Abstract

Wireless Embedded Webcam consists of an analog video camera that transmits signals via the Internet. They function for video monitoring, recording and video analysis. The aim of this project is mainly to ensure the safety of property of the user by always having an eye over the property. They are also able to detect the person and provide any intrusion alerts. By completing this mini-project, we hope to create a general outlining architecture for Wifi Embedded Webcam. By the motivation and inspiration this we collected the works of *M. Kathiresan, A. Robson Benjamin and C. Vijaya* and researched on how it was the best real life project that could save both time and money at the same time. And, at the very end we will have developed potentials to be able to develop the similar projects in the future by the help of this project.

Table of Contents

List of Figures

Acronyms

APP   Application

WI-FI   Wireless Fidelity

HD   High Definition

TCP/IP   Transmission Control Protocol/Internet Protocol

PCB   Printed Circuit Board

Chapter 1: Introduction

People could have worked hard their whole life to develop their empire and earn enough money to spend for their old ages and other stuffs. But, due to theft and robbery their property as well as their life are always in threat. So, the idea of this project is to develop a monitoring system to view the activities that is happening around the houses, offices and other places. Due to this, any intrusions can be detected and unethical things can be monitored. Thus this simple project provides a great measure of security for the users. As well as, Wireless webcams are an impressive technology to be owned by people around the world. These tiny cameras make our chats feel real even when we are far away from our family or friends.

This project is built around a Wi-Fi module, a PIC microcontroller and a camera. The camera captures live video from a remote location, which is transmitted wirelessly through the Internet and can be viewed on a PC or laptop. Due to this, we could use this device for the purpose of communication as well as a security system. It could really have an impact on the lives of people by insuring their property and provide communication among friends and families.

1.1 Objectives

1. To know how an internet based webcam system is developed that allows people to view activities around their offices and homes on their wifi connected laptop or mobile devices.
2. To learn how the security around house and offices are increased through the continuous live stream of the real time video sent from the webcam via the internet.
3. To learn more about how embedded systems work and how they are used in real life situations.
4. To identify the reason for which the necessity of developing webcams was realised.

1.2 Motivation and Significance

The news regarding theft and robbery are heard very often nowadays. We got motivated to research about the ways to mitigate this issue. So, we found out a project that consisted of a Wifi Embedded Webcam such that the intrusions alerts and any unethical activities can be monitored out. So, we selected this project to carry out research on it. The main significance of this project is basically to provide wireless security of life and property as well as maintain real time communication with friends and families.

Chapter 2: Related Works

In the present context such projects are being widely used by large audience. Wireless webcams are an impressive technology to be owned by people around the world. These tiny cameras make our chats feel real even when we are far away from our family or friends. Wireless webcams can also be used for security purposes as it can be seen in various companies and industries these days. Some of the previously developed wireless webcams include:

1. D-Link Wi-Fi Camera with Remote Viewing (DCS-930L)

This webcam comes with an embedded Wi-Fi or Ethernet Connectivity which helps in the secure connection for flexible placement. It also has a motion detection feature i.e. it emails or sends alert notifications based on motion sensing technology. The images or videos captured through it can be easily viewed on iPhone, iPad, Android devices or Windows Phones with free mydlink app. Due to its compact design it easily fits in the smallest corners of your home. It is very simple and easy to use. The device is not compatible with Microsoft Edge browser. This device is only for day purposes only so further developing it a newer version of it i.e. DCS932l – Wireless N Day/Night Camera has been made.

2. Belkin NetCam HD + Wi-Fi Camera with Night Vision – White (Certified Refurbished)

This Certified Refurbished product is tested and certified to look and work like new. It works with WeMo products. The sensing motion and lights feature on this webcam come on automatically. It has a premium HD wide-angle glass lens for high definition video and ultra clear viewing of day or night. It also has a Night vision filter which lets you view more with little to no. Since it only connects with its servers it is secure. The built in push-to-talk

microphone allows two way conversation. Email alerts let you enjoy peace of mind with movement detection notifications.

3. Dropcam Wi-Fi Wireless Video Monitoring Camera

This webcam works with Alexa for voice control. You can use your computer to find your Wi-Fi and network and the live stream starts within a minute. It allows to get into the details with 720p high definition video. It is very fast and easy to setup and also allows the online streaming of videos securely. It has a field of view of 107 degrees diagonal along with Night Vision and zoom which means you will not miss a thing in this webcam.

Chapter 3: Design and Implementation

3.1 System Architecture

This project is built around an MRF24WBOMA Wi-Fi module, a PIC microcontroller and a camera module using the TCP-IP protocol. The camera captures live video from a remote location, which is transmitted wirelessly through the Internet and can be viewed on a PC or laptop.

The design uses easily-available low-cost components and a serial peripheral interface (SPI). Microchip's recently introduced MRF24WBOMA is an inexpensive Wi-Fi chip that uses SPI communication.

