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Data Transmission Using Virtual Reality and Li-Fi

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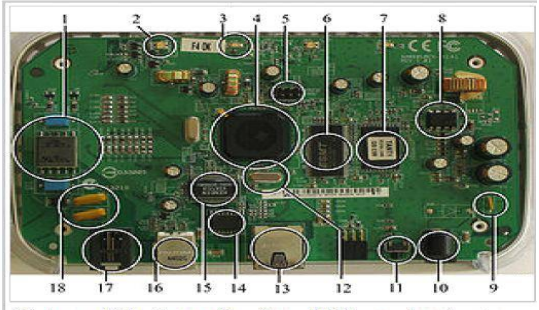
ABSTRACT: The concepts behind virtual reality are based upon theories about a long held human desire to escape the boundaries of the 'real world' by embracing cyberspace.
Once there we can interact with this virtual environment in a more naturalistic manner which will generate new forms of human-machine interaction (HMI). The aim is to move beyond standard forms of interaction such as the keyboard and mouse which most people work with on a daily basis. This is seen as an unnatural way of working which forces people to adapt to the demands of the technology rather than the other way around. But a virtual environment does the opposite. It allows someone to fully immerse themselves in a highly visual world which they explore by means of their senses. This natural form of interaction within this world often results in new forms of communication and understanding.

KEYWORDS: Visible light communication, Li-Fi, Virtual Reality, Data transmission.

I. INTRODUCTION

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end user needs. Embedded systems control many devices in common use today.

Modern embedded systems are often based on microcontrollers (i.e CPUs with integrated memory and/or peripheral interfaces) but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also still common, especially in more complex systems. In either case, the processor(s) used may be types ranging from rather general purpose to very specialise in certain class of computations, or even custom designed for the application at hand. A common standard class of dedicated processors is the digital signal processor (DSP).The key characteristic, however, is being dedicated to handle a particular task. Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.



Picture of the internals of an ADSL modem/router. A modern example of an embedded system. Labelled parts include a microprocessor (4), RAM (6), and flash memory (7).

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II. EXISTING SYSTEM

- In the golden days, the suppliers only serve the menu to the customer.
- But every often we asking the menu from the supplier is quit complex.

Drawbacks

- They need other help.
- There is no automatic system.
- Power consumption is high

III. PROPOSING SYSTEM

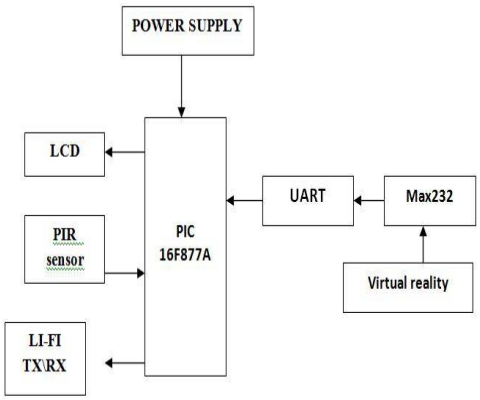
- Here we introduce a new technology in restaurant for automatic digital menu transmission through mobile phone.
- Virtual reality technology is used to wide transmission of data without occurring of noise.

Advantages

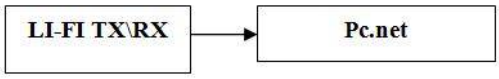
- The system automatically provide the menu in indoor without any manual work.
- It reduces the complexity among to server and customer.

IV. BLOCK DIAGRAM

TRANSMITTER



RECEIVER



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Working principle

The proposed system can be used in restaurant wherever the supplier serving to the customer. The proposed system consists of table top transmitter section and customer table receiver section. Whenever the customer reach the table, then PIR sensor sense the person identification. Then the user can get menu and at the same using virtual and also it reduces the complexity occurring among to customer and server.

