IR T.V REMOTE BASED COMPUTER AND LAPTOP OPERATING

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ABSTRACT

This paper represents how your PC and Laptop can be controlled from with your T.V remote with the help of Frontend Application. It means the conventional PC mouse operations controlled by using T.V Remote. It turns your Remote into a wireless mouse and don't need any surface. It requires Forntend application on your computer. This is an implementation of RC5-remote reception on an 8051 micro controller. The received code is decoded and sent to the PC IR remote software written in Visual Basic. The cursor position is moved according to the keys pressed. There are two modes of operation one is as mouse control and second is Windows media player control without monitor running. The convenience of selecting TV channels using your remote and then pointing the same remote to your Computer so that you can control the whole system using the single remote control. The 8051 microcontroller is used to control all the system. An integrated Infrared Receiver is used to receive the infrared signal from the remote control handset. The received infrared signal was decoded by using the program, which was written on the ROM of the Microcontroller. The programs are flashed on the ROM area of the Microcontroller. The Flash memory is a type of EEPROM. The Details of the switch pressed was sent to the PC through its serial port. In the PC, Visual Basic was used to control the PC through the API functions.

Keywords: RC5 Protocol; Decoding with IR Signal; TSOP 1738; Serial Communication

1. INTRODUCTION

Consumer electronics devices and personal computers have become inevitable part of our life. Similarly, mobile devices and computers like CELL PHONEs and Tablets are becoming more and more commonly used in our daily life. Controlling consumer electronics devices and computers remotely is an important aspect of the technology. Today, we have remote control devices to control

consumer electronic devices such as DTMF sets. Similarly, it is desirable to remotely control stationary desktop/laptop PCs and their applications. Which offers a wireless means of communication between the computer and the user and also helps to overcome the disadvantages of wired and wireless mouse. For ex- ample, an instructor in class-room may want to control a PowerPoint presentation running on his laptop computer and projected on the screen using a TV Remote (i.e. wireless mouse). Our application will be primarily based on .Net Technology [4]. The one side of the system runs on top of the Windows operating system [1] and the other side is a .Net based application built in IR technology.

Controlling of electrical appliances through IR remote is interesting and very useful application. This system is widely useful to industries, offices, Banks, hotels, hospitals, and display boards. In this, IR remote is used for controlling PC\Laptop in your room. We identified the following as the requirements of a system that enables a TV Remote to be used as a remote control device for desktop PC while he is moving around in the class-room freely. In this way, he does not have to go to the laptop each time when he wants to use the Power Point screen. Its architecture is based on IR Transmitting - Receiving paradigm. It   consists of two parts: a transmitter part and a recevier part. The transmitter part is known as TV Remote. The recevier part consists of microcontroller, TSOP Receiver, serial communication and PC. This side of the system is capable of listening incoming connections, sending and receiving data, processing control, commands taking screenshots, modify applications [5].

This device helps to have better control of computer without mouse. As a result mouse can be avoided and mouse functions are incorporated in the PC remote control. The commands made by the user through the PC remote control is read and interpreted by the 8051 microcontroller. The button pressed in PC remote control by the user will be detected by microcontroller based circuit and these details are sent to PC via RS232.It can be also used for windows media player functioning. PC remote control is basically an alternative for a mouse. PC remote control offers a wireless means of communication between the computer and the user. PC remote control helps to overcome the disadvantages of wired and wireless mouse [1]. Such devices can be easily attached to computers. PC remote control has become an indispensable component of modern desktops and laptops.

2. OBJECTIVE

1. It operates PC\Laptop from our living room using with key pad inputs of TV Remote.
2. It allows a power button, as well as a switch or series of buttons to select which device the remote is controlling at the moment.
3. It allows a numeric keypad for moving the mouse cursor.
4. It allows Arithmetic Keys for controlling media player and slider also.
5. It allowing the user to program command sequences to 5 User defined Programs.
6. It allowing the remote to be programmed to control new devices not already in its code list by IR coding
7. Accept infrared signals from any remote and transmit them to the device being controlled using repeater.

