



DIGITAL DATA TRANSMISSION USING VISIBLE LIGHT COMMUNICATION

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Abstract-Currently, Visible Light Communication (VLC) technology remains a lagging research in the field of Ultra-Wide Band (UWB), due to the inefficiency of data capture and synchronization period. Accordingly, this paper proposes a fundamental design and implementation of data communication of VLC on the MAC layer based on FPGA. This paper includes basic research context, design and implementation of UWB MAC layer, along with the simulation and verification results of this system.

Light fidelity (Li-Fi) technology attached to the visible light communications (VLC) offers many key advantages and effective solutions to the problems posed in the last decade. Data is transmitted by light thanks to the unique properties of white light emitting diode (LED) lamps switching. Transmission is based on pulse-width modulation (PWM). The transmitted information is an audio signal generated by a mobile phone. Saw tooth signal is compared with audio signal in order to create a PWM signal. Modulated signal will be transmitted by LED in the form of a light signal that the photodiode (PD) detects and transforms it into an electrical signal.

Demodulated signal is obtained by a simple first-order low-pass filter RC in the speakers.

In today's world where data security is one of the major concern, it becomes vital to get new methods for the data transmission. Visible Light Communication (VLC) is emerging as new method for data transmission in which data is transmitted through LEDs. This is a much more secure method of transmission compared to existing technologies. Also the data transmission rate is very high around few GBps. The use of various colored LEDs can produce different speeds and data rates. This paper describes the design of Li-Fi audio transmission system and analyzing its performance.

Keywords: Visible Light Communication (VLC), Ultra-Wide Band (UWB), pulse-width modulation (PWM), photodiode (PD),

I. INTRODUCTION

Wi-Fi and Bluetooth are as of now the two noticeable short range remote advances utilized for different remote applications. However the radio recurrence range utilized by these strategies is rare. There are



different downsides of these current innovations like high cost, uncertainty of information, high power utilization. In this way, there is an incredible need of an innovation that could defeat every one of the disadvantages of existing advancements.

Unmistakable Light Communication (VLC) is rising as a decent option. It is likewise named as Li-Fi importance Light devotion. This up and coming innovation utilizes light as a method of transmission. Li-Fi works in the unmistakable light range which is 10 thousand times that of the radio wave range. It utilizes unmistakable light as a method of transmission as opposed to the conventional radio waves. In this way, it can be utilized as a part of spots where the utilization of radio waves is precluded. Besides, since light stays bound to a room, the information stays secure and can't be hacked by somebody sitting in other room. What's more, the most appealing element of this up and coming innovation is the speed by which information gets transmitted which is 100 times quicker than Wi-Fi.

In this innovation information is transmitted utilizing LED knob. The essential thought is to flip the LED quick with the end goal that it isn't recognizable to human eye. Information can be transmitted at substantially higher rate contrasted with Wi-Fi or Bluetooth radio recurrence. At the point when LED is „ON“ intelligent "1" is transmitted and when LED is „OFF“ sensible "0" is transmitted.

In our undertaking we are recording distinctive sound documents in APR. The voice or sound that must be recorded in APR is recorded with the inbuilt amplifier in that IC. Distinctive changes are utilized

to store diverse sound records. APR is controlled by PIC 16F877A microcontroller for sending the sound information document serially to the Li-Fi transmitter module. The sound document gets transmitter when the LED of the transmitter module flickers.

The beneficiary part contains a Li-Fi collector module which gets the sound record. The recipient module contains a photodiode to recognize the transmitted sound. This got information is then sent to the speaker.

II. LITERATURE SURVEY

A key investigation done on unmistakable light correspondence arrived at the conclusion that obvious light correspondence was required to be the indoor remote correspondence of the cutting edge because of the likelihood of transmitting at a high information rate. Communication execution was corrupted extremely by intersymbol obstruction Intersymbol impedance relied upon the information rate and the Field of Receiver (FOV) on the grounds that the LED lights were dispersed inside a room and the irradiance of light was wide for the capacity of the lighting hardware. Research done by TakakuniDouseki on the battery less optical-remote framework with white-drove enlightenment demonstrated the framework's capacity to transmit information at the speed of 100Kbps with the separation of 40cm. In this examination, they likewise talked about reflection and inter symbol obstruction.

This framework effectively performed without a battery. This framework utilized the white LED as the transmitter and the photocell as the recipient completed the numerical reproductions for an ideal



lights format plot for the unmistakable light correspondence to discover the viability of this correspondence system. There were two sorts of correspondence frameworks being proposed, an optical up-interface and an optical down-connect.

The up-connect had a little, shallow region and restricted edge of irradiance like an electric light where by the LED could be lit from the base to the top. Generally, the down-interface framework had an expansive shallow territory and wide point of irradiance on the grounds that the light was situated at the roof and lit from the best to the base. The execution of the obvious light correspondence was broke down utilizing the ideal lights design plot as far as the got power and bit blunder rate (BIT). In light of the numerical recreation comes about, the got control was extensive contrasted with the infrared remote correspondence which could make broadband correspondence possible. The adequacy of the light design was dissected in light of the got control.

