

Wireless Point to Point Data Transmission for Data Acquisition

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ABSTRACT: In industry monitoring of system and data acquisition for a system is done manually. Now the technology has developed. Aim of this paper is to get the data acquisition report of a system for day, week and month automatically using wireless technology. Temperature data is collected through a sensor and it is given to a system and stored in database using wireless technology. Data is transferred from one point of the system to a server at a different location using Wi-Fi and automated report of temperature data is generated.

KEYWORDS: Wireless Sensors; Wi-Fi; Temperature; Data Transmission; Database.

I. INTRODUCTION

In earlier days temperature measurement and database management was done manually. The worker will have to take temperature readings every hour and keep a record this is not real time and is also very time consuming. There was no proper database maintenance for data acquisition. In a big industry various temperature units will be spaced by a larger distance and record keeping will be a tedious job for a worker.

In this paper a real time data transmission and database management system is implemented using wireless technology. Unlike the older systems temperature measurements are transmitted automatically and real time database is updated periodically using Wi-Fi technology. An automated data acquisition report is generated for day, week and month. Here we discuss how the data is transmitted automatically from one location of industry to server and the database is maintained for each data at equal time intervals. This method doesn't require any human intervention to carry measured data from one location to another location; once data is measured it will be sent from system to database server using Wi-Fi technology. The future work of this project involve building an Android application that will show a report generated by the microprocessor. This report can be checked in real-time using the app and it is more convenient and efficient than the conventional method.

II. SYSTEM OVERVIEW

Here we explain the overview of the system. In this system there are two sections. One is system side and other is database side. In system side they include sensing of data and transmission of data. In database side they include collection of data and report generation. Temperature value is measured using wireless sensors. IR wireless sensors are used to measure the temperature value for each and every minute (time is based on requirement). The sensed values are converted to digital value and transferred to system. An application is developed to receive the data from sensor.

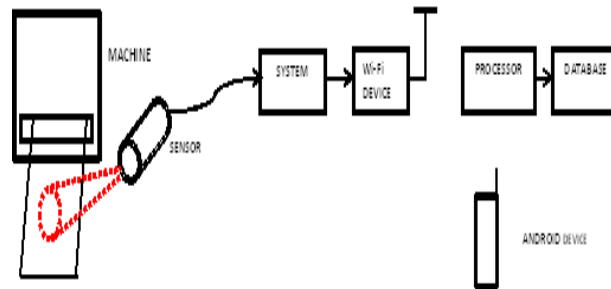


Fig. 1. Overall System Block diagram

Fig .1 shows how the temperature value is obtained and transferred to system. From the machine the value is sensed by IR sensor and the value is transferred to the system, from system the digital value is transferred over Wi-Fi to the processor where they are collected and stored in the database. From the database the report generated by processor are checked over the android device.

The application will receive the sensed data transferred from one point to other point. Wi-Fi device is connected through system which will send the data to server wirelessly. The data received in the application is programmed to transfer via serial port to Wi-Fi device. WI-FI device is programmed to collect data from serial port and transfer it. The program running on the system will automatically transfer it once the digital data is received by application to COM port where Wi-Fi device will be connected and the automated program will detect the COM port to which device is connected. There is a serial convertor through which Wi-Fi device is connected and data is sent serially. They can also be connected to RS232 pin. The Wi-Fi device will act both as station and receiver. Once the data is transferred it is collected by a processor and stored in data base. The report will generated by application running on the processor. The application will generate the report based on user for day, week or month. An android application is to be developed to access the data base and check the report from their smart phone through Wi-Fi.

III. SOFTWARE IMPLEMENTATION

The system has to be implemented combining both software and hardware. In software implementation an application is first developed and installed in system where temperature readings are collected.



Fig. 2. Serial Port Detection And Data Transmission.

