© 2018 IJSRST | Volume 4 | Issue 5 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
Themed Section: Science and Technology

Weather Monitoring Using Wireless Sensor Networks based on IOT

L. Siri Chandana[1], A. J. Raja Sekhar[2]

[1]Department of MCA, Sree Vidyanikethan Institute of Management, Tirupati, Andhra Pradesh, India
[2]Assistant Professor, Department of MCA, Sree Vidyanikethan Institute of Management, Tirupati, Andhra Pradesh, India

ABSTRACT

The system proposed in this paper is a propelled answer for monitoring the weather conditions at a specific place and make the data visible anyplace on the world. The technology behind this is Internet of Things (IoT), which is a progressed and proficient answer for interfacing the things to the web and to associate the whole universe of things in a system. Here things may be whatever like electronic devices, sensors and car electronic hardware. The framework manages monitoring and controlling the natural conditions like temperature, relative humidity, light force and CO2 level with sensors and sends the data to the website page and afterward plot the sensor information as graphical insights. The information refreshed from the actualized framework can be available in the web from anyplace on the world.

Keywords : Internet of Things; Wireless; Wi-Fi; Sensors.

I. INTRODUCTION

The significance of weather monitoring is existed in numerous perspectives. The weather conditions are required to be observed to keep up the solid development in crops and to guarantee the sheltered workplace in enterprises, and so on. Because of innovative development, the way toward perusing the natural parameters ended up less demanding contrasted with the previous days. The sensors are the scaled down electronic gadgets used to gauge the physical and natural parameters. By utilizing the sensors for monitoring the weather conditions, the outcomes will be exact and the whole framework will be speedier and less power devouring. The framework proposed in this paper depicts the executed stream of the weather monitoring station. It incorporates the wireless communication technology IEEE 802.11 b/g which is likewise recognizable as Wi-Fi as a rule terms. The framework screens the weather conditions and updates the data to the site page. The purpose for sending the information to the page is to keep up the weather states of a specific place can be known anyplace on the world. The framework consists of temperature sensor, Co2 sensor, Humidity sensor and light ward resistor. These sensors can gauge the relating weather parameter. The framework is expected to use in extensive private structures and assembling ventures. The framework is incorporating with a microcontroller to process every one of the tasks of the sensors and different peripherals. The wireless communication standard was picked in our framework by investigating the necessities of the application that the weather conditions ought to be checked and refreshed all the time consistently. There are numerous neighborhood benchmarks for communication, yet they are all independent communication forms and totally confined communication. In our application, we need to influence the weather state of a specific place to can be useful anyplace around the world. The other communication technologies like ZigBee, RF Link can make the communication almost in a similar scope of Wi-Fi however they can't communicate the data as they can just convey distributed. The World Wide Web (www) needs one customer – server design for

communication. It customer should be associated with the server with its IP address which can be all around open. The framework is furnished with all sensor gadgets should goes about as customer to send the information to the web server. For building up an association between the sensor system and web, we utilized a Wi-Fi module as an extra communication interface controlled by the microcontroller. A Wi-Fi module requires a wellspring of wireless web association. Once arranging the Wi-Fi module with a web source, it goes about as customer and sends the sensor information recovered by the microcontroller. The criteria of associating every one of the sensors to the web are Internet of Things (IoT).

Internet of Things (IoT): It is the future technology of associating the whole world at one place. Every one of the items, things and sensors can be associated with share the information acquired in different areas and process/examinations that information for planning the applications like activity flagging, mobile health monitoring in medicinal applications and modern security guaranteeing strategies, and so on. According to the estimation of mechanical specialists, 50 billion articles will be associated in IoT by 2020. IoT offers an extensive variety of network of gadgets with different protocols and different properties of uses for acquiring the total machine to machine cooperation. The customary technologies like home computerization, wireless sensor systems and control frameworks will turn out to be more productive and quicker witted because of contribution of IoT. IoT is having an extensive variety of use zones. For example, Medical applications for monitoring the strength of a patient and sends the data wireless. The present creating Wearable instrumentation is additionally in view of IoT. The illustration wearable instrumentation is Smart wrist groups, route pills, and so forth. These strategies require a web interface to refresh the health information or to control the gadget with an advanced mobile phone. The IoT additionally assumes an imperative part in media applications for promoting and trading the data around the world. The assembling forms additionally require IoT for production network service, computerized control frameworks for monitoring the assembling forms. The space necessities of IoT technology, the geological particulars are constantly imperative if there should be an occurrence of following applications. The topographical measurements of items are likewise imperative while acquiring the information from the articles. IoT in vehicle applications and movement support turned into a most utilizing zone of mechanization. The mechanized gadgets in a vehicle ought to be associated with a cloud to refresh the auto health inside a timeframe. By associating the vehicles and activity flagging frameworks to the web, individuals can without much of a stretch locate the most limited way for their goal from the movement monitoring frameworks and can explore naturally by monitoring every single other heading.