3. DEVELOPMENT PROCESS

This paper is about how to control PC applications remotely inside a house, an office, or a conference room. As the remote control device, we consider using a TV Remote with Visual Basic capability. For this purpose, we have designed and implemented a frontend application, called Remote Control that enables a Remote to act as a remote controller device for desktop PCs and their applications. In this paper, we introduce of, its architecture, and how we have realized it. Remote

Control is a system/tool that allows users to control their desktop computer applications from a TV Remote by using its inbuilt RC5 Protocol technology [3]. The designed system was successfully tested on a personal computer with the use of TV remote. During the testing stage, the components and devices were connected and implemented on the workstation and the user by installing the system interface to Remote. Application successfully enables user to remotely access their workstation while being cost effective and user friendly. We identified the following as the requirements of a system that enables PC control using TV remote. Those identified requirements helped us as the basic guidelines in designing our system.

Ease of use: The system should be easily launched, configured and used. It should have a nice and graphical user interface [7].

Mobility: The system should support mobility of the user while controlling the desktop computer application. Mobility can be enabled if the remote control device is portable and if its connection to the desktop computer.

Wireless: The wireless connection can be a short-range local or personal area connection, most of the time. In this case, the operating range can be up to 20 to 30 meters depending on the wireless technology used and on the propagation environment.

Flexible Control: A user should be able to control and execute as much functionality as possible. It is the best if the user can do everything that he/she can do in a remote manner. The user should be able to give keyboard inputs and mouse inputs to the desktop PC and also should be able operate media player while monitor off condition.

Power: The system should be power efficient since Remote are power constrained device and have limited energy.

Reliability: The system and connectivity should be reliable enough so that a user can control the desktop computer with-out losing data and/or commands.

Bandwidth: The system should be bandwidth efficient on the wireless link between Remote and desktop PC.

No Surface: The system can be operated on any direction and those don't need any surface like wired and wireless mouse.

4. RELATED WORK

There are already some products for controlling an electrical appliances through IR remote. They are HOME APPLIANCE CONTROL SYSTEM Will be done with this technology of IR Data Transmitting and Receiving [5] and RC5 Protocol working Similarly, the desktop PC is also controlling using IR technology, with some application as named remote control worked as GUI (graphical user interface) in nature[7].

5. HARDWARE TOOLS

RC5 PROTOCOL: The RC-5 protocol was developed by Philips in the late 1980s as a semi-proprietary consumer IR (infrared) remote control communication protocol for consumer electronics. However, it was also adopted by most European manufacturers, as well as many US manufacturers of special audio and video equipment. The advantage of the RC-5 protocol is that (when properly followed) any CD handset (for example) may be used to control any brand of CD player using the RC-5 protocol [3].
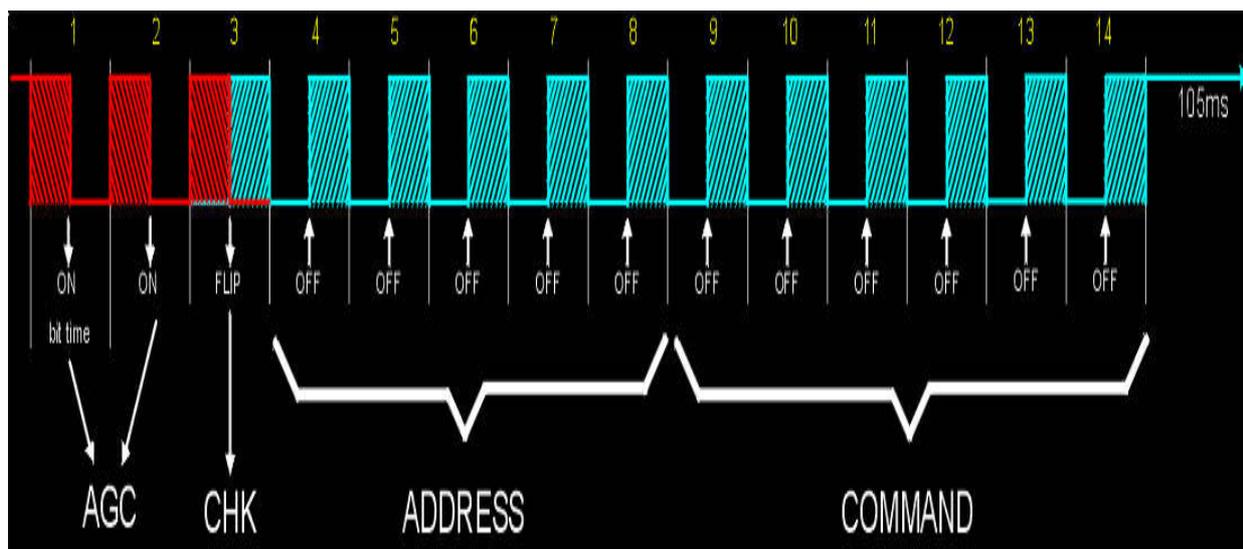

