Wireless Display using RF-Module

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Abstract—Exchange of information has always been important. Without this it is impossible to express one's thoughts and ideas. A study in the various modes of communication has bridged this gap enabling an easy and free flow of information among the people. There has always been an effort to develop various ways and methods to make the transfer of information and data, even more efficient. One such study is in the transfer of serial data over a limited distance i.e., within a particular range. To meet the present day technology needs, data transfer at higher speeds is to be achieved which is possible by RF Communication. This project uses an RF Module to transfer serial data in a better way reducing the cost overhead and limiting the drastic effects of noise. In this project we have two sections, one is transmitter section and the other is receiver section. The transmitter section mainly consists of ATMEL8 and an RF Transmitter. The same is also used in the receiver section. It also involves a wireless LCD Display to display the information transferred. Arduino is used as an ISP (In-System-Programmer). This allows us to use the board to burn the boot loader onto an ATMEL. An antenna is also used at both the transmitter and receiver sections. In this method of serial communication, the maximum baud rate is 8000 bits per second. It can be used within a range of 150metre radius (with obstacles). It also has an error checking feature by which the noise is reduced. For the transfer of information within a short range, this method can be employed as it is more efficient when compared to the prevalent methods of data transfer.

Keywords-ATMEL, LCD, RF, ISP, Transmitter, Communication.

I. INTRODUCTION

Wireless communication is the transfer of information between two or more points by an electrical conductor. It permits services, such as long-range communications, that are impossible or impractical to implement with the use of wires. The communication systems use some form of energy (e.g. radio waves, acoustic energy etc.) transfer the information without the use of wires. Information is transferred in this manner over both short and long distances. Communication systems are classified into two types based upon the way they transfer the data. They are Serial Communication and Parallel Communication. Most of the microprocessors and microcontrollers are designed for parallel communication. In parallel communication number of lines required to transfer data depends on the number of bits to be transferred. For example, to transfer a byte of data, 8 lines are required and all 8-bits are transferred simultaneously. Thus for transmitting data over a long distance, using parallel communication is impractical due to the increase in the cost of cabling. Parallel communication is also not practical for devices such as cassette tapes or a CRT terminal. In such situations serial communication is used.

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In serial communication one bit is transferred at a time over a single line. Serial data transmission can be classified on the basis of how transmission occurs.

II. REQURIMENTS

RF Module 866MHz, 16X2 Display, Two Atmega 8, Keyboard (ps2), 7805 Voltage Regulator.

III. DESCRIPTION

Atmel 8-bit AVR Microcontroller:

Micro Controller is a computer-on-chip, containing a processor, memory, and input and output functions. It is a Microprocessor emphasizing high integration, in contrast to general purpose microprocessor. In addition to the usual arithmetic and logic elements of a general purpose microprocessor, the microcontroller integrates additional elements such as read/write memory for data storage, read only memory for program storage, EPROM for permanent storage, peripheral devices, and input/output interfaces. At clock speeds compared to modern day microprocessors, but this adequate for typical applications. They consume relatively little power and will generally have the ability to sleep while waiting for an interesting peripheral event such as a button press to wake them up again to do something. Power consumption while sleeping may be just nanowatts, making them ideal for low power and long lasting battery applications. Microcontrollers are frequently used in automatically controlled products and devices, such as automobile engine control systems, remote controls, office machines, appliances, power tools and toys. By reducing the size, cost and power Consumption compared to a design using a separate microprocessor, memory and input/output devices, microcontrollers make it economical to electronically control many more processes.

IV. RF MODULE :

An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio. Signals between two devices. In an embedded system it is often desirable to communicate with another. Device wirelessly. This wireless communication may be accomplished through optical communication or through Radio. Frequency (RF) Communication. For many applications the medium of choice is RF since it does not require line of Sight. RF communications incorporate a transmitter and/or receiver.

Transmitter Module:

An RF transmitter module is a small PCB sub-assembly capable of transmitting a radio wave and modulating. That wave to carry data. Transmitter modules are usually implemented alongside a microcontroller which will provide

Data to the module which can be transmitted. RF Transmitters are usually subject to Regulatory requirements which Dictate the maximum allowable Transmitter power output, Harmonics, and band edge requirements.

