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Real Time Video Streaming and Controlling of Robo through PC

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ABSTRACT

The use of video streaming for communication is becoming very popular among social and industrial applications such as video calling Skype, we chat, security system, surveillance system etc. Conventional rate policing such as generic cell rate algorithm is inadequate to sufficiently regulate transmission of data sources over Zigbee limited by bandwidth. Hence, it is very difficult to transmit JPEG pictures over Zigbee channel. This project Graphical Output Presentation Information System presents Omni Eye, a wireless distributed real-time surveillance system composed of wireless smart cameras. Omni Eye is comprised of custom-designed smart camera nodes called DSP cams that communicate using an IEEE 802.11 network. These cameras provide Live Streaming and can be monitored by using pan, tilt and zoom (PTZ).

KEYWORDS: *Camera, Raspberry pi, Video Streaming, JPEG, Wireless protocol. Robot*

I. Introduction

Wireless sensor networks have received lots of attention in recent years. WSN have been applied to multiple fields such as video surveillance, home automation, and health care [13].Video streaming based on wireless networks could be a difficult application. The system is based on Raspberry Pi as the heart of the system. The Images are captured from an onboard camera connected to the robot. The captured pictures are read and are stored by the Raspberry pi by having the SD card inserted to the SD card slot in the Raspberry pi development board. The system comprises of the video monitoring system and controlling of the robot.

The monitoring system is used for video streaming and capturing of required images at a particular instant of time. The JPEG pictures are captured by using the Camera installed to the robot. It is impossible to transmit JPEG pictures over Zigbee channel. In this system we have used Camera (Serial JPEG camera – RS232) with USB cable for capturing pictures and it transmit multiple pictures in one second to receiver in such a way that it look like a video. The image sensor node senses and transmits the variations in the local environment to the central computing unit placed within the range. The receiver receives the pictures and displays continuously on GUI on PC through USB to serial cable which look like a motion picture or video.

II. Block Diagram

A Controller receives image information from vision sensor. This information is transmitted to the coordinator and the transceiver. Now, the nodes Transceiver send a signal to the coordinator

Transceiver to share the information in the wireless network. We take into an account a network of one slave nodes using D-Link module and one master node (sink).Slave node can send the non-heritable information to the master node. The master node is interfaced with computer with the assistance of USB to serial cable. The result can be logged of with the help of GUI on PC. The program of each node is written on embedded C through coder and debugger Keil. Figure 2.1 and Figure 2.2 shown below.

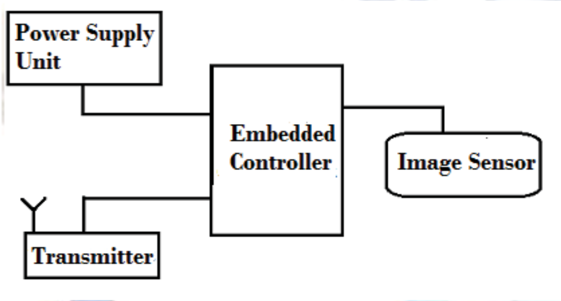

Figure 2.1: Block diagram for video Monitoring System

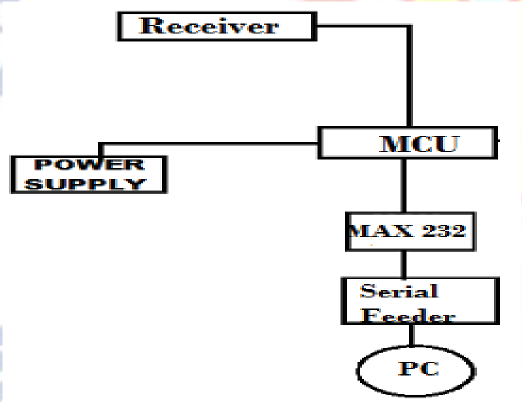

Figure 2.2: Block diagram for display unit

III. Design and Implementation

The monitoring unit captures the image from main unit. This data is fed to the controller. The controller fetches the data and transmits it over the network. The following is the list for the components used in the proposed model:

- Raspberry Pi
- Camera
- D-link
- Robot
- Power supply unit
- GUI Display

A. Raspberry Pi

The Raspberry pi is a series of credit card sized single board computers developed in the United Kingdom by Raspberry Pi Foundation. Several generations of Raspberry Pis have been released. All models feature a Broadcom system on a chip (SoC), which includes an ARM compatible central processing unit (CPU) and an on chip graphics processing unit (GPU). The CPU speed ranges from 700 MHz to 1.2 GHz for the Pi3 and on board memory range from 256 MB to 1 GB RAM.

