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Enhanced Wireless Security System With Digital code lock using RF &GSM Technology

[1]E.Supraja,[M.Tech.],[2]K.V.Goutham,[M.Tech.],
[3]N.Subramanyam,[M.Tech.],[4]A.Dasthagiraiah,[M.Tech.],
[5]Dr.H.K.P.Prasad,[Ph.D]
[1,2,3,4] *Assistant Professors in Priyadarshini Institute Of Technology ,Nellore*
[5,] *Pricipal at Priyadarshini Institute Of Technology ,Nellore*

Abstract

Security is primary concern in our day-to-day life. Everyone wants to be as much as secure as possible. An access control system forms a vital link in a security chain. This access control system allows only authorized persons to access a restricted area .this system is best suitable for corporate offices ,ATMs and home security. This project is aimed to design a digital code lock system with a status display by using wireless communications RF technology and GSM technology. The wireless communications is established by using RF modules and a digital keypad interfaced to the controller. The authentication is provided through password for locking or unlocking the system and the status will be displayed using LCD module and the acknowledgement is provided to the user by GSM technology.

Key Words: *GSM,LCD,RF*

I. INTRODUCTION

Wireless communications has announced its arrival as big stage and the world is going mobile. We want to control everything and without moving an inch. This remote control of appliances as possible through embedded systems. The use of "Embedded Systems" in communication has given rise to many interesting applications that ensures comfort and safety to human life. In this paper, it is proposed to design a model where the security of a locking system can be enhanced with the help of RF and GSM wireless technology by using a 4 digit password which provides the authentication.

Here the wireless communication between the remote areas can be achieved by using the RF modules called RF transmitter and RF receiver. This project is designed in such a way that the digital keypad is interfaced to the controller, on the transmitter side. When we enter the password(code) through this keypad, the controller will compares it with the preset password and passes a corresponding signal to the RF transmitter which is also interfaced to the controller. The signal passed will be indicating whether the password is matched or not. Now on the receiver side, the receiver will receive the signal transmitted by the transmitter and passes the corresponding signal to the controller through an RF decoder. The RF decoder is used to decode the signal received by the receiver into 4 bit digital data. Now the controller will display the corresponding message on LCD i.e. if the password is matched it will display "UNLOCKED" and if it is not matched "LOCKED" will be displayed and the same displayed message will be send to our mobile using GSM technology so that the user can get the acknowledgement of the status of code lock.

II. EXISTING SYSTEM:

The system that is in existence for wireless digital code lock is that code is provided and the system will be unlocked. No acknowledgements will be given to the users and it may become a major backdrop of the system if an unauthorized person uses the system by hacking the system password.

III. PROPOSED SYSTEM:

In order to overcome the backdrops of existing system ,it is proposed to design a system with enhanced security in order to prevent the hacking. The GSM technology is used for this and after the system gets unlocked ,the acknowledgement of the status of locking system will be sent as SMS to the user i.e., the authorised person whose number is predefined in the system software.

With this enhanced security system, we can feel safe such that we will be known whether if any unauthorised people unlocked the system if any intruder attacked the system.

Hardware requirements:

The system consists of two sections, the transmitter section and the receiver section.

The transmitter section consists of power supply, keypad, RF encoder, RF transmitter and piezo buzzer interfaced to the microcontroller.

The receiver section consists of power supply, RF receiver, RF decoder, LCD display, DC servo motor and GSM modem.