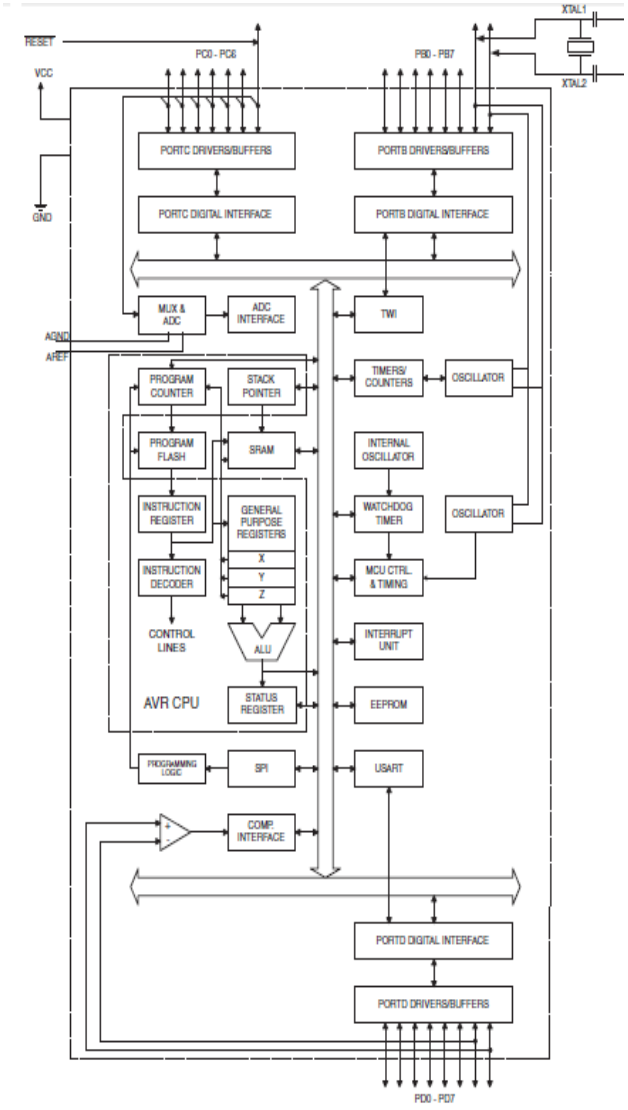
Receiver Module:

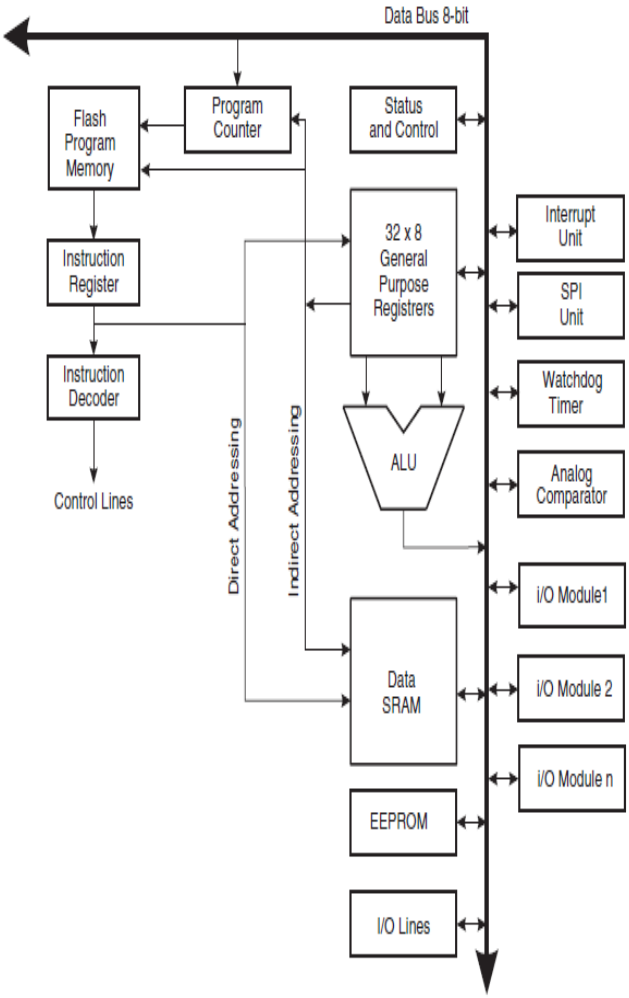
An RF Receiver module receives the modulated RF signal, and demodulates it. There are two types of RF. Receiver modules: Super heterodyne receiver and super regenerative receiver. Super-regenerative modules are usually. Low cost and low power designs using a series of amplifiers to extract modulated data from a carrier wave. Super-Regenerative modules are generally imprecise as their frequency of operation varies considerably with temperature and Power supply voltage. Super-heterodyne receivers have a performance advantage over super-regenerative; they offer Increased accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal Design which in turn leads to a comparatively more expensive product.