Secure Digital cards are used to store the operating system and program memory in either the SDHC or Micro SDHC sizes. Most boards have between one and four USB slots, HDMI and composite video output, and a 3.5 mm phone jack for audio. The model that is used to implement this project is having the two USB slots on development board. The figure 3.1 shows the basic view of raspberrypi.

Figure 3.1: Basic view of Raspberry Pi

The Raspberry Pi2 uses a Broadcom BCM2836 SoC with a 900 MHz 32-bit quad core ARM cortex A7 processor with 256 KB shared L2 cache. The raspberry pi2 could be up to 14 times faster than a raspberry pi1. The figure 3.2 shows the view of Raspberry Pi development board.

Figure 3.2: Raspberry Pi Development Board

B. Camera

A camera is an optical instrument for recording or capturing images, which may be stored locally, transmitted to another location, or both. The images may be individual still photographs or sequence of images constituting videos or movies. The camera is a remote sensing device as it senses subjects without physical contact. The functioning of camera is very similar to the functioning of the human eye. The figure 3.3 shows the view of camera used in this project.

Figure 3.3: Logitech camera

Technical Specifications:

- Video capture: Up to 1024 x 768 pixels
- Photos: Up to 5 Megapixels
- Built-in mic with noise reduction
- Hi-Speed USB 2.0 certified
- Universal clip fits Laptops, LCD or CRT monitors

Logitech camera software:

- Pan, Tilt and Zoom controls
- Video and Photo capture
- Face tracking

C. D-Link

D-Link DWA-131 wireless N Nano USB adapter provides superior wireless signal for your computer compared to the existing wireless 802.11g technology. It uses smart antenna technology to transmit multiple streams of data allowing users to receive wireless signals from the farthest corners of their homes. Furthermore, DWA-131 wireless N technology extends wireless range, while maintaining compatibility with all the existing 802.11g wireless routers and access points. With its unique 'Firefly' design and unmatched performance, this ultra-portable USB adapter is an ideal choice for setting up a secure wireless connection. The figure 3.4 shows the view of D-link dongle.

Figure 3.4: D-Link wifi dongle

D. Robot

The robot is constructed to make this system as a surveillance system as it will move to anywhere as per the instructions provided to the robot from the control unit. The robot will move 360^0. The robot used in this project will have the platform board to hold all the embedded components and the camera for capturing the AV signal of remote locations. The robot is controlled from the PC which is also the control unit.

While the robot is moving around the required images or the suspected things are captured by using this camera and is stored in the SD card placed in the Raspberry Pi development board.

E. Power Supply Unit

This unit is basically designed to power up the node 1 and node 2. This provides 5 V, 500mA output to drive the nodes. Here, the AC voltage at 220V is stepped down to 20V using a 220/20V steps down transformer. This AC voltage at 20V is fed to rectifier that converts it to DC voltage and is then filtered using 40 Farad shunt capacitor. The filtered DC voltage is then regulated using a 7805 regulator, and is then supplied to the microcontroller work at 5V, 500 mA.

F. GUI Display

A Graphical User Interface is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicators. The graphical user interface is presented on the computer screen. It is the result of processed input and usually the main interface for human-machine interaction. The human-machine interaction is needed in this for moving the robot to the desired locations and for capturing the AV signals. The GUI display used in this project is the Personal Computer. The figure 3.5 shows the GUI used in this project.

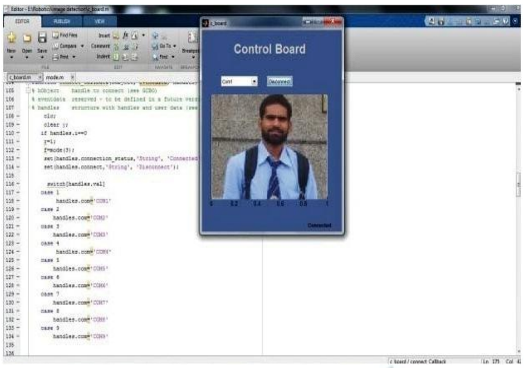

Figure 3.5: GUI Display

IV. Real Time Development

The monitoring unit receives the captured images from main unit. The data is fed to the raspberry pi development board and it transmits the captured images to the GUI display at the monitoring section. The raspberry pi is interfaced with the D-Link wifi dongle to provide the IP connectivity with the control unit and with the robot.

