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IoT Based Weather Monitoring System using Raspberry Pi

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Abstract - *Weather condition plays an very important role in our daily life. Collecting of data about the different parameters of the weather is necessary for planning in home and environments. Recent developments in Internet of Things made possible to collect the data. In this system some digital as well as analogue sensors like DHT11, BMP180, LDR and marked scale with ULN2803 are used for environmental parameter measuring. This data from input sensors is then read by server that is Raspberry Pi itself and stored in CSV as well as text files. The sensors gather the data of various environmental parameters and provide it to Raspberry PI which act as a base station. The Raspberry PI then transmits the data using WIFI and the processed data will be displayed on laptop through accessing the server that is on the receiver side.*

Key Words: Embedded System, Raspberry Pi, IoT, HTTP

1. INTRODUCTION

Weather or Climate is important part of human life. Sensors are essential components not only applicable to the industries for process control but also in daily life for safety of building's and traffic flow measuring, environmental parameters measurement.

IoT means Internet of Things. It provides inter-networking of physical devices, buildings, vehicles and other components like sensors and actuators. By giving network connectivity to systems embedded with electronics, software, sensors and actuators; these objects are able to collect and exchange data. By using IoT objects to be sensed or controlled remotely through existing network. It gives opportunity to connect physical world with computer-based systems. IoT improves efficiency, accuracy, economic benefits along with reduced manpower.

IoT frameworks help for the interaction between "things". Also supports for more complex structures like distributed computing and development of distributed applications. Now a days most of IoT frameworks seem to focus on real-time data logging solutions. The data of the measured parameters are not useful if they are not transmitted fast and accurate manner to the users. Therefore, transmitted and processing the measured data is a very important aspect of the modern weather forecast. Transmission of the measured data could be done by a number of means: WI-FI link, GSM/GPRS link, satellite link direct, wired link, etc. Weather forecasting has to be reliable and accurate, regardless of its application.

Also, it has to provide simple access to all the measured parameters. The quality of sensors and precision of measurements may vary, and the location of weather forecasting station can determine the accuracy and reliability of the weather data collection. Raspberry Pi, acting as data logger process the converted output of sensors from analog to digital. The logged data can then be transferred to a desktop or any other monitor has GUI for further analysis. So by using easily obtained components and less complicated circuitry powerful weather station can be build Now a day's various weather factors like wind and many other cause great impact on humans day to day life.

1.1 Internet of Thing (IoT)

An IoT platform facilitates in developing, deploying, and managing IoT and M2M applications. It also automates processes and manage network connections, storing of the data collected from the sensors, connecting and controlling your devices, and analyzing the data. Another popular application of IoT is media applications where it serves as a platform to advertise and exchange of information worldwide. In manufacturing processes, IoT is effective for supply chain management, monitoring the manufacturing processes.

The space requirements of IoT technology, the geographical specifications are always important in case of tracking applications. The geographical dimensions of objects are also important while obtaining the data from the objects.

IoT in automobile applications and traffic maintenance became a most using area of automation. The automated devices in a vehicle should be connected to a cloud to update the car health within a period of time. By connecting the vehicles and traffic signaling systems to the internet, people can easily find the shortest path to their destination from the traffic monitoring systems and can navigate automatically by checking all other directions. By connecting this weather station to the internet, the IoT can be made much more extensive in predicting and knowing the weather data in particular place. The mobile app and thing speak database to store and share the weather data are key ways to associate the weather station with the internet of thing. IoT applications gather more data compared to traditional batch processing. Having capabilities for

streaming data continually is key to reliably feeding real-time business processes and extracting timely insights.

2. Block Diagram

Raspberry pi is the latest wireless technology .Proposed System will visualize and store various weather parameters as given above with the help of sensors interfaced to Raspberry will get all data, SD card on Pi stores the collected data as like memory card. Then at the output side LCD is to be connected for showing the result and on off relays for server access.

