Agricultural Applications Control Using Radio Frequency

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Abstract: *A radio frequency (RF) module is a small electronic circuit used to transmit, receive, or transceiver a radio waves on one of a number of carrier frequencies. RF modules are widely used in consumer applications such as garage door openers, wireless alarm systems, industrial remote controls, smart sensor applications and wireless home automation systems. They are often used instead of infrared remote controls as they have the advantage of not requiring line-of-sight operation. Radio Frequency involves two sub units Named, Transmitter & Receiver. As their name implies transmitter is used to transmit or to send the data from input & it convert into serial port data by using HT12E encoder. This encoded data get received by receiver placing far away from it. The first job that a receiver do after receiving it, Is to convert or decode the data into parallel ports by using HT12D decoder. After converting the data into parallel form we simply connect the receiver side circuit with relay so that we can operate AC devices (e.g. Bulb, Tube, Motors) with RF Module.*
Keywords: *Radio Frequency, Wireless ,Micro-controller, Module , Encoder, Decoder.*

I. Introduction

In India mostly the farmers have to start and stop there pumps in there farms manually. It becomes very difficult for them to do it during rainy seasons. As the soil becomes wet and there is also a danger of animal attack on farmers during night .As the rate of leopard attacks on farmers quite increased with the help of RF module just by using a remote he can monitor or control his pumps as well as the luminaries which are present in his farm at long distance away from his house (distance may be in Km , m, cm) . And it can be called as modernized farming.

1.1 Wireless

Wireless is a term used to describe telecommunications in which electromagnetic waves (rather than some form of wire) carry the signal over part or the entire communication path. Some monitoring devices, such as intrusion alarms, employ acoustic waves at frequencies above the range of human hearing; these are also sometimes classified as wireless. Wireless technology is rapidly evolving, and is playing an increasing role in the lives of people throughout the world. In addition, ever larger numbers of people are relying on the technology directly or indirectly. (It has been suggested that wireless is overused in some situations, creating a social nuisance.)

1.1Examples Of Wireless Devices

1. Cordless computer peripherals - the cordless mouse is a common example; keyboards and printers can also be linked to a computer via wireless
2. Cordless telephone sets - these are limited-range devices, not to be confused with cell phones
3. Home-entertainment-system control boxes - the VCR control and the TV channel control are the most common examples; some hi-fi sound systems and FM broadcast Receivers also use this technology
4. Remote garage-door openers - one of the oldest wireless
5. Devices in common use by consumers; usually operates at Radio frequencies. Two-way radios - this includes Amateur and Citizens Radio Service, as well as business, marine, and military Communications
6. Baby monitors - these devices are simplified radio transmitter/receiver units with limited range

II. Hardware

2.1 RF Module

The module consist of a transmitter and a receiver circuit . the encoded output from encoder is given to the transmitter and the transmitter transmits encoded output to the receiver and the receiver gives it to the decoder to decode it. Our distance of RF module can selected of any range according to our requirement . any physical or natural barrier does not affects the RF transmission
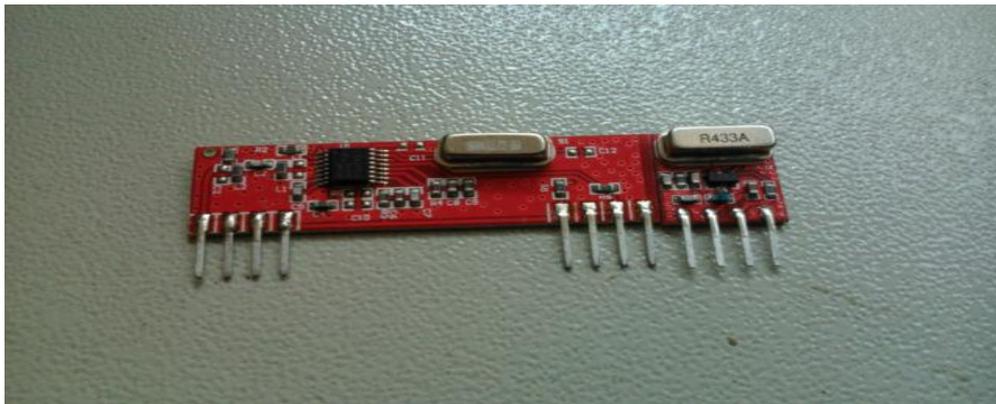
Fig.1: RF Module

