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Meteorological Parameters Monitoring GSM Based Missed Call System with Storage Database

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Abstract

The Energy is defined as the that resources which are naturally replenished on a human time scale such as sunlight, wind, rain, tides, waves and geothermal heat. Solar and wind Energy is a playing a key role in the 21st century as non renewable sources are not much available to fulfill our energy needs. This is very important to all country like India, where the supply demand ratio is very limited. In this project, we are interested to identify the geographical areas for solar and wind energy generations at a very low cost. It can be achieved by monitoring atmospheric Weather conditions such as temperature, humidity, and rain count and soil moisture.

This design is a remotely operated model with sensors, which gathers weather parameter information and transmits measured values to the control station. In our research, we have considered a number of options to device atmospheric weather monitoring system at low cost, long lasting. This system can be easily installed at particular locations to continuously monitor changes in the climate on our mobile by giving missed call on GSM module and also provide data storage on SD card for office record.

Index Terms: Rain Gauge¹, LM 35 Sensor², 10 HS Sensor³, GSM Module⁴, SD Card⁵ etc.

1. INTRODUCTION

In our project, model continuously monitors and records atmospheric conditions of weather via sensors. Weather is determined by the basic factors, namely temperature, rain count in mm, humidity, moisture in soil, cloudiness, visibility, pressure, and winds. Sun is the major contributor to the continuously changing climatic conditions. In the Solar System, energy from the sun creates so many imbalances in the temperature of winds, which move from place to place creating wet, stormy or even sunny weather. The regulating effect of the climate on play a major role of sea. due to which there is an enormous difference in the humidity, temperature and even pressure between the regions of the country and the also coastal regions. Weather is also affected by the earth on natural dimensions of the earth and its rotator motion. In India, where alternative forms of energy are of the need

of the hour, due to ever increasing pollution, industries and population, identifying places or locations which can generate renewable energy is very much important. The present existing model used by the Indian Meteorological Department involves floating a weather monitoring device in a hydrogen balloon at every four hour intervals. This model is very expensive and requires frequent manual efforts and is not practical for many places in India. India has several geographical advantages for implementation of power plants based on renewable energy, such as solar and wind energy. The Tropic of Cancer passes through Indian subcontinent, so the temperature factor is very much suitable to fit the needs of the generation of solar energy. Indian subcontinent is also close to the Equator which gives it a tropical climate and Monsoon. This type of climate is featured by strong and regular Rain throughout the Monsoon across the country. In fact, temperature conditions are very good at certain states, like

Gujarat, Madhya Pradesh, and Chhattisgarh. However, weather analysis in local regions are to be done for places within these states, to identify naturally rainy, cloudy or shadow regions, humidity and moisture in which case we can easily arrange further precautions related to land or area used for farming. Means this analysis is very useful for Meteorological Department, farmers, and for any person who want to know weathers details

2. BLOCK DIAGRAM & ITS DESCRIPTION

The LPC 2148 microcontroller are a 16bit/32bit ARM7TDMI-S CPU with real time emulation and embedded trace support, it is combination of microcontroller and embedded with high speed flash memory ranging from 32kb to 512kb. A 128 bit wide memory interface and a unique accelerator architecture enable 32 bit code execution at the maximum clock rate. For critical code size application, the alternative 16-bit thumb mode reduced code by more than 30% with minimum performance penalty. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for application where miniaturization is a key requirement, such as access control point of.requirement, such as access control point of sale. Serial communication interfaces ranging from a USB 2.0 full speed device multiple UARTs, SPI, SSP to I2c bus and on

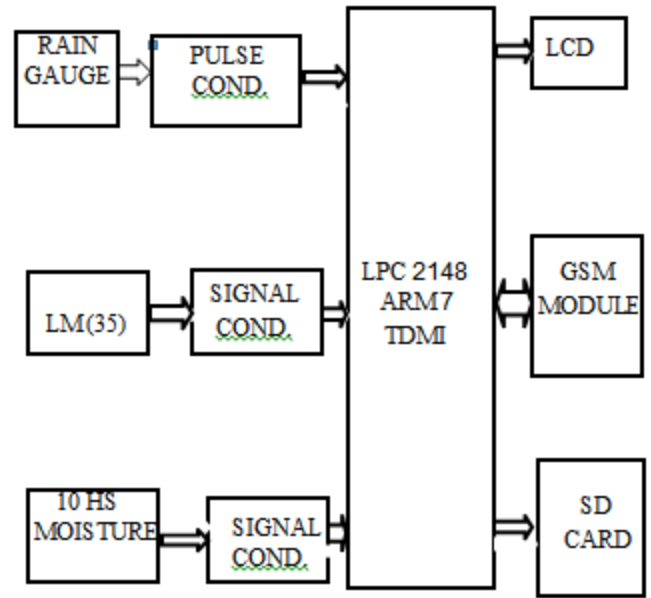


Fig No. 1

devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32 bit timers, single or dual 10 bit ADC, 10 bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industry contro and medical system.

