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Embedded Web Server Based Monitoring System

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Abstract - *With the development of internet and the coming of the post-PC era, the embedded systems is becoming the centre of interest in the current IT industry and exhibiting broad potential market. In the meantime, the access of embedded systems into the internet has become an important direction of the present internet development. By analyzing the adoption of ARM-based embedded Web server, it introduces the design and implementation of its key technical line, and by simulating the application to verify availability of the design finally.*

Current Forest Fire Monitoring Systems make use of PC–based servers. The Appliances in case of Fire Detection and processes in case of Process Monitoring System are interfaced to these servers. As a result, it becomes necessary to keep the servers on all the time, which ultimately increases the producing cost. This shortcoming can be overcome by using an Embedded Web Server in place of a PC-based Server. Embedded Web Server is a single-chip
implementation of the Ethernet networking standard. By embedding Ethernet onto a device, it has the capability to communicate via Ethernet without using a computer. The server enables Web access to the automation and monitoring system and provides a scalable networking solution. The users can browse the home page of the system using web browser and Enquire about their operational status.

This paper proposes a development of such a low-cost electronic prototype, which is designed for monitoring forest fire via web browser. Users can monitor the forest fire situation by setting at the base station.

Key Words: Embedded web; Embedded System; ARM

1.INTRODUCTION

As the world gets more and more technologically advanced, we find new technology coming in deeper and deeper into our personal lives. Web technology is becoming more and more popular around the world and is becoming a common practice. With the help of Embedded Web technology we monitor the forest fire.

Existing an embedded forest fire monitoring and positioning system is designed by the technique of embedded system, 3G wireless communication and GIS. In the field trials, the system achieves forest fire detection at the head end by FPGA and DSP, communicates with the monitoring centre by 3G wireless network. 2D and 3D map of the system are linkage with CCD.

Proposed an embedded forest fire monitoring and positioning system having few embedded forest fire monitoring and positioning system based on machine vision consists of four parts: embedded forest fire detection, 3G wireless communication, positioning system and held terminal. Video image is gathered by CCD. Forest fire is distinguished and warned by embedded forest fire detection module. First, the image de-noising and filtering pre-treatment is processed in FPGA. If fire is found in the video, system sends alarm information, head angle and fire image to the monitoring centre for positioning.

Existing Forest fire monitoring and positioning system is fixed on watch tower. For video image this system must be fixed at very high height from ground. But practically construction of watch tower on mountain is very difficult or almost not possible. Also dithering caused error because of the strong wind on the top of the mountain. In the night time when fire is occurred in forest it is difficult to take video images. In forest there is no 3G service to transfer video image.

To overcome this problem of existing system we design embedded web server based system for forest fire detection which is mount anywhere in the forest. Also node to node data transmission technique covered large area as compared with this existing forest fire detection system. And finally use of Ethernet technology at the base station where Internet is easily available.

2. General Structure of Embedded Web Server

The hardware structure of Embedded Web Server is implemented by using ENC28j60 which is stand alone Ethernet controller, Designing embedded web server based on ARM microcontroller (base station) for monitoring transmitted data from Node1 and Node2. After receiving sensors data, Symmetric Key cryptographic Algorithm is applied at this base station for Decryption of transferred data. Here use same key to decrypt the data.ENC28J60 Ethernet controller, uses SPI protocol for communication .Transmitted sensors data which is stored in LPC2138 to Ethernet Controller.ENC28J60 process this received data and mapped on to the web page. This web page is dynamic web page, Ethernet controller refresh this web page after every two second. Ethernet cable is connected to PC and ENC28J60 to display this web page on PC.

3. Software Implementation

As shown in below fig.1 Web Server contains LPC2138 and JNC20J60 Ethernet controller. Encrypted data which,

transmitted from node1 and node2 to Base station.LPC2138 collect this data through Zigbee and sent to Ethernet controller. JNC20J60 Ethernet controller supports standard Serial Peripheral Interface (SPI).

