applications in Agriculture, Education ,Environmental Studies, Landfills, Reclamation, Wastewater Facilities, Water Budget Analysis, Water Conservation.

V. RESULT AND CONCLUSION

The project helps in determination of temperature, humidity ,pressue,wind speed, intensity of light while working in agricultural fields . The measurements of temperature, light intensity wind speed and relative humidity remotely by using the appropriate sensors is not only important in environmental or weather monitoring but also crucial for many industrial processes. A device for weather monitoring has been developed as described in this paper to monitor and display the temperature, light intensity wind speed and relative humidity of the atmosphere, using analogue and digital components.

VI. FUTURE SCOPE

The development of weather casting systems for severe weather events is ongoing in several countries. Researchers are exploring several approaches to the problem of very short-range forecasts that are highly specific in time and

space. These approaches vary widely, ranging from extrapolation to expert systems to explicit numerical modeling of storm cells. They all share three common needs: data, data and even more data! The observational data must be sufficient to characterize the storm and its environment in great detail. One thing seems certain weather casting will be an ever more important and valuable component of the weather forecasting paradigm

VII. ACKNOWLEDGEMENTS

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