II. Literature Survey

The review has right off the bat done on wireless advancements to set up a Wireless sensor arranged. Study continued picking the reasonable wireless technology. It ought to be reasonable in all angles like financial and innovative. The essential concern we need to make while picking the specialized technique is scope of communication. Here we have picked 802.11 b/g Wi-Fi. When we are giving a web source, the information can be traded anyplace on the world through its IP address. The further investigation has done on choosing the microcontroller. The framework execution is contained with a concealed objective of accomplishing low power consumable arrangement. The microcontroller ought to be likewise low power devouring close by all the rest of the sensors additionally low power expending. We have picked LPC2148 which is low power microcontroller and works with just 3.3v. The following examination went on the information lumberjack strategies on site page. The information gathered from the sensors is

generally as whole number esteems speaking to the estimation of natural parameter. The site page showing the information of sensors straightforwardly won't establish a less complex connection for the clients. It ought to be in a graphical portrayal for simple comprehension of the clients. The information facilitated on a claim site page will be more costly and need to pay for it in a rental premise. To make the framework more affordable, we favored some free information facilitating sites that gives a cloud space to our sensor information to make it general and furthermore makes the framework more affordable.

III. System Architecture

The implemented framework consists of a microcontroller (LPC2148) as a fundamental preparing unit for the whole framework and all the sensor and gadgets can be associated with the microcontroller. The sensors can be worked by the microcontroller to recover the information from them and it forms the examination with the sensor information and updates it to the web through Wi-Fi module associated with it.

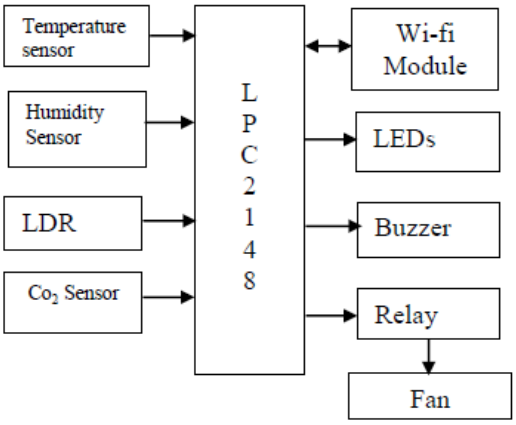

Fig 1: Block Diagram

In the above block diagram, there it is demonstrating the principle components in the proposed framework.

LPC2148: The microcontroller utilized as a part of this framework LPC2148 is a powerful decision for the actualized framework. As our proposed framework is a low power consumable arrangement, the microcontroller ought to be additionally low power expending. LPC2148 is having 8 channels Analog to Digital converter which will be a noteworthy favorable position with this microcontroller to get the information from the simple sensors associated with it. It is having such huge numbers of highlights on chip.

Wi-Fi Module: Here we utilized ESP8266 Wi-Fi module which is having TCP/IP protocol stack coordinated on chip. So it can furnish any microcontroller to get associated with Wi-Fi organize. ESP8266 is a prearranged SOC and any microcontroller need to speak with it through UART interface. It works with a supply voltage of 3.3v. The module is arranged with AT orders and the microcontroller ought to be customized to send the AT orders in an expected grouping to design the module in customer mode. The module can be utilized as a part of both customer and server modes. When it gets associated in a Wi-Fi organize, we'll get one IP address which is available in its nearby system. The module is moreover having 2 GPIO sticks close by UART pins. It is additionally having inbuilt SPI protocol by utilizing the two pins of UART as information lines and by arranging the two GPIO sticks as control lines and clock flag. It is additionally having 1MB on-chip streak memory. Inside it is having power service unit with all controllers and PLLs. The on-chip processor it is having is a 32 bit CPU.