Figure 1: RC5 Protocol

The basics of the protocol are well known. The handset contains a keypad and a transmitter integrated circuit (IC) driving an IR LED. The command data is a Manchester coded bit stream modulating a 38 kHz carrier. (Often the carrier used is 38 kHz or 40 kHz, apparently due to misinformation about the actual protocol.) The IR signal from the transmitter is detected by a specialized IC with an integral photo-diode, and is amplified, filtered, and demodulated so that the receiving device can act upon the received command. RC-5 only provides a one-way link, with information traveling from the handset to the receiving unit. The 38 kHz carrier frequency was chosen to render the system immune to interference from TV scan lines. The carrier frequency of the RC5 code is 36 kHz so take always a receiver with a response frequency of 38 kHz.

The command comprises 14 bits:
- 2 start bits for the automatic gain control in the infrared receiver.
- 1 toggle bit (change every time when a new button is pressed on the IR transmitter)
- 5 address bits for the system address
- 6 instruction bits for the pressed key

IR RECEIVER (TSOP1738): The TSOP 1738 are miniaturized receivers for infrared remote control systems. PIN diode and preamplifier are assembled on lead frame, the epoxy package is designed as IR filter. The demodulated output signal can directly be decoded by a microprocessor. TSOP1738 is the standard IR remote control receiver series, supporting all major transmission codes.
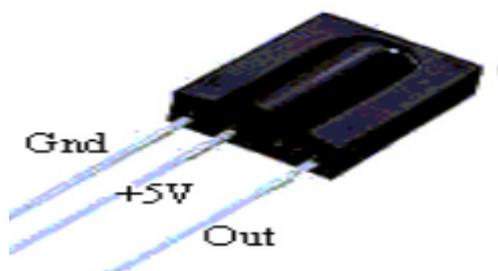
Figure 2: TSOP1738

DECODING IR SIGNAL WITH A MICRO CONTROLLER: To receive this signal using a microcontroller follows the timing from the figure below. Note that the Infrared Receiver invert the bit signal, low level means bit ON.

During inactivity (no Infrared present) the output of the Infrared receiver is UP (bit zero). We can connect the IR receiver output to any input port pin or interrupt pin of our microcontroller, and keep polling it or prepare the interrupt routine to trigger our reading after the first low level sensed. When we press a key at the remote, it transmits the train of pulses, and our microcontroller will receive bit #1 first. It will be sensed right after the middle of the bit when it changes from high to low level to means bit "1".This is the first time that your microcontroller will "see" the incoming IR signal. We don't need to decode those first two bits, not even the CHK bit (except if you want to control as the TV do and described above), so we can skip those 3 bits and start to receive the ADDRESS bits. To do that, we need to skip 2.75 bits time, and we will be exactly at the middle of the right level of the first ADDRESS bit to be read.

So, upon sensing the first low level, our software should wait 3.752 milliseconds and then start to read the next 11 bits spaced 1.728ms each. The first 5 bits are Address and the next 6 bits are Command, logic correct level, LOW = 0, HIGH = 1. At our bit reading routine use an available microcontroller port pin and generate a fast pulse UP and DOWN, then use one scope channel to display this pulse, and the other scope channel to show the incoming signal from the receiver. Press and hold key number ZERO at the remote, and sync the scope to show a complete wave form, don't worry with timing. The fast 11 pulses should always be in place of those RED down arrows at the figure. It means that the "bit reading" software routine will reading exactly in the middle of the correct bit level [6].
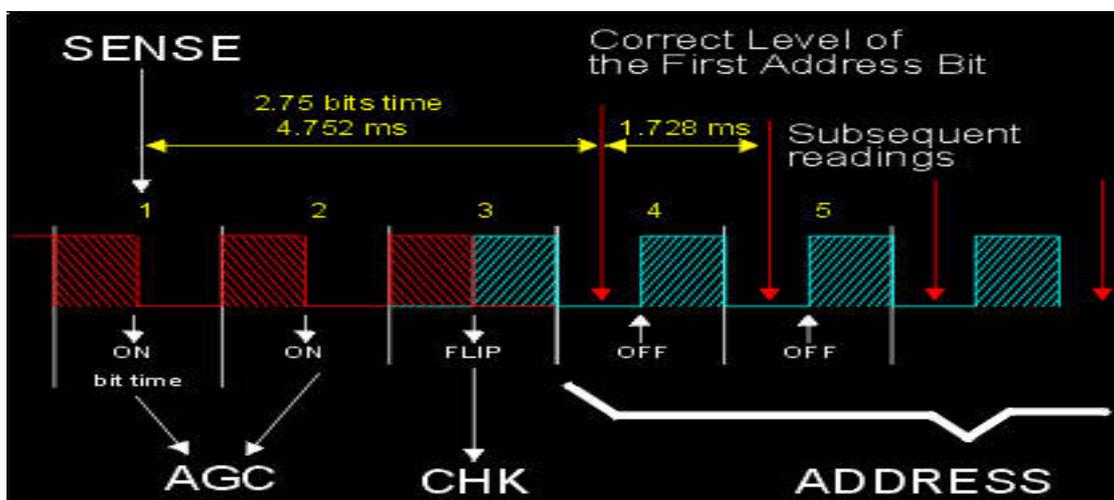