Transceiver Module:

An RF Transceiver module incorporates both a transmitter and receiver. The circuit is typically designed for Half-Duplex operation, although Full Duplex modules are available, typically at a higher cost due to added complexity.

Block Diagram:

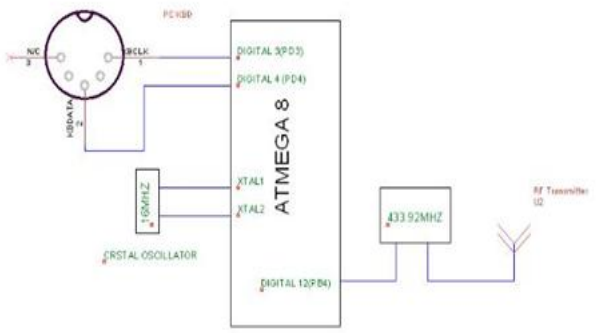




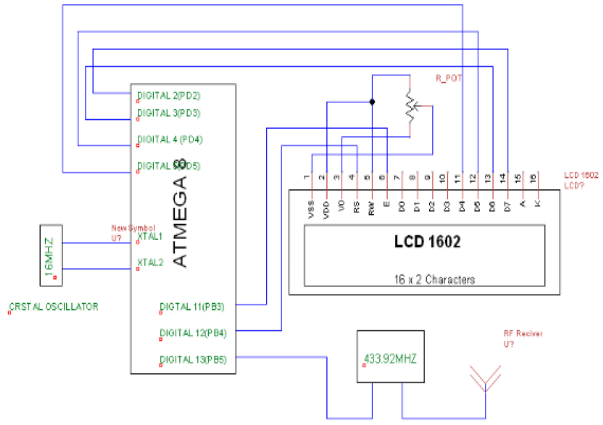
LIQUID CRYSTAL DISPLAY (LCD):

Liquid crystal display is a type of display which used in digital watches and many portable computers. LCD displays utilize two sheets of polarizing material with a liquid crystal solution between them. An electric current passed through the liquid causes the crystals to align so that light cannot pass through them. Each crystal, therefore, is like a shutter, either allowing light to pass through or blocking the light. The liquid crystals can be manipulated through an applied electric voltage so that light is allowed to pass or is blocked. By carefully controlling where and what wavelength (color) of light is allowed to pass, the LCD monitor is able to display images. A back light provides LCD monitor's brightness. Other advances have allowed LCD's to greatly reduce liquid crystal cell response times. Response time is basically the amount of time it takes for a pixel to "change colors". In reality response time is the amount of time it takes a liquid crystal cell to go from being active to inactive. They make complicated equipment easier to operate. LCD's come in many shapes and sizes but the most common is the 16 character x 4 line (16X4) display with no backlight. It requires only 11 connections- eight bits for data (which can be reduced to four if necessary) and three control lines (we have only used two here). It runs off a 5V DC supply and only needs about 1mA of current. The display contrast can be varied by changing the voltage into pin 3 of the display.

Functionality :



Schematic of the Transmitter



Schematic of the Receiver

V. CONCLUSION

In this project an ATMEL 8-bit microcontroller is used along with an RF module at the transmitter end to transmit the data. The data that is to be sent is given through an input device to a microcontroller. Here a PS/2 keyboard is used as a medium through which the input is given. The data is then processed by the microcontroller i.e. the data present in the converted byte code format (ASCII code) is then added a parity bit for each of the bytes. The parallel data is then converted into serial data. This serial data is now given to the RF Transmitter where the data is Amplitude Modulated at a frequency of 433 MHz and transmitted. At the receiver end an RF Receiver module is present that receives the transmitted signal. Here the signal is demodulated and is also checked for errors (a feature present in the receiver module). The demodulated signal is then given to the microcontroller which sends it to the 16x2 LCD display that displays the data intended to be transmitted by the user. This project eliminates this cost overhead by just using an RF Module (433MHz) in addition to the MC. The project also involves a wireless LCD Display to display the information transferred. The maximum baud rate is 8000 bits per second. It can be used within a range of 150m radius (with obstacles). Greater efficiency and the ability to remove signal variations and noise are a few of the advantages of RF modules.

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