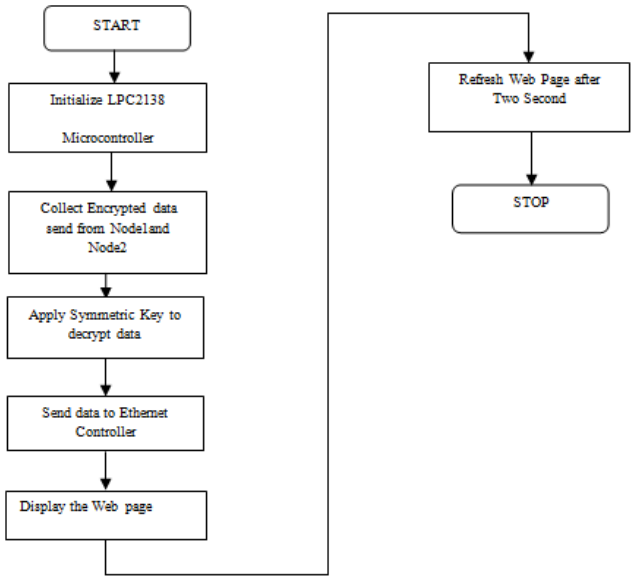

Figure 1: Flow Chart of Web Server

Apply Symmetric Key algorithm to transmitted data. This symmetric key is common to both receiving and transmitting station. Now send this decrypted data to Ethernet controller using SPI protocol. Finally through Ethernet controller, this data is displayed on to the web page which is created using Java script. This web page is refreshing after two seconds

4. Result

Fig2 shows actual Web page is appear on PC and Fig3 shows Output at UART of Base Station (WEB SERVER)

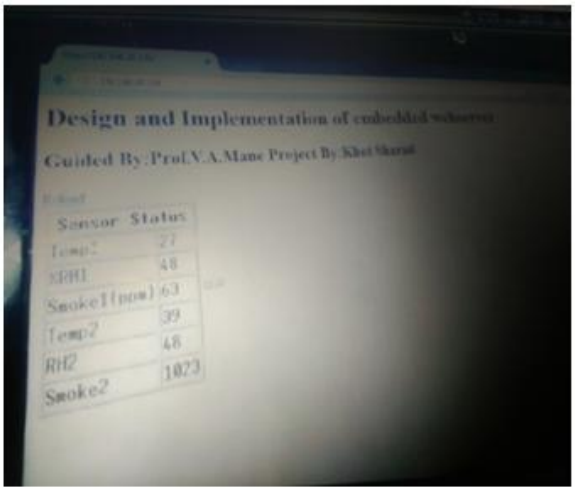

Figure 2: Web Server

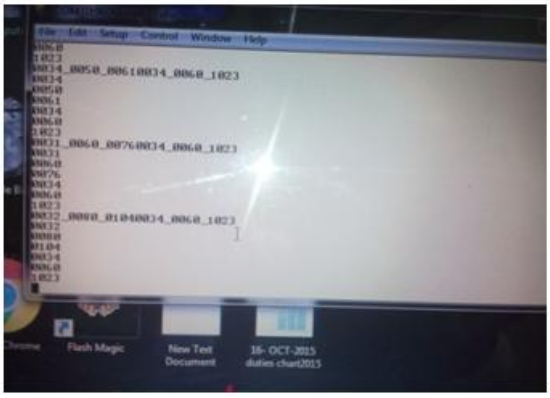

Figure 3: Output at UART of Base Station (WEB SERVER)

5. CONCLUSIONS

An embedded automation and monitoring system is successfully implemented. The proposed system uses an embedded web server which monitors the Forest Environment. The system is accessible from any Computer/Laptop, PDA or Smartphone having internet connectivity. This not only eliminates the need for having a dedicated server PC maintaining the web-pages, but also the need for special software, thus proving beneficial in terms of minimizing cost.

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