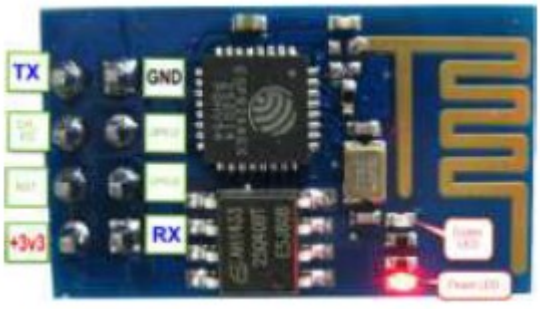

Fig 2: ESP8266 Pin Details

Sensors: The framework consists of temperature sensor, stickiness sensor, LDR and C02 sensor. These 4 sensors will gauge the essential ecological factors light

power, temperature, Co2 levels and relative humidity separately. These sensors will give the simple voltage speaking to one specific weather factor. The microcontroller will changes over this simple voltages into advanced information.

LEDs: The Light Dependent Resistor will screen the light power of the light force of encompassing condition. In the event that the light force is getting low then consequently the LED lights will gleam with a required power. Utilizing the LED knobs will spare the vitality in homes and ventures. Here we are controlling the force of the LEDs in view of the outside light, with the goal that we can spare more power.

Relay: Relay is utilized to play out the exchanging activities for the AC/DC gadgets. In the proposed framework, relay is utilized to switch the cooling fan. At whatever point the room temperature is getting higher than the breaking point, at that point the cooling fan will be ON consequently through transfer.

IV. Software Implementation

In the proposed framework, the product usage assumes a noteworthy part while recovering the sensor information and refreshing it to the server. Here two software devices we utilized essentially. They are Keil uVision Ide and Flash Magic. The Keil uVision IDE is an inserted software stage which underpins different microcontrollers and gives an entire software condition to the microcontrollers. We utilized this IDE for software the LPC2148 which is a microcontroller with ARM7 TDMI processor. Streak enchantment is a device utilized for composing the machine dialect code into the microcontroller's streak memory. This instrument likewise encourages the extra highlights like terminal window for the equipment gadgets. The whole software piece of the framework should be possible in C dialect. Right off the bat, we need to instate the ESP8266 by sending a couple AT orders. Instatement process incorporates, monitoring the communication with ESP8266 to microcontroller, hunting down a Wi-Fi arrange inside its range and interfacing the Wi-Fi module to that system by getting validated with required accreditations. After the instatement procedure, we need to program for arranging the Wi-Fi module as a TCP/IP customer. While arranging the ESP8266, monitoring the affirmation is vital to guarantee that the module is designed accurately. Subsequent to designing the ESP8266, we need to program for perusing the sensor information. The ADC (Analog to Digital Converter) unit should design with all essentials like clock recurrence, determination and information arrange. At that point the microcontroller will run the direction constantly to get the refreshed information esteems from sensors. Presently the real undertaking has touched base in dialog, i.e. plotting the sensor information in a graphical frame. Here we have to experience some sort of a systems service condition, where we have to manage IP address communication. As we specified in the before parts, we utilized one open source information lumberjack site to make decrease the usage cost. Ordinarily, on the off chance that we need to plot the information into site, we have to possess and pay for the area space and outline the website page according to our necessities, which is mind boggling and costlier strategy. Rather than paying for a possess space, we utilized one site called "Thingspeak". It gives a free client space to making the information channels. Each channel will have 8 fields to compose the different information and it naturally plots the given information in a graphical portrayal. The communication with Thingspeak server should be possible by utilizing its IP address. We need to program for ESP8266 to send the required AT charges and to build up an association between the framework and thingspeak server. When we made once channel for entering the information into site, the channel will be assigned with one API key. So we need to compose the API key before composing the real information, at that point the information will be put away and showed in the required channel. The accompanying

pictures demonstrate the case plot of temperature and light power appearing in the channels.