Above figure .2 shows success of opening of serial port after the detection of data transfer and shows confirmation of data transformation is success

International Journal of Innovative Research in Science, Engineering and Technology

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They are developed in way that when the data is sent to system, it collects data and transfer to serial port. After transferring data a program will detect and open the serial port automatically. The figure shows the detection and opening of serial port. Serial port is detected and opened automatically after the data is transferred from system. The serial data has to be transferred from serial port to Wi-Fi device. Then a program takes data from serial port to device and transfers the data. The device will be acting both as the station and receiver to transfer data from system and receive data from sensors and for other needs. Once data is transferred they are received by Wi-Fi device at other end which is connected to processor. The processor is programmed to collect data from the device serially. It is programmed in a way that it will check for incoming every minute to collect data from device and store it in database. Once the data are stored in data base a report will be generated according to the program and according user input value from android device.

IV. HARDWARE IMPLEMENTATION

Hardware implementation is comparatively simple. Only few hardware components are required for the point to point data transmission. Wi-Fi device is converted into a serial transmitter by connecting a FTDI.

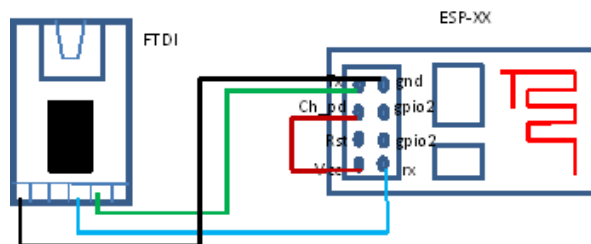


Fig. 3. Pin connection of ESP and FTDI

Above figure. 3 shows how connections are made between ESP and FTDI .The connections are made accordingly between ESP and FTDI

- FTDI RX to ESP-xx
- TDI GND to GND
- ESP-xx GND to G
- TDI CP_PD to TX
- FTDI TX to ESP-xx RX
- ESP-xx GND to GND

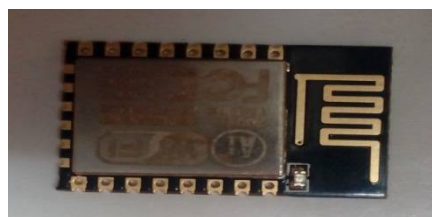


Fig. 4. ESP-XX.

Above Figure.4 shows the industry outcome structure of product ESP-XX Wi-Fi device and how it looks in market.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

FTDI TX is 5V which needs to be brought down to 3.3v. This is done with a voltage divider. FTDI RX can be connected to ESP-xx TX directly. The FTDI will accept the 3.3v signal from the ESP-xx as HIGH.

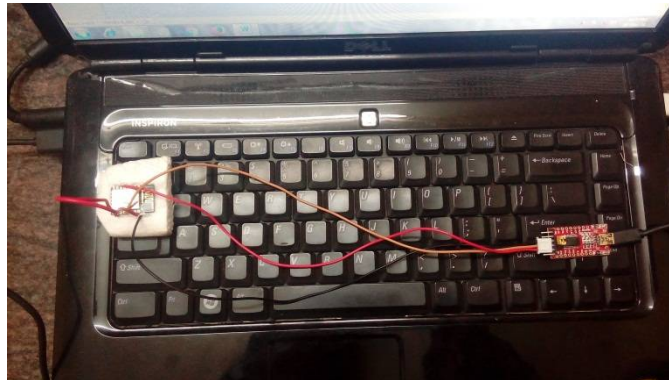


Fig. 5. Wi-Fi and FTDI connection

Above figure. 5 shows how the connection are made between the ESP and FTDI product for sending data from system to database serially and to receive data serially.

It is common that a 3.3v out on the Arduino is used to power the ESP-xx but the Arduino cannot really provide enough power and may damage the components. Plug the FTDI adaptor in to an usb port on your computer and power up the ESP-xx. The power LED on the ESP-xx should come on. Once Wi-Fi device connected we have to make the connection to processor so that the processor has to receive wirelessly transmitted data automatically to transfer it to data base.

