Original Research Paper Engineering

WIRELESS ELECTRICAL APPARATUS CONTROLLING SYSTEM WITH SPEED CONTROL OF AC MOTOR USING RF-COMMUNICATION

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ABSTRACT

It is one of the real time applications in industry now a days all electrical devices in Industry are controlled by man power , But in industry so many electrical devices are there. To control all electrical devices we need a lot of " MAN POWER " if manpower increases maintenance cost also increases this is one of the drawbacks of industry, so to avoid such type of drawback we need some wireless controlling systems, One of the wireless communication system is RF (Radio frequency) communication system, it is very cheap and very easy to implement. That is why we have selected RF- Technology, This is not only used in industry but also used for Domestic Purpose as home appliances controlling using RF remote, some persons who are unable to walk to switch board such type of persons need this type of project and also for old persons, why because you can switch ON/OFF load with remote, without moving away from your place, In this project we have six on/off loads and one variable load. In Industry we have different types of loads at different locations. We can control all loads at a time from one place (control room) without connecting any physical wire between loads and control room. In this project we are using RF transmitter, RF receiver, AT89S52 microcontroller, 16X2 LCD, BT136 TRIAC And some discrete components. There are two main sections one is transmitter and Receiver let us explain about transmitter (TX) , Transmitter contain one RF Transmitter , HT12E (encoder) and 8 ON/OFF switches, when we are press one switch, the data from switch taken by encoder(HT12E) is given to Transmitter, The simple transmitter it at RF frequency range(433MHz), At receiver side we are receiving data from Transmitter which is given to decoder (HT 12D) the decoder decodes the data which has received from RF receiver , decoded data is given to AT89S52 , Inside controller there is a S/W Program according to that program, AT89S52 controls all electrical loads. iii . The loads we are using here is AC which should not be directly connected to microcontroller it may be destroyed, To avoid such type of drawback we need some drivers, we are using TRAIC as load controller (as a switch) so we need TRAIC drivers. To drive these AC loads, we are using a combination of (BT136, Moc 3021) Here we use regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer

KEYWORDS :

1.INTRODUCTION TO EMBEDDEDSYSTEMS

An Embedded system is a computer system designed for specific functions within a larger system and 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 controls many devices in common use today. Embedded systems contain processing cores that are typically either microcontrollers or digital signal processors (DSP). The key characteristic, however, is being dedicated to handle a particular task. They may require very powerful processors and extensive communication, for example air traffic control systems may usefully be viewed as embedded, even though they involve mainframe computers and dedicated regional and national networks between airports and radar sites (each radar probably includes one or more embedded systems of its own).

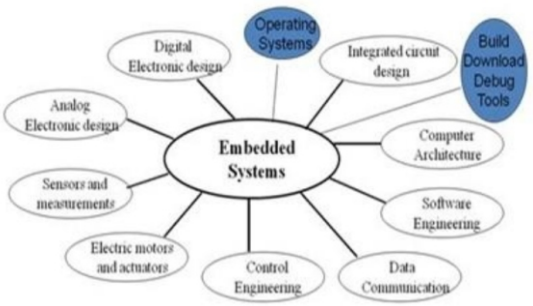


Fig 1.1: Embedded system design calls

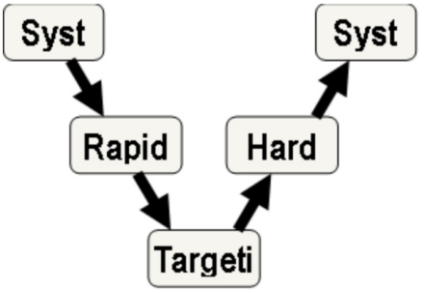


Fig 1.2: Tree Diagram of Embedded

Embedded systems are found in wide range of application areas. Originally they were used only for expensive industrial control applications, but as technology brought down the cost of dedicated processors, they began to appear in moderately expensive applications such as automobiles, communication and office equipments and television Today's embedded systems are so inexpensive that they are used in almost every electronic product in our life. Embedded systems are often designed for mass production.

2. EXISTING SYSTEM

In the existing system, we used the IR technology to control the loads in the homes and industries. For this method, IR transmitter and the receiver must be in the Line of Sight. Then only the communication can take place, In many cases of obstacles occurs in between the transmitter and receiver. To overcome this drawback, we are using the proposed system and it is upgraded to the current technologies

2.1 PROPOSEDSYSTEM

In the proposed system, we are using RF technology to control the loads in the homes/industries. The RF transmitter and RF receiver are no need to be in the Line of Sight. We are using two bulbs and one AC motor in the application. By using switches and the PWM technology, we are increasing or decreasing the speed of the AC motor.

2.2 DIFFERENCE BETWEEN EXISTING AND PROPOSEDSYSTEM

RF stands for Radio Frequency waves which range from 3 KHz to 300 GHz in the frequency scale. IR stands for Infrared waves which range from 300 GHz to 400 THz in the scale. Wavelength of infrared ranges from 700 nm to 1 mm. Typically, the remote control device operates on IR (Infrared) or RF frequency range. Both remotes are used for the same applications to control the remote device mostly television (TV). Let us understand difference between IR and RF remote controls.