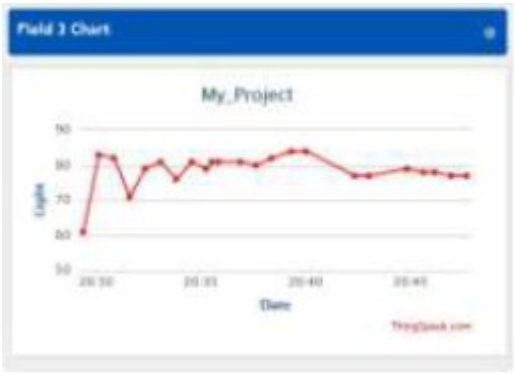

Fig 3: Light Intensity Plot

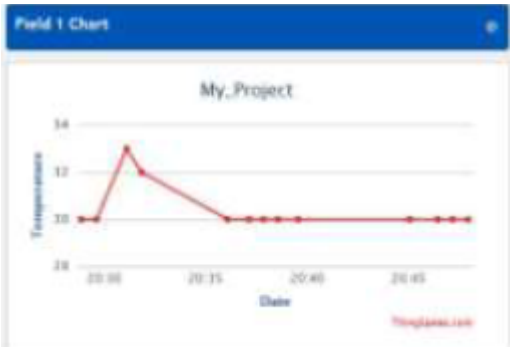

Fig 4: Temperature plot

In this proposed framework, we have made one thingspeak channel and utilized 4 fields in it. The four fields can store and plot the information relating to the 4 sensors. The genuine information acquired from the sensors will be first put away in a content and after that the thingspeak server will consequently plots the information recovering from the field which we have entered a number information of sensor yield. The foundation content of the channel information can be traded in different arrangements for additionally utilize and it can be appeared as following in XML format.

Fig 5: XML view of channel data

V. System Functionality

The framework usefulness includes the working procedure of the whole framework after integrating all the peripherals alongside software. The framework works in three stages, one is perusing the information from the sensors, and another is sending the information to the "thingspeak" server lastly controlling the gadgets according to the information got. The framework can likewise plays out the controlling assignments for a prompt activity with respect to the sensor yield. At first the Wi-Fi module will be arranged in customer mode, at that point the sensors will be checked and perused by the microcontroller. The temperature sensor and LDR will give the qualities persistently which is required to control the fan and light in light of the qualities. In the event that the temperature is expanded upon the range, instantly fan will be ON to control the temperature. Also, if the light is getting dull, instantly, the LED knobs will be ON. Likewise the staying two sensors additionally checked and refreshed constantly, yet the humidity and Co2 are the uncommon factors in the weather thought, so we are perusing the information from these two sensors when is it getting high or low than as far as possible. For instance, if the relative moistness noticeable all around is more 35 degree Celsius, sensor gives the information as rationale 1 (High) generally rationale 0 (Low). Similarly, Co2 sensors likewise give the information 1 or 0 in view of Co2 levels in air. The acquired sensor esteems will be sent to the thingspeak server and a plot can be attracted the channel by considering the given sensor esteems as Y hub and time and date as X pivot. The main confinement in refreshing the qualities is one field can be refreshed once for 15 seconds. It can't be refreshed in excess of one time inside a period traverse of 15 seconds. So it won't be an issue while perusing the information from the sensors. All the simple sensors at any rate sets aside time for perusing the physical parameter and process it.

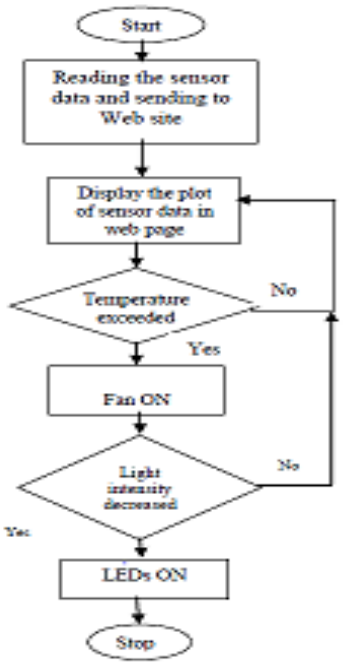

Fig 6: Flow Diagram

The whole working flow of the framework is appeared in the above graph.