The main unit here consists of the 4 wheeled robot having the raspberry pi development board and camera modules placed on the chassis of robot. The camera placed on the robot will continuously transmit the video signal to the control unit. The raspberry pi is having the SD card slot to save the captured images by the camera.

The controller here is the GUI unit which is having the GLCD output for monitoring the video signals received from the main unit. While monitoring at the control unit the person at the control unit will move the robot by viewing the video signal in GLCD output. If anything suspecting then the person will capture the images by pressing the buttons allotted in the keyboard of the GUI unit. The figure 4.1 shows the block diagram for real development of the system.

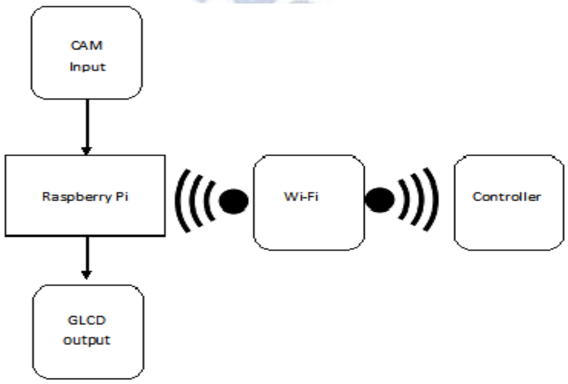

Figure 4.1: Block Diagram for Real Time Development of the system

V. Results

This system was implemented successfully to stream video data wirelessly that is received at the end point for monitoring. The captured JPEG pictures can be transmitted as per the bandwidth of the IP connectivity established by using the D-Link wifi dongle attached to the development board. JPEG which is sufficient for any security and surveillance purposes for perimeter control, if any intruder is detected the image of the intruder will be captured and sent to the control unit.

VI. Conclusion and Future Scope

Conventional bandwidth problem can be overcome by using this algorithm, currently we are working with low quality images, in future we will try to improve the quality of the image.

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References

[1] Thomas Schierl, Thomas Wiegand and Markus Kampmann "3GPP Compliant Adaptive Wireless Video Streaming Using H.264/AVC" , ISSN – 0-7803-9134-9, IEEE-2005.

[2] EhsanHaghani, Nirwan Ansari, Shyam Parekh and Doru Colin "Traffic-Aware Video Streaming in Broadband Wireless Networks", ISSN - 978-1-4244-6398-5, IEEE-2010.

[3] "Serial JPEG Camera - RS232" by Sunrom Technologies, http://www.sunrom.com/99

[4] Minghua Chen and AvidehZakhor," Rate Control for Streaming Video over Wireless", ISSN - 0-7803-8356-7, IEEE INFOCOM 2004.

[5] S. Biaz, N. H. Vaidya, "Distinguishing congestion losses from wireless transmission losses: a negative result", Computer Communications and Networks, 1998.

[6] S. Biaz, N. H. Vaidya, "Discriminating congestion loss from wireless losses using inter-arrival times at the receiver", Proc. of IEEE Symposium on Application-specific System and Software Engr. and Techn., pp. 10-17,Richardson, TX, Mar 1999

[7] N. Samaraweera, "Non-congestion packet loss detection for TCP error recovery using wireless links", in IEEEProceedings of Communications,146(4), pp. 222C230, Aug 1999.

[8] Y. Tobe, Y. Tamura, A. Molano, S. Ghosh, and H. Tokuda, "Achieving moderate fairness for UDP flows by pathstatus classification," inProc.25th Annual IEEE Conf. on Local Computer Networks (LCN 2000), pp. 252C61, Tampa,FL, Nov 2000

[9] Kazemian, H.B., "An intelligent video streaming technique in zigbeewireless" FUZZY-IEEE 2009.PP NO. 121 – 126. [10] Petracca, M. ; Ghibaudi, M. ; Salvadori, C. ; Pagano, P. ;Munaretto, D. "Performance evaluation of FEC techniques based on BCH codes in video streaming over wireless sensor networks", ISCC-2011 ,Page(s): 43 – 48.

[10] Mei-Hsuan Lu ; Tsuhan Chen ," CMUseum: A Location- aware Wireless Video Streaming System" ,ICME-2006, Page(s): 2129 – 2132.

[11] Paolini, C. ; Natarajan, S., Adaptive ajax-based streaming video for the irobot create platform for use in buildings with infrastructure mode 802.11 networks, WAC- 2010, Page(s): 1-6.