Figure 3: Correct level of First Address Bit

Our software will need to have two timing delays, the first to wait 3.752ms and the second to wait 1.728ms. Adjust the timing loop from the 3.752ms until the first fast pulse happens exactly as indicated above. Then adjust the 1.728 ms timing delay in such way that the last fast pulse (#11) bit reading happens exactly at the middle of the low part of the last bit (#14). Check all other bits and fast pulses, they should be all matching ok. Small errors would be accepted since the reading would be happening in the middle of the bit, few errors for more or less is not a problem, but it is better to be the most possible in the middle of the low level of each bit. This is why you should adjust our 1.728ms timing routine looking at the last data bit and fast pulse, if they match somehow ok, all the other bits should be ok too. Remember that any other remote key will generate a different pattern and it can confuse you. Use always key number ZERO for this software calibration. Once we find the correct timing delays, we can replace the FAST pulse instructions with NOPS, or keep the fast pulse there just for fun, so we will be able to recheck it in case of problems [6]. Here few examples of the complete waveform (14 bits)
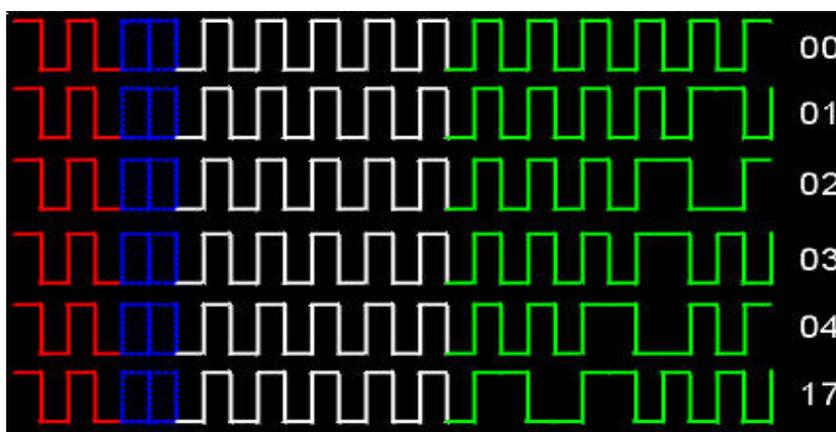

Figure 4: Right commands in hexadecimal Red: AGC pulses (ON) Blue: Check bit (flipping) White: Address (00) Green: Command

6. SOFTWARE TOOLS

.NET TECHNOLOGY: The .NET platform is one over which Web-based applications can be distributed to a great variety of devices and to desktop computers. The platform offers a new software-development model that allows applications created in disparate programming languages to communicate with each other. One key aspect of .NET is its independence from a specific language or platform, further extending the portability of .NET programs. A key component of the .NET architecture is Web services, which are reusable application software components that can be used over the Internet. Clients and other applications can use Web services as reusable building blocks. The Microsoft .NET Framework is at the heart of the .NET strategy. This framework manages and executes applications and Web services, contains a class library, enforces security and provides many other programming capabilities. The details of the .NET Framework are found in the Common Language Infrastructure (CLI), which contains information about the storage of data types, objects and so on. The CLI has been standardized by Ecma International, making it easier to create the .NET Framework for other platforms. The Common Language Runtime (CLR) is another central part of the .NET Framework [4] it executes .NET programs. Programs are compiled into machine-specific instructions in two steps. First, the program is compiled into Microsoft Intermediate Language (MSIL), which defines instructions for the CLR. Code converted into MSIL from other languages and sources can be woven together by the CLR. The MSIL for an application's components is placed into the application's executable file. When the application executes, another compiler in the CLR

translates the MSIL in the executable file into machine-language code, then the machine-language code executes on that platform. MSIL is Microsoft's name for what the C# language specification refers to as Common Intermediate Language (CIL).