Number of Units (Modules):

- **Power Supply Unit**
- **Microcontroller Unit.**
- **Display unit**
- **Communication Unit.**
- **Software Unit**

Power Supply Unit

The supply of 5V DC is given to the system which is converted from 230V AC supply. Firstly, the step down transformer will be used here for converting the 230V AC into 12V AC. The microcontroller will support only the DC supply, so the AC supply will be converted into DC using the bridge rectifier. The output of the rectifier will have ripples so we are using the 2200uf capacitor for filtering those ripples. The output from the filter is given to the 7805 voltage regulator which will convert the 12V DC into 5V DC. The output from the regulator will be filtered using the 1000uf capacitor, so the pure 5V DC is getting as the output from the power supply unit. Here we are using the PIC microcontroller which will be capable of getting the supply of 5V DC so we have to convert the 230V AC supply into 5V DC supply.

Microcontroller Unit

The microcontroller unit is used to monitor the monitor the car drivers by using sensor, the corresponding information is send to the section by Zigbee, this operations are controlled by the controller. Here we use PIC microcontroller.

Display Unit

The display unit is mainly is mainly achieved by the 16X2 LCD. A liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. In this project LCD is used to display sensor value.

Communication Unit.

In our project zigbee is the communication unit is used to transmit the datas from to another.

Software Unit:

Software is used to compile the coding of the desired application for the corresponding embedded system.

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Introduction to Embedded C

Looking around, we find ourselves to be surrounded by various types of embedded systems. Be it a digital camera or a mobile phone or a washing machine, all of them has some kind of processor functioning inside it. Associated with each processor is the embedded software. If hardware forms the body of an embedded system, embedded processor acts as the brain, and embedded software forms its soul. It is the embedded software which primarily governs the functioning of embedded systems.

During infancy years of microprocessor based systems, programs were developed using assemblers and fused into the EPROMs. There used to be no mechanism to find what the program was doing. LEDs, switches, etc. were used to check correct execution of the program. Some 'very fortunate' developers had In-circuit Simulators (ICEs), but they were too costly and were not quite reliable as well.

As time progressed, use of microprocessor-specific assembly-only as the programming language reduced and embedded systems moved onto C as the **embedded programming language** of choice. C is the most widely used programming language for embedded processors/controllers. Assembly is also used but mainly to implement those portions of the code where very high timing accuracy, code size efficiency, etc. are prime requirements.

V. EMBEDDED SYSTEM

PROGRAMMING

Embedded systems programming is different from developing applications on a desktop computers. Key characteristics of an embedded system, when compared to PCs, are as follows:
Embedded devices have resource constraints(limited ROM, limited RAM, limited stack space, less processing power)
Components used in embedded system and PCs are different; embedded systems typically uses smaller, less power consuming components.· Embedded systems are more tied to the hardware.
Two salient **features of Embedded Programming** are code speed and code size. Code speed is governed by the processing power, timing constraints, whereas code size is governed by available program memory and use of programming language. Goal of embedded system programming is to get maximum features in minimum space and minimum time.
Embedded systems are programmed using different type of languages:

- Machine Code
- Low level language, i.e., assembly
- High level language like C, C++, Java,Ada, etc.
- Application level language like Visual Basic, scripts, Access, etc.

Block Diagram Description:

Block 1: Power Supply

Block 2: ARM Microcontroller

Block 3: PIR sensor

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Block 4: MAX 232

Block 5: UART

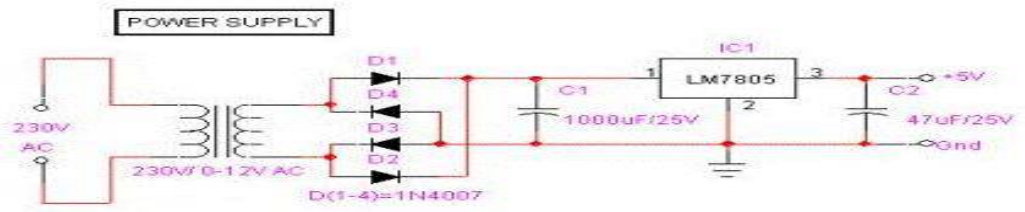
Block 6: LI-FI

Block 7: LCD

BLOCK 1:

Power Supply:

This section describes how to generate +5V DC power supply



The power supply section is the important one. It should deliver constant output regulated power supply for successful working of the project. A 0-12V/1 mA transformer is used for this purpose. The primary of this transformer is connected in to main supply through on/off switch& fuse for protecting from overload and short circuit protection. The secondary is connected to the diodes to convert 12V AC to 12V DC voltage. And filtered by the capacitors ,Which is further regulated to +5v, by using IC 7805.