Also 5V, 1A power supply is given to the Raspberry Pi board through micro USB slot. An SD card of 8GB is used to store the operating system as well as all programs and files needed for this project. Keyboard and mouse is connected to the Raspberry Pi board through USB ports. Monitor is connected to the Raspberry Pi board through HDMI port using HDMI to VGA cable. Ethernet port is used to give internet connection to the system via LAN.

To know the current weather status at remote location, the user can to log in on web browser by entering username and password given for particular server by the user. Web application opens after entering password and with the output graphical representation also obtain. Raspberry pi processed data will updated continuously on cloud server & user will get to know the stored data on hourly and daily basis.

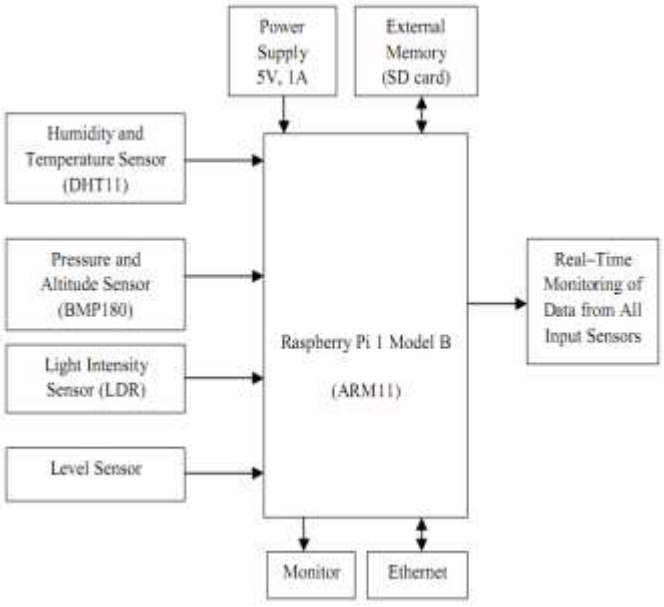

Figure 1: Block diagram of overall system

This item is the Raspberry Pi Model B, revision 2.0, which has 512 MB of RAM, an Ethernet port, HDMI output, RCA composite video output, audio output, two USB ports, and 0.1″-spaced pins that provide access to general purpose inputs and outputs (GPIO). The Raspberry Pi requires an SD card with an operating system on it (not included). The Raspberry Pi is very popular, with lots of example projects and information available online.

3. Hardware Components

3.1 Development board

Raspberry PI is a card-sized ARM powered Linux computer development board. There are in total of 5 types of various board with different specification, for the proposed Weather forecasting system Raspberry PI 2 model B is used as the main development board which is shown in Figure-2.

Figure 2: Raspberry PI model 2 board.

The raspberry pi consists of four USB Ports and one 10/100 Base T Ethernet Socket. Forty pins GPIO Header are present in the raspberry pi board which is used for connecting to Analog to Digital converter chip (MCP3008) to which the sensors are connected. A 5V Micro USB power port is present to which the power supply is given for the device. A HDMI port is present through which interfacing of the monitor and the Raspberry pi can be done and the USB ports for the keyboard and mouse interfacing. At the bottom a Micro SD Card Slot is provided where the Micro SD card is to be inserted with the Raspbian Jessie botting software which based on the Linux platform. The GPIO pins have different uses individually such as power supply, ground, clock, UAR

4. SOFTWARE DETAILS

4.1 Raspbian

Raspbian is a Debian-based computer operating system for Raspberry Pi. Since 2015 till now it is ofcially provided by the Raspberry Pi Foundation as the primary operating system for the family of Raspberry Pi single-board computers.

Raspbian was created by Mike Thompson and Peter Green as an independent project.

The initial build was completed in June 2012.The operating system is still under active development. Raspbian is highly

optimized for the Raspberry Pi line's low-performance ARM CPUs.