PROGRAMMING LANGUAGE: Programming language used in this paper is C. C is a general purpose structured programming language that is powerful, efficient and compact. It has emerged as the language of choice for most applications due to speed, portability and compactness of code. The C compiler combines the capabilities of an assembler language with the features of high level language. C is highly portable. This means that C programs written for one computer can be on another with little or no modification. Portability is important if we plan to use a new computer with a different operating system. C language is well suited for structured programming thus requiring the user to think of a problem in terms of function modules and blocks. A proper collection of these modules make a complete program. This modular structure makes program debugging, testing and maintenance easier. Another important feature of C is its ability to extend itself. A C program is basically a collection of functions that are supported by the C library [2].We can continuously add our own functions to the C library. With the availability of a large number of functions, the programming task becomes simple.

7. IMPLEMENTATION

A product implementation method is a blueprint to get users and/or organizations running with a specific product. The method is a set of rules and views to cope with the most common issues that occur when implementing a software product. The implementation of product software, as the final link in the deployment chain of software production, is in a financial perspective of a major issue. A software application in general is implemented after navigating the complete life cycle method of a product. Various life cycle processes such as requirement analysis, design phase, verification, testing and finally followed by the implementation phase results in a successful product management. The software application which is basically a web based application has been successfully implemented after passing various life cycle processes.

PROCESS OF IMPLEMENTATION

- ❖ The product aims to development of a PC remote control.
- ❖ This remote control will be very useful and highly user friendly in application. Inputs are given through remote control and are processed by 8051 microcontroller.
- ❖ There should be Windows Platform
- ❖ The system should support visual studio 2010
- ❖ The project uses built in components in VC# such as IO port Interface classes and Timers for getting and processing signals from IO ports.
- ❖ It is expected that Windows Media Player is installed on the testing Machine.
- ❖ The signals received through IO ports are processed and mouse controlling functions and media control functions are made using USER32.dll and Process classes in C#.USER32.dll is a famous dynamic link library for windows programmers, it contain many functions for generating mouse events and keyboard strokes.

The status of port and Software working can be monitored using PC remote control monitor.

8. CONCLUSION

In this paper the architecture used for introduce remote controlling computer technology. This architecture can be used to gives us an idea of RC5 Protocol and the microcontroller 8051. Thus by this attempt of ours the ON/OFF processes of many devices was successfully carried out by just using a TV remote. The system has been tested in all ways and well executed to perform the mouse and media player functions. The simplicity in the design and flexible operation will be very helpful in using the device. The device is highly user friendly in nature. The device developed has tried to avoid almost all disadvantages caused due wired, wireless and optical mouse.

9. REFERENCES

[1] Windows operating system. "http://www.microsoft.com/windowsxp/7/8/defaultmspx"
[2] Programming Language. "http://www.engineersgarage.com/tutorials/emebedded-c-language"
[3] RC5 Protocol. "Remote Control System RC-5 Including Command Tables, Philips Semiconductors" December 1992, Publication No. 9388 706 23011
[4] .NET Technology. "Option Explicit and Option Strict in Visual Basic .NET and in Visual Basic". Support. Microsoft. 19 March 2008. Retrieved 22 August 2013
[5] IR remote control "http://www.ieeeghn.org/wiki/index.php/Milestones:Early Developments in Remote Control"1901
[6] Decoding IR data "Decoding IR Remote controls" and Eric Maass (2001) "How does a universal remote control work?"
[7] GUI "3D Graphical User Interfaces by Farid BenHajji and Erik Dybner, Department of Computer and Systems Sciences, Stockholm University" and "Evolution of Graphical User Interface in last 50 years by Raj Lal"
[8] Taha Abdelshafy Abdelhakim Khalaf, "Optimal Decoding For Wireless Relay Networks With Decode-And-Forward Cooperation Protocol" International journal of Electronics and Communication Engineering &Technology (IJECET), Volume 5, Issue 1, 2014, pp. 138 - 147, ISSN Print: 0976- 6464, ISSN Online: 0976 –6472.