3.2 System Specifications

3.2.1 Tools Used

1. MRF24WBOMA Wi-Fi module

The MRF24WBOMA is a low-power, 2.4GHz, IEEE Std. surface mount module with all associated RF components—crystal oscillator, by-pass and bias passives with integrated MAC, baseband, RF and power amplifier, a built-in hardware support for AES and TKIP. The MRF24WBOMA module is approved for use with the integrated PCB meander antenna. The PCB antenna is fabricated on the top copper layer and covered with solder mask.
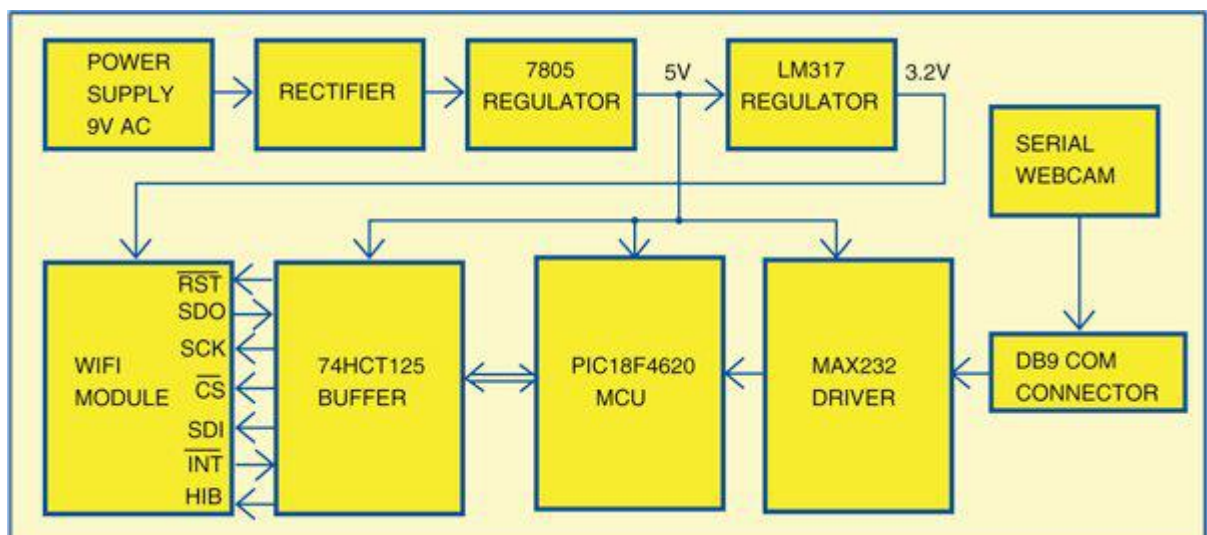
2. PIC microcontroller

A PIC microcontroller is a compact microcomputer designed to govern the operation of embedded systems in motor vehicles, robots, office machines, medical devices, mobile radios, vending machines, home appliances, and various other devices.

3.Camera module

A camera module is a webcam that is connected to the main circuit to transmit live video through the WIfi module. Several camera modules are available in the market. For 5V operation, we chose microCAM (uCAM) serial JPEG camera.

3. LCD module

16×2 LCD module is used to display the IP address and for debugging the project. It is operated in 4-line mode.

2.2.2 Programming Languages Used

Software for the PIC microcontroller is written in 'C' language and compiled using CodeBlocks IDE. The main goal is to hide the complexities of the hardware and make it simple for someone to program it.

Chapter 4: Testing and Result

We assemble the components on the PCB and connect power supply to the circuit. It needs CodeBlocks IDE for compiling the code and burning the hex code into the micro controller. We should take care of the following:

1. PC should be connected to either wireless modem or wireless router with modem. The connection between the board and router should be wireless, but the connection between PC and the router should be non-wireless. Hence PC should be connected to Ethernet port of the router.

2. The modem or router should be configured as follows:

SSID=your_preference, and security=none. If we want to change SSID name, change it in wf_config.h file and compile and program the micro controller.

3. Camera should be connected to the board through RS232 cable.

4. When we switch-on the circuit, we see default IP address as 169.254.1.1. Then it will switch over to a new IP address, say, 192.168.1.25, depending on the network. We can see this address on our LCD screen also. Since DHCP client is enabled, we get the correct IP address in LCD display.

5. On typing the 192.168.1.25 IP address in address bar of the web browser, a screen will appear with 'Embedded Systems Project' on top.

6. If we click 'switch-on' button, we can see live video being captured by the camera on our PC screen.

5. References

1. *Wifi-Embedded-Webcam, https://electronicsforu.com (2019)*

2. *D-Link Wi-Fi Camera with Remote Viewing , https://amazon.com (2019)*

3. *Transmitting a video stream through a microcontroller, https://electronics.stackexchange.com(2019)*

4. *Wireless Camera with Arduino and the CC3000 WiFi chip, https://openhomeautomation.net(2019)*