2.1 LPC 2148 ARM TDMI PROCESSOR

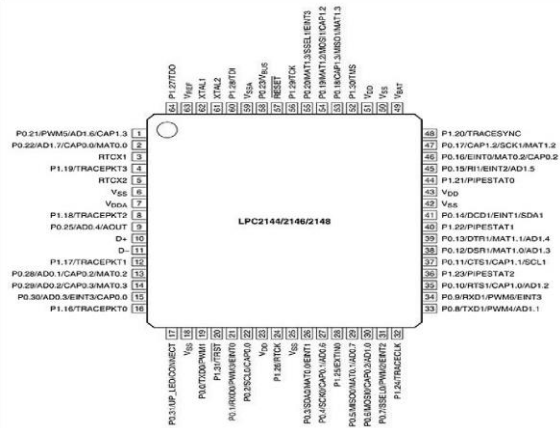


Fig No. 2 ARM TDMI PROCESSOR

2.2LPC2148 Processor Features

16-bit/32-bitARM7TDMI-S microcontroller in a tiny LQFP64 package.8 kobo to 40 kobo of on-chip static RAM and 32 kobo to 512 kobo of on-chip flash memory. 128-bit wide interface/accelerator enables high-speed 60 MHz operation. In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader software. Single flash

sector/full chip erase in 400 nms and programming of 256 bytes in 1 Ms. USB 2.0 Full-speed compliant device controller with 2 kobo of endpoint RAM. In addition, the LPC2146/48 provides 8 kobo of on-chip RAM accessible to USB by DMA. This are One or two 10-bit ADCs provide a total of 6/14 analog inputs, with conversion times as low as 2.44 μ s per channel. Single 10-bit DAC provides variable analog output Two 32-bit timers/external event counters, PWM unit and watchdog. Low power Real-Time Clock with 32 kHz clock input and independent power. Multiple serial interfaces including two UART , two Fast I2C-bus , SPI and SSP with buffering and variable data length capabilities. Vectored Interrupt Controller with configurable priorities and vector addresses. Up to 45 of 5 V tolerant fast general purpose I/O pins in a tiny LQFP64 package. Up to 21 external interrupt pins available.

3.COMPONENT &DESCRIPTION

3.1 Humidity Sensor

The 10HS humidity sensor is measures the dielectric constant of the soil in order to find its volumetric water content . Since the dielectric constant of water is much higher than that of air or soil minerals, the dielectric constant of the soil is a sensitive measure of volumetric water content.

The 10HS has a low power requirement and very high resolution. This gives you the ability to make as many measurements as you want over a long period of time with minimal battery usage.



Fig No. 3 Humidity Sensor

3.2 Temperature Sensor (LM 35)

The LM35 series are accuracy integrated-circuit temperature sensor, whose voltage is linearly proportional to the Celsius temperature. The advantage of LM35 over linear temperature sensors calibrated in $^{\circ}$ Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain

convenient Centigrade scaling. The LM 35 provide typical accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a full -55 to $+150^{\circ}$ temperature range .It is low cost is assured by timing at the wafer level .The LM35 is low output impedance, linear output and precise inherent calibration make interfacing to read out or control circuitry especially easy. It can be used with single power.