Raspbian uses PIXEL, Pi Improved Xwindows Environment, Lightweight as its main desktop environment as of the latest update. It is composed of a modified LXDE desktop environment and the Openbox stacking window manager with a new theme and few other changes. The distribution is shipped with a copy of computer algebra program Mathematical and a version of Mine craft called Mine craft Pi as well as a lightweight version of Chromium as of the latest version.

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.

The initial build of over 35,000 Raspbian packages, optimized for best performance on the Raspberry Pi, was completed in June of 2012. However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible

Developer Raspberry Pi Foundation
- OS family: Unix-like
- Source model: Open source
- Latest release: Raspbian Jessie with PIXEL / 16.02.2017
- Marketing target: Raspberry Pi
- Update method: APT
- Package manager: dpkg
- Platforms: ARM
- Kernel type: Monolithic
- Userland: GNU
- Default user interface: PIXEL, LXDE
- License: Free and open-source software licenses (mainly GPL)

5. CONCLUSION

Weather prediction is a very important factor, which forecasts the climate in a region based upon the values of weather parameters. So the calculated results from this system can be made use in forecasting the weather of that locality for a period of time. As we made use of Raspberry pi in this model, immediate alert message or e-mail can be sent to the mobile phone, when the parameters changes are drastic. The technology changes day by day. Using the sensors for air temperature, air humidity, light, soil moisture, and rain detection in combination with Raspberry PI a prototype had been developed. Data from the sensors is transmitted to sever where it can be viewed globally which will be easily accessible to everyone. This IoT based system gives real-time monitoring of environmental parameters. This system monitors temperature, humidity, pressure, altitude, light intensity and rain water level. Data can be seen from anywhere in the world. By using this system the client can continuously monitor different environmental parameters without any interaction with additional server.

REFERENCES

[1] Deshmukh A. D. & Shinde U. B. 2016, August. A low cost environment monitoring system using raspberry Pi and arduino with Zigbee. In: Inventive Computation Technologies (ICICT), International Conference on. 3: 1-6. IEEE.

[2] Jindarat S. & Wuttidittachotti P. 2015, April. Smart farm monitoring using Raspberry Pi and Arduino. In: Computer. Communications and Control Technology (I4CT), 2015 International Conference on. IEEE. pp. 284-288.

[3] Savić T. & Radonjić M. 2015, November. One approach to weather station design based on Raspberry Pi platform. In: Telecommunications Forum Telfor (TELFOR), 23rd. IEEE. pp. 623-626. Nikhil Ugale, Prof. Mahesh Navale, "Implementation of IoT for Environmental Condition Monitoring in Homes", International Journal For Engineering Applications And Technology (IJFEAT) – Feb 2016.

[4] Tamilarasi B, Saravanakumar P, "Smart Sensor Interface for Environmental Monitoring in IoT", International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) - Volume 5, Issue 2, February 2016.

[5] Arko Djajadi, Michael Wijanarko, "Ambient Environmental Quality Monitoring Using IoT Sensor Network", Internetworking Indonesia Journal (IIJ) - Vol.8/No.1 (2016).

[6] International Journal of Computational Science, Mathematics and Engineering, Volume 2, Issue 2, February 2015 "Weather Monitoring Systems in Hazardous Zones Survey".

[7] International Journal of Embedded Systems a Applications (IJESA) Vol.2, No.3, September 20DOI : 10.5121/ijesa.2012.2311 "WEATHER MONITORING STATION WITH REMOTERAD FREQUENCY WIRELESS COMMUNICATIONS"

[8] KESHAV KUMAR SINGH, Department of Electronics and Communication Engineering National Institute of Technology "DESIGN OF WIRELESS WEATHER MONITORING SYSTEM".

[9] International Journal of Computer Science, Vol. (1) 'Design of ARM based Embedded Web Server for Agricultural Application'.

[10] DeHennis, A. D., and K. D. Wise. A wireless microsystem for the sensing of temperature, and relative humidity. Journal Micro elect.