BLOCK 2:

PIC Microcontrollers

INTRODUCTION OF PIC16F877A:

The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction execution, 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

Microchip PIC16F877A Microcontroller

Features:

High-Performance RISC CPU

- Operating speed: 20 MHz, 200 ns instruction cycle
- Operating voltage: 4.0-5.5V

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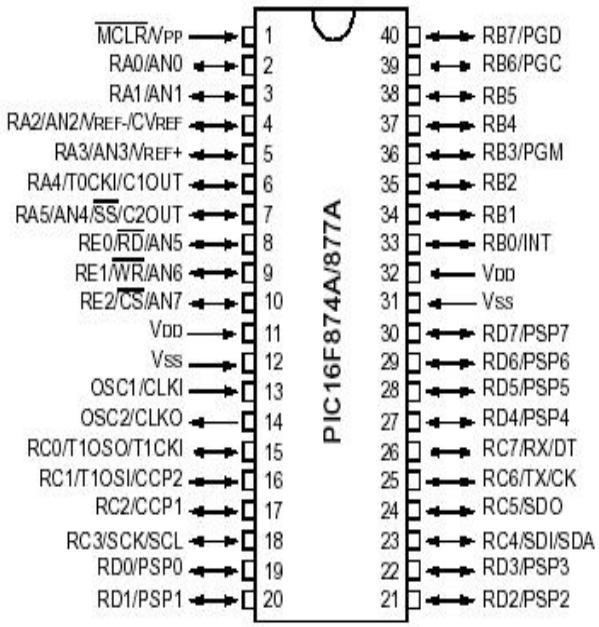
- Industrial temperature range (-40° to +85°C)
- 15 Interrupt Sources
- 35 single-word instructions
- All single-cycle instructions except for program branches (two-cycle)

Special Microcontroller Features

- Flash Memory: 14.3 Kbytes (8192 words)
- Data SRAM: 368 bytes
- Data EEPROM: 256 bytes
- Self-reprogrammable under software control
- In-Circuit Serial Programming via two pins (5V)
- Watchdog Timer with on-chip RC oscillator
- Programmable code protection
- Power-saving Sleep mode
- Selectable oscillator options
- In-Circuit Debug via two pin.

Pin diagram



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BLOCK 3:

PIR SENSOR

PASSIVE INFRA-RED SENSOR

A **Passive Infrared sensor(PIR sensor)** is an electronic device that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of PIR-based motion detectors. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall.

This PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared (heat) levels emitted by surrounding objects. This motion can be detected by checking for a sudden change in the surrounding IR patterns. When motion is detected the PIR sensor outputs a high signal on its output pin. This logic signal can be read by a microcontroller or used to drive a transistor to switch a higher current load.

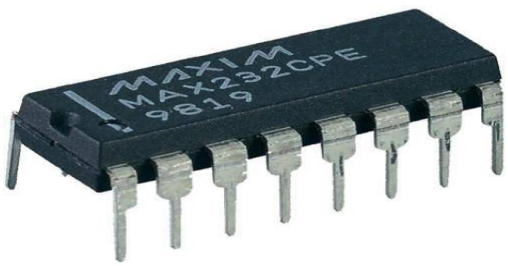
Figure: PIR Sensor Module

BLOCK 4:

Max 232

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply RS 232 voltage levels from a single 5v supply. Each receiver converts RS-232 to 5v TTL/CMOS levels. Each driver converts TLL/CMOS input levels into EIA-232 levels. The P3_0 (RX) and P3_1 (TX) pin of controller is connected to the max 232

driver and the TX and RX pin of max 232 is connected to the GSM modem or PC.