VI. Conclusion

The examination and execution of a framework for monitoring the natural parameters utilizing IoT situation is expert. The framework gives a low power answer for setting up a weather station. The framework is tried in an indoor condition and it is effectively refreshed the weather conditions from sensor information. It is likewise a more affordable arrangement because of use of low power wireless sensors and SoC contained Wi-Fi module.

VII. REFERENCES

[1]. S. Folea, G. Mois, L. Miclea and D. Ursutiu "Battery lifetime testing using LabVIEW", Proc. 9th Int. Conf. Wireless Eng. Virtual Instrum. (REV), pp.1 -6

[2]. D. Larios, J. Barbancho, G. Rodr guez, J. Sevillano, F. Molina and C. Le¿¿n "Energy efficient wireless sensor network communications based on computational intelligent data fusion for environmental monitoring", IET Commun., vol. 6, no. 14, pp.2189 -2197 2012

[3]. J. Ko, C. Lu, M. B. Srivastava, J. A. Stankovic, A. Terzis and M. Welsh "Wireless sensor networks for healthcare", Proc. IEEE, vol. 98, no. 11, pp.1947 -1960 2010

[4]. C. H. See, K. V. Horoshenkov, R. A. Abd-Alhameed, Y. F. Hu and S. Tait "A low power wireless sensor network for gully pot monitoring in urban catchments", IEEE Sensors J., vol. 12, no. 5, pp.1545 -1553 2012

[5]. T.Sanislav and L. Miclea "An agent-oriented approach for cyber-physical system with dependability features", Proc. IEEE Int. Conf. Autom. Quality Testing Robot. (AQTR), pp.356 -361

[6]. F.-J. Wu, Y.-F. Kao and Y.-C. Tseng "From wireless sensor networks towards cyber physical systems", Pervasive Mobile Comput., vol. 7, no. 4, pp.397 -413 2011

[7]. S. Tozlu, M. Senel, W. Mao and A. Keshavarzian "Wi-Fi enabled sensors for internet of things: A practical approach", IEEE Commun. Mag., vol. 50, no. 6, pp.134 - 143 2012

[8]. "Indoor air facts no. 4 (revised) sick building syndrome", 1991 online] Available: http://www.epa.gov/iaq/pdfs/sick_building_facts heet.pdf

[9]. S. Sharma, V. N. Mishra, R. Dwivedi and R. R. Das "Quantification of individual gases/odors using dynamic responses of gas sensor array with ASM feature technique", IEEE Sensors J., vol. 14, no. 4, pp.1006 -1011 2014

[10]. Xively. Xively Is the Public Cloud Specifically Built for the Internet of Things., online] Available: https://xively.com/whats_xively/

[11]. H. Yang, Y. Qin, G. Feng and H. Ci "storage and leakage based on wireless sensor networks", IEEE Sensors J., vol. 13, no. 2, pp.556 -562 2013

and Temperature Transmitter 3008-40-V6., online] Available:
[12]. Sensor Moves Into Volume Production., online] Available: http://www.enocean-alliance.org/en/gss-seamless-sensingco2- sensor-moves-into-volume-production
[13]. V. Jelicic, M. Magno, D. Brunelli, G. Paci and L. Benini "Context-adaptive multimodal wireless sensor network for energy-efficient gas monitoring", IEEE Sensors J., vol. 13, no. 1, pp.328 -338 2013
[14]. Programmable System-on-Chip (PSoC)., 2014 online] Available: http://www.cypress.com/?docID=49257
[15]. RN-131G & RN-131C 802.11 b/g Wireless LAN Module., 2012 online]

About Authors:

Ms.Lingamgunta Siri Chandana is currently pursuing her Master of Computer Applications, Sree Vidyanikethan Institute of Management, Tirupati, A.P

Mr. A.J.Rajasekhar is currently working as an Assistant Professor in Master of Computer Applications Department, Sree Vidyanikethan Institute of Management, Tirupati, A.P.