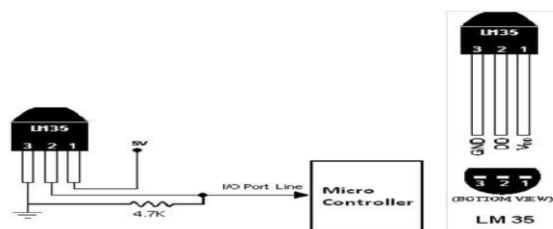


Fig No. 4 Temp Sensor

3.3 Rain Gauge

A rain gauge has several components that allow it to accurately measure of rainfall. As rain falls it lands in the funnel of the tipping bucket rain gauge. The rain travels down the funnel and drips into one of two very carefully calibrated „buckets“ balanced on to get the most accurate results from a bucket rain gauge, you need to properly install the rain gauge as follow:



Fig No. 5 Rain Gauge Sensor

1. The rain gauge must be positioned on a flat surface – if the surface isn't flat, the see-saw may tip before the bucket has filled to the calibrated level, or not tip at all. The rainfall calculated will not be correct. Use a self level to determine whether a surface is flat, and then fix the gauge to the flat surface to ensure you are getting an accurate reading.
2. The rain gauge must be positioned on a surface that does not vibrate – surfaces such as a porch or fence can move and vibrate. The tipping bucket is very sensitive and any vibrations could cause the gauge to tip even if it is not raining.
3. The instrument must not be positioned near trees – being positioned near trees could allow leaves or pollen to fall inside the funnel and block it, causing an inaccurate reading.
4. It must not be positioned in a sheltered area – Being positioned in a sheltered location (such as beside your house

or a fence) could significantly increase or decrease the amount of rain depending on the wind direction, and cause an inaccurate reading. The gauge should be positioned at least twice as far away from the object as the object's height (e.g. if the fence is 6 feet high, the gauge should be positioned at least 12 feet away).

5. Your weather equipment must not be located near any magnetic, steel, or iron objects. Magnetic, steel, or iron objects can affect the amount of time the magnet will hold the bucket or whether it will hold it all, causing an inaccurate reading.

3.4 GSM Module(GSM900)

GSM network is divided into 3 major systems, the Switching subscriber related function. The base station subsystem is the section of a traditional cellular telephone network which is responsible for handling traffic and signaling between a mobile phone and a network switching subsystem. The BSS carries out the transcoding of speech channels to phones, paging, transmission system, Base Station System and Operation and Support System. The switching system is responsible for call processing and reception over the air interface and many other tasks related to the radio network. The base transceiver station or, BTS, contains the equipment for transmitting and receiving radio signals, and equipment for encrypting and decrypting communication with the base station controller.



Fig No. 6 GSM Modules

3.5 DISPLAY UNIT:

LCD (Liquid Crystal Display) screen is an electronic display module and finds a wide range of applications. A 16x2 LCD display is a very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven-segment and other multi-segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven-segments), animations and so on. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD, each character is displayed in a 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to the LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on

the LCD. The data is the ASCII value of the character to be displayed on the LCD.

Click to learn more about the internal structure of a LCD.

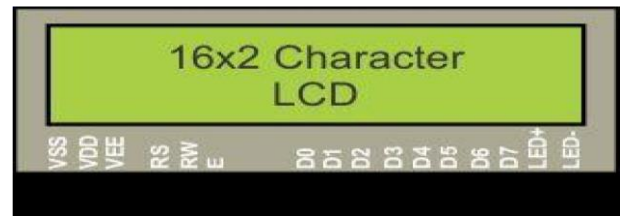
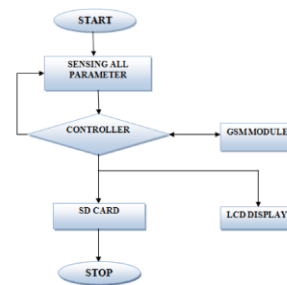


Fig No. 7 Display

3.6 FLOWCHART



4. ADVANTAGES

- This project can be used to save power.
- Implementation of power plants based on renewable energy, such as solar and wind energy.
- Enhanced for monitoring & controlling of atmospheric conditions.

5. DISADVANTAGES

- The component cost is more expensive.

6. CONCLUSION

- By using our system, we are trying to provide environmental information to any consumer without any cost by just giving a missed call. Because of changing environmental parameters, rain count, moisture proportion in soil, fluctuations in temperature and humidity can affect growing crops, so, our module can be used by farmers or anyone who wants to know the exact count of all parameters for adjustment and further precautions.

- Our system provides all reliable data in particular format to official use for INDIAN
- METEOROLOGICAL DEPARTMENT, PUNE

7.FUTURE SCOPE

1. Adding of more sensors to monitor other environmental parameters such as Soil PH Sensor, CO2 and oxygen Sensor while allowing the replacing of current sensors if a wider range of measurements is desired
2. Integration of additional monitoring devices such as a Wi-Fi camera to monitor growth of agricultural product

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