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In this circuit the microcontroller transmitter pin is connected in the MAX232 T2IN pin which converts input 5v TTL/CMOS level to RS232 level. Then T2OUT pin is connected to reviver pin of 9 pin D type serial connector which is directly connected to PC

BLOCK 5:

UART

A UART (Universal Asynchronous Receiver/Transmitter) is the microchip with programming that controls a computer's interface to its attached serial devices. Specifically, it provides the computer with the RS-232C Data Terminal Equipment

(DTE) interface so that it can "talk" to and exchange data with modems and other serial devices. As part of this interface, the UART also:

- Converts the bytes it receives from the computer along parallel circuits into a singleserial bit stream for utbound transmission
- On inbound transmission, converts the serial bit stream into the bytes that the computer handles
- Adds a parity bit (if it's been selected) on outbound transmissions and checks the parity of incoming bytes (if selected) and discards the parity bit
- Adds start and stop delineators on outbound and strips them from inbound transmissions
- Handles interrupt s from the keyboard and mouse (which are serial devices with special port s)
- May handle other kinds of interrupt and device management that require coordinating the computer's speed of operation with device speeds

More advanced UARTs provide some amount of buffering of data so that the computer and serial devices data streams remain coordinated.

BLOCK 6:

LI-FI TRANSCEIVERS

This is because of the huge growth in the number of mobile phones subscriptions in recent times. This has been causing a rapid reduction in free spectrum for future devices. Light fidelity (Li-Fi) operates in the visible light spectrum of the electromagnetic spectrum i.e. it uses visible light as a medium of transmission rather than the traditional radio waves. The figure below shows a brief idea of the functioning of the Li-Fi system.

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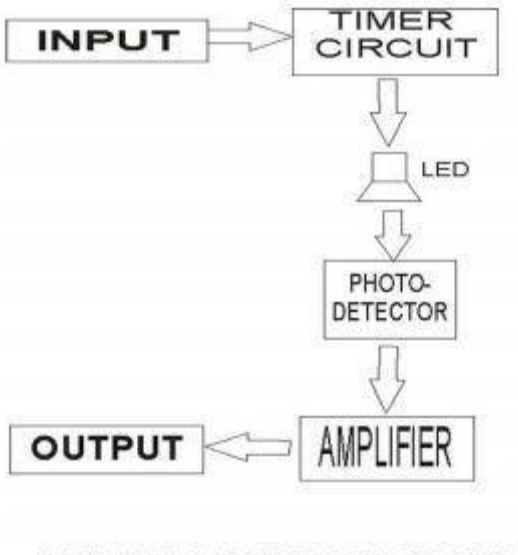

BASIC LI-FI SYSTEM BLOCK DIAGRAM

The Li-Fi system consists of mainly two parts, the transmitter and the receiver. The transmitter part modulates the input signal with the required time period and transmits the data in the form of 1"s and 0"s using a LED bulb. These 1"s and 0"s are nothing but the flashes of the bulb. The receiver part catches these flashes using a photodiode and amplifies the signal and presents the output.

Transmitter:

As per the given diagram, the transmitter section consists of the input, a timer circuit, and a LED bulb. The input can be any type of data that you wish to transmit, for example voice, text etc. The timer circuit is used to provide the required time intervals between each bit. These bits i.e. 1"s and 0"s are transmitted in the form of flashes of the LED bulb.

Receiver:

The flashes of the bulb are received by the photodiode. The photodiode then converts the light energy into electrical signals. Next these electrical signals are amplified and the output is presented.

Block 7:

LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

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HARDWARE REQUIRMENT

- PIC16F877A microcontroller
- Power supply
- PIR sensor
- LCD
- LI-FI transceiver
- MAX232
- Virtual reality module.

SOFTWARE REQUIRMENT

- MPLAB IDE
- Embedded C
- Hyper terminal

Mp-lab IDE

- The mp lab ide is a code developing software and it has a high tech c compiler.
- By using this software we converting the embedded c language (high level) to machine(low level).

Embedded c

- It is an c extension language and it has memory mapping, input and output register.

By using this language we giving the task to microcontroller

APPLICATION

- It is used for hotel management to save the time for waiter and customer.
- Home Appliance control
- Robot control.

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