2.2Microcontroller

Microcontroller is a main element in the system it gets the decoded signal from the decoder and the signals are compared in it, an from microcontroller the signal is given to the relay driver for the further operation of relay . The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

2.3 Encoder

HT12E Encoder is used, the function of the encoder is it codes the various signals in a protocol and given to the transmitter the transmitter transmit the signals to the receiver. For this conversion of signal encoder is needed. The 212 encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding information which consists of N address bits and 12N data bits. Each address/ data input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a TE trigger on the HT12E or a DATA trigger on the HT12A further enhances the application flexibility of the 212 series of encoders. The HT12A additionally provides a 38 kHz carrier for infrared systems.

2.4 Decoder

HT12D Decoder is used. The decoder receives the signal from the receiver side of the RF module and converts the coded protocol into the format understandable by the microcontroller . its main function is to decode.

2.5Relay

We have used relay having input 10A/120V AC and output 17A/250V AC a relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching

2   SOFTWARE

ORCAD is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and electronic technicians to create electronic schematics and electronic prints for manufacturing printed circuit boards.

3   BLOCK DIAGRAM

The circuit is divided into two parts transmitter circuit and receiver circuit, in transmitter input is given through the keyboard to encoder in which it is converted into a protocol and this signal is send through RF transmitter through transmitter to receiver.
Receiver side
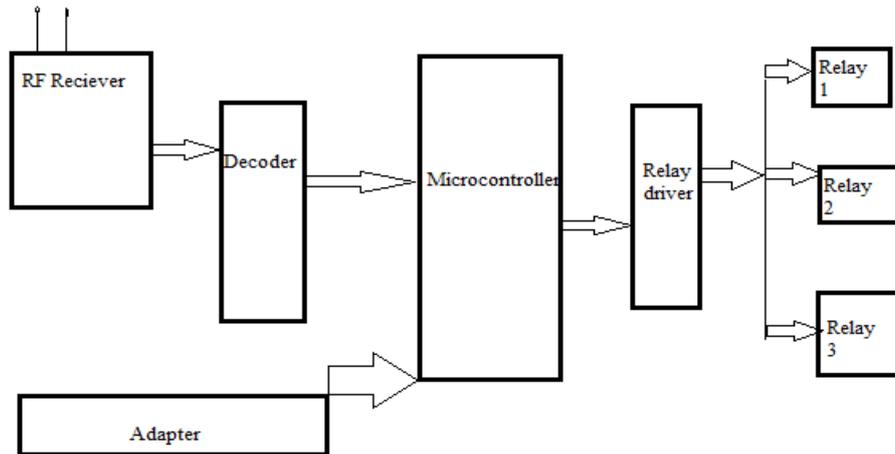
Fig.2: Receiver side Block diagram

Transmitter side
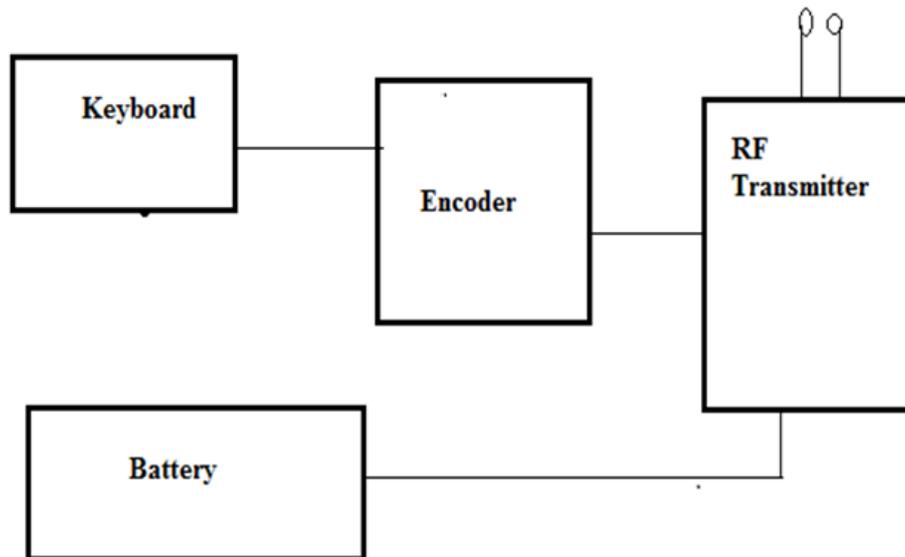
Fig.3: Transmitter side Block diagram

Through receiver it is given to the decoder and the protocol is decoded and the signal is given to the micro controller . micro controller gives command to the relay though relay driver .A microcontroller is given separate energy source through a adapter and various single phase applications are connected to relay which are control by it

III.   Actual Module

All the hardware components are mounted on the PCB . And the module works in the way explained in the circuit diagram
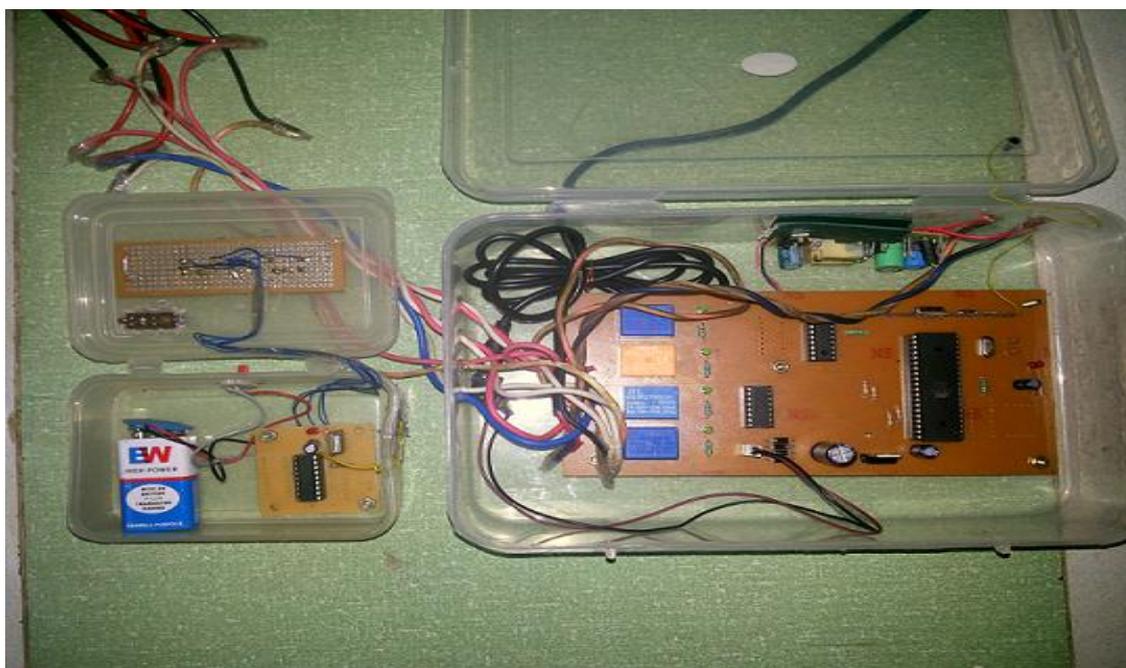
Fig.4: Actual kit

IV.   Conclusion

The above mention system we are using RF technology to control various applications which is cheaper than other systems .It is not affected by any environmental conditions. The system is compact and user-friendly than other systems. The transmission range of the module can be selected according to users requirement.

References

[1].   A.Nasneen Fathima , P.S.Nivedha ,T.Sangavi ,and S.Selvalakshmi " Vehicle tracking system for kid's safety using RFID" ,GPS and GSM, pp 37-41(2016)

[2].   Akshay Punjabi, Siddharth GV ,Siddhant Singhal ,K.V.N .Kavitha " RFID Security system for domestic applications ".vol 04,article 11062; December 2013.

[3].   Panaskar Prajakta R, Patel Karishma M ,Mote Shital P ,Kale Aniket V. "RFID Based school children monitoring system " vol 5, issue1 , January 2016.

[4].   Xiao, Y., Yu, S., Wu ,K., Ni, Q., Janacek ., C.,Nordstad , "Radio frequency identification technologies, applications, and research issues." Wiley journal of wireless communications and mobile computing . vol 7,pp 457-472,2007.

[5].   Higgins , N., L.,Cairney ,T., " RFID opportunities and risks "Journal of corporate accounting and finance , vol,17 (5) : pp 1195-1198 , 2006