Due to advantages of RF over IR as well as easy replacement of IR LEDs with RF Transmitter and IR receiver with RF receiver many IR remote controls are now replaced by RF remote controls. But RF hardware is consider complex compare to IR hardware. Hence choice between IR remote or RF remote lies with the applications of use.

3.DESIGN OF THE PROJECTMODULE

The implementation of the project design can be divided in two parts. Hardware implementation and Firmware implementation.

Hardware implementation deals in drawing the schematic on the plane paper according to the application, testing the schematic design over the breadboard using various IC's to find if the design meets the objective, carrying out the PCB layout of schematic tested on breadboard, finally preparing the board and testing the designed hardware.

The firmware part deals in programming the microcontroller so that it can control the operation of the IC's used in the implementation. In the present work, we have used the ORCAD design software for PCB circuit design, the Keil µv3 software development tool to write and compile the source code, which has been written in the C language. The Proload programmer has been used to write this compile code into the microcontroller. The firmware implementation is explained in the next chapter. The The block diagram discusses about the required components of the design .

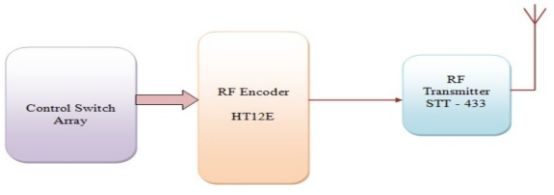


Fig 3.1 Transmitting Section of Wireless Electrical Apparatus Controlling System Using RF Communication

RF TRANSMITTER STT-433MHz:

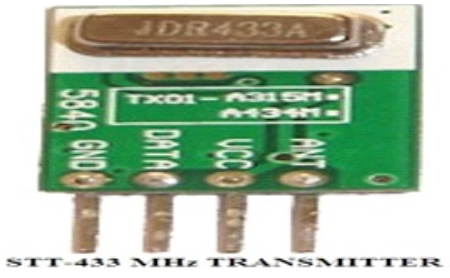
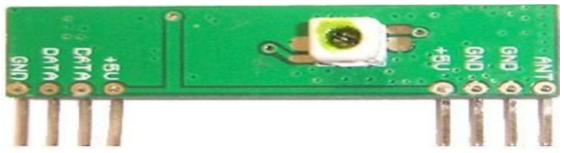


Fig 3.2: RF Transmitter STT-433 Block Diagram

FACTORS INFLUENCED TO CHOOSE STT-433MHz ABOUT THE TRANSMITTER:

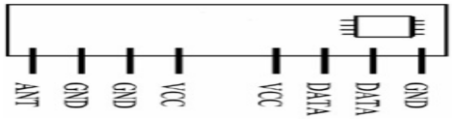
- The STT-433 is ideal for remote control applications where low cost and longer range isrequired.
- The transmitter operates from a1.5-12V supply, making it ideal for battery- poweredapplications.
- The transmitter employs a SAW-stabilized oscillator, ensuring accurate frequency control for best rangeperformance.
- The manufacturing-friendly SIP style package and low-cost make the STT-433 suitable for high volumeapplications.
- Features
- 433.92 MHz Frequency
- LowCost
- 1.5-12Voperation
- Smallsize

FACTOR TO CHOOSE STR-433MHz RF RECEIVER STR-433 MHZ



The data is received by the RF receiver from the antenna pin and this data is available on the data pins. Two Data pins are provided in the receiver module. Thus, this data can be used for further applications.

Fig 3.4 RF Receiver STR-433 Pin Diagram



PINOUT:

ANT: Antenna input.

GND: Receiver Ground. Connect to ground plane.

VCC (5V): VCC pins are electrically connected and provide operating voltage for the receiver. VCC can be applied to either or both. VCC should be bypassed with a .1µF ceramic capacitor. Noise on the power supply will degrade receiver sensitivity.

DATA: Digital data output. This output is capable of driving one TTL or CMOS load. It is a CMOS compatible output.

4. SOFTWARE USED

1. Keil software for cprogramming
2. UcFlash
1. KEILSOFTWARE

It is possible to create the source files in a text editor) and finally running the Object-HEX Converter to convert the Linker output file to an Intel Hex File. Once that has been completed the Hex File can be downloaded to the target hardware and debugged. Alternatively KEIL can be used to create source files; automatically compile, link and covert using options set with an easy to use user interface and finally simulate or perform debugging on the hardware with access to C variables and memory. Unless you have to use the tolls on the command line, the choice is clear. KEIL Greatly simplifies the process of creating and testing an embeddedapplication.