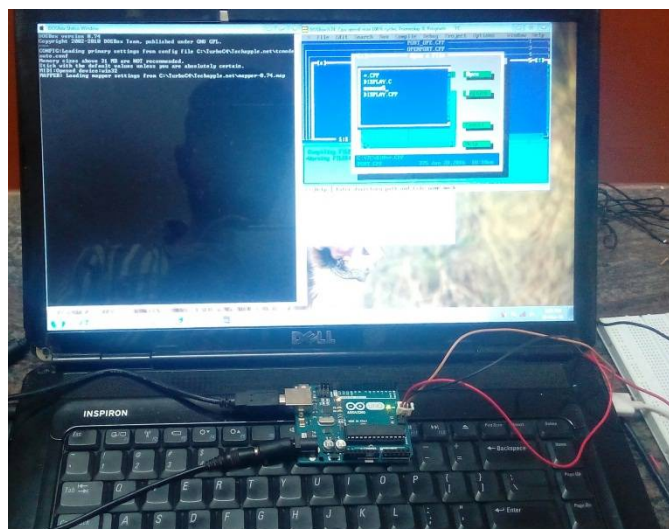


Fig. 6. Arduino Connection

Above figure.6 shows how the data are collected using Wi-Fi and stored in database and how the arduino connection are made between the system and arduino.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

Then we have to make hardware connection for arduino to connect to system to receive and store values in database. Arduino Wi-Fi Shield is used to connect board with Wi-Fi. After connectivity with Wi-Fi, one can perform many tasks using this shield. We can build a complete server on it and can also use it as a client. Servers designed on an Arduino Wi-Fi Shield are usually quite simple as it doesn't have much processing power to support heavy server. Once they are connected to receive Wi-Fi data they will receive the data. They are connected to receiving pins and they monitored and store data to data base after receiving.

V. RESULT

We used the SQLite database to store data sent from one point of the location where the temperature readings are measured. The values are stored in digital format in database and figure 7 shows one unit's temperature value and how they are stored in database. The database contains time, date, and temperature value, deviated and compensated temperature values. These values from the database are taken by the processor to generate the report. Figure 8 shows comparison of different temperature readings of the particular day. The general analysis of temperature for one day is shown in graph.

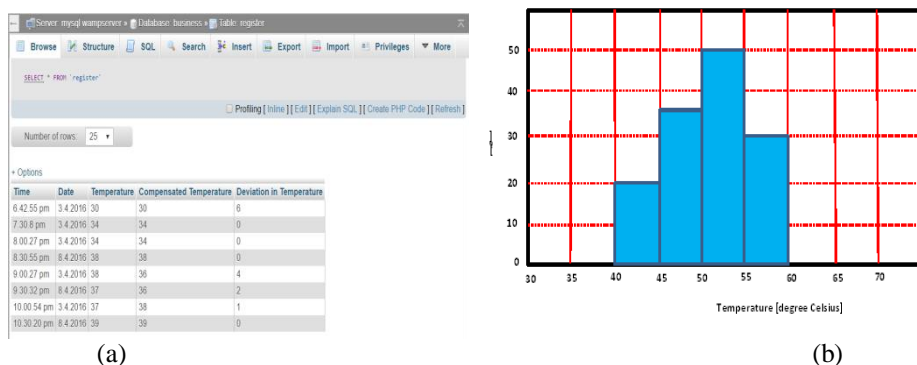


Fig. 7. Result (a)Database of the day (b)Analysis graph of a day

Above figure. 7.a shows the database that is containing the collected temperature data and deviated data for particular day and second figure 7.b shows the comparison graph for particular day report.

VI. CONCLUSION

We have accomplished point to point data transfer and stored it in a database for data acquisition. Then an automated report is also generated for analysis. The future work of this project is to develop an android app to check the report and analysis data from database using wireless method for the convenience of the employees where they can sit at their table and access the information from their smart phone.

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