From the consequences of the reenactment of the ideal lights format conspire for unmistakable light correspondence, they reasoned that this method could be connected to get an incredible performance. A think about on the difficulties and conceivable outcomes of noticeable light interchanges was finished by which presented the standards of VLC and plot some of its major challenges. The examine was an outline of the uses of obvious light correspondence. In this investigation, issues with the execution of these correspondence frameworks were featured.

Research on Zigbee remote correspondence innovation:

This paper displayed a diagram of Zigbee remote correspondence innovation [1] and the way toward setting up Zigbee network. This paper presented the systems administration innovation, use of Zigbee remote sensor, the essential ideas of Zigbee remote correspondence innovation, its origin. Zigbee convention stack and the utilization of Zigbee innovation were additionally introduced. Zigbee remote correspondence innovation is a sort of recently emerged remote system technology. Its trademark is short separation correspondence, low speed, low power dispersal and low cost. Zigbee remote correspondence innovation has preferences of high-limit systems, sheltered and solid information transmission. It could be connected in remote control and information acquisition. Zigbee will be utilized as a part of several years in the zone of industry control, modern remote area, home system, building mechanization, medicinal hardware control, mine security, and so on, particularly home computerization and industry control will be the principle application fields. This system is disadvantageous in light of the fact that scope territory is little.

III. METHODOLOGY

We can easily interface Cx51 to routines written in 8051 Assembler. The A51 Assembler is an 8051 macro assembler that emits object modules in OMF-51 format. By observing a few programming rules, we can call assembly routines from C and vice versa. Public variables declared in the assembly



module are available to your C programs. There are several reasons why we might want to call an assembly routine from your C program. We may have assembly code already written that you wish to use, we may need to improve the speed of a particular function, or we may want to manipulate SFRs or memory-mapped I/O devices directly from assembly.

This section describes how to write assembly routines that can be directly interfaced to C programs. For an assembly routine to be called from C, it must be aware of the parameter passing and return value conventions used in C functions. For all practical purposes, it must appear to be a C function.

FUNCTIONS OF Cx51 COMPILER

- Direct Cx51 to generate a listing file.
- Control the information included in the object file Specify code optimization and memory Models.

DIFFERENCES FROM ANSI C

- **WIDE CHARACTERS**

Wide 16-bit characters are not supported by Cx51. ANSI provides wide characters for future support of an international character set.

- **RECURSIVE FUNCTION CALLS**

Recursive function calls are not supported by default. Functions that are recursive must be declared using the reentrant function attribute. Reentrant functions can be called recursively because the local data and parameters are stored in a reentrant stack. In comparison, functions which are not declared using the reentrant attribute use static memory segments for

the local data of the function. A recursive call to these functions overwrites the local data of the prior function call instance.

USE OF KEIL C

KEIL C software is used for microcontroller programming. C is efficient when compared to assembly language because

- Minimizes the lines of code - In assembly language, program which takes 100 lines will take 10 lines in Keil C.

Easy to code and debug - C is easy to learn so it is easy to code and since no of lines is less it will reduce complexity in debugging. Compatible with any microcontrollers - Just changing the header files we can make the program to work for different microcontrollers e.g. PIC. For programming the Microcontroller we use KEIL C programming. The Microcontroller is programmed for serial communication by enabling Timer 1 and also the coding is written so as to collect the digital data from the Analog to digital converter. A keil cross compiler is a software, which compiles a source code of one environment as an object file to be executed in a different environment. It is broadly classified into development and simulation. The simulation is handled by D Scope.

IV. FUTURE SCOPE

The future necessities on life is gone through the video flag. At the point when seek on my simple flag will be required on people to come. It is focused by optical correspondence on media transmission administrators. At that point it is high effectiveness



and different advancement require from LI-FI. The capacity to light from transmit of data. They give to testing or put away a sound flag by light. Vast number of looks into change of innovation from LIFI innovation. I'm occupied with the execution of video flag and computerized framework that is reasonable to this innovation. The recurrence accomplished to more prominent than 1Gbits/s and guided or caused the VLC framework to the bidirectional transmission.

V. CONCLUSION

LI-FI innovation in remote correspondence of sound flag transmission. The future prerequisites on lifi is gone through the video flag. At the point when seek on my simple flag will be required on people to come. It is focused by optical correspondence on media transmission administrators. At that point it is high proficiency and different advancement require from LI-FI. The capacity to light from transmit of data. They give to testing or put away a sound flag by light. Vast number of examines change of innovation from LIFI innovation. I'm keen on the usage of video flag and advanced framework that is reasonable to this technology. The recurrence accomplished to more noteworthy than 1Gbits/s and guided or caused the VLC framework to the bidirectional transmission.

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