Start Debugging:

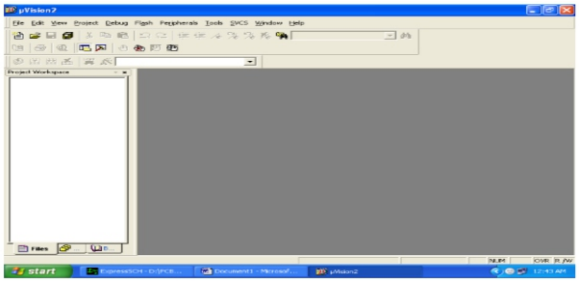
You starts the debug mode of µVision2 with the Debug – Start/Stop Debug Session command. Depending on the Options for Target – Debug Configuration, µVision2 will load the application program and run the start upcode µVision2 saves the editor screen layout and restores the screen layout of the last debug session.

For example, you can use the find command or correct program errors. Program source text of your application is shown in the same windows.

5.SOFTWARE COMPONENTS

KeilVersion:

1. Click on the KeiluVision Icon onDesktop
2. The following fig will appear

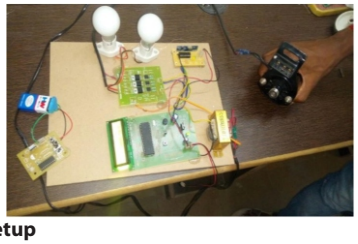


3. Click on the Project menu from the title bar
4. Then Click on New Project

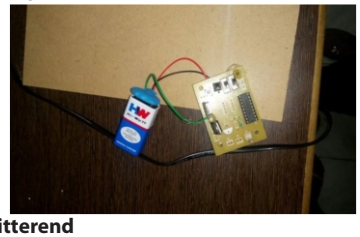
6. RESULTS

Assemble the circuit on the PCB as shown in circuit diagram. After assembling the circuit on the PCB, check it for proper connections before switching on the power supply. Various test was carried out before, during and after the construction has been completed. The multi-meter was extensively used for carrying out most of these tests. Each subunit was tested and confirmed efficient. After the construction of the entire system, the program was written and burned into the microcontroller chip.

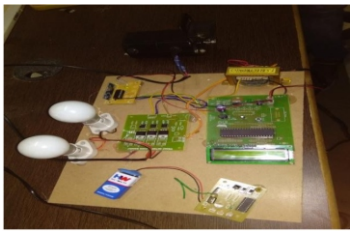
6.1 Kit Photos



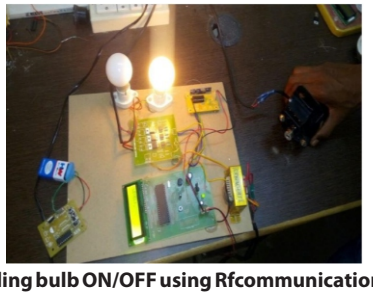
1) **Entire setup**



2) **Transmitterend**



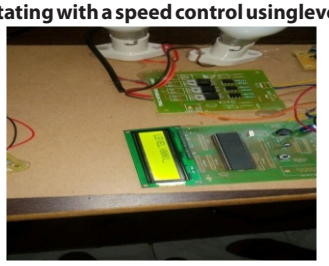
3) **Receiverend**



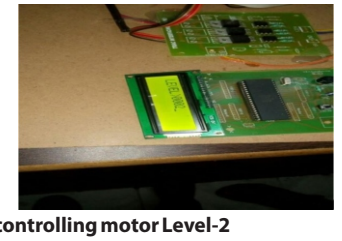
4) **Controlling bulb ON/OFF using Rfcommunication**

5) **Control over 2bulbs**

6) **Motor rotating with a speed control usinglevels**



7) **Speed controlling motor Level-1**



8) **Speed controlling motor Level-2**

9) **Speed controlling motor Level-3**

6.2 WORKINGPROCEDURE:

The main aim of this project is to control the loads and regulates it's speed using the RF communication technology. This is the wireless technology. For this project, we are using the AT89S52 microcontroller, RF transmitter section and RF receiver section and loads. At the RF transmitter section, we have switches to control the loads at the receiver side and these are connected to the HT-12E encoder to give the encoded output.The RF transmitter will get that data from the encode rand send to the receiver side using the RF technology.

At the receiver side, the RF receiver will receive the data through the antenna and that data was decoded by using the HT-1D decoder. The decoded data was connected to the AT89S52 microcontroller and according to that data; the controller will control (ON/OFF) or regulate the speed of the loads. To control the speed of the AC motor, here we are using the duty cycle changing in the coding. There are two switches for speed increment/decrement purpose at the transmitter side. If you press the increment switch then the duty cycle varies and the speed of the motor will increase. Like the same way for the decrement switch also.

The coding for this project was written in the embedded C language and compiled using the KEIL software. To dump the hex file into the controller, we are using the PROLOAD software.

7.CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. This project presents us with a chance to use maximum solar energy for power generation instead of going with non-renewable energy resources and hence thus contributing a greenerenvironment.

Also, using highly advanced ICs with the help of growing technology, theproject has been successfully implemented. Thus the project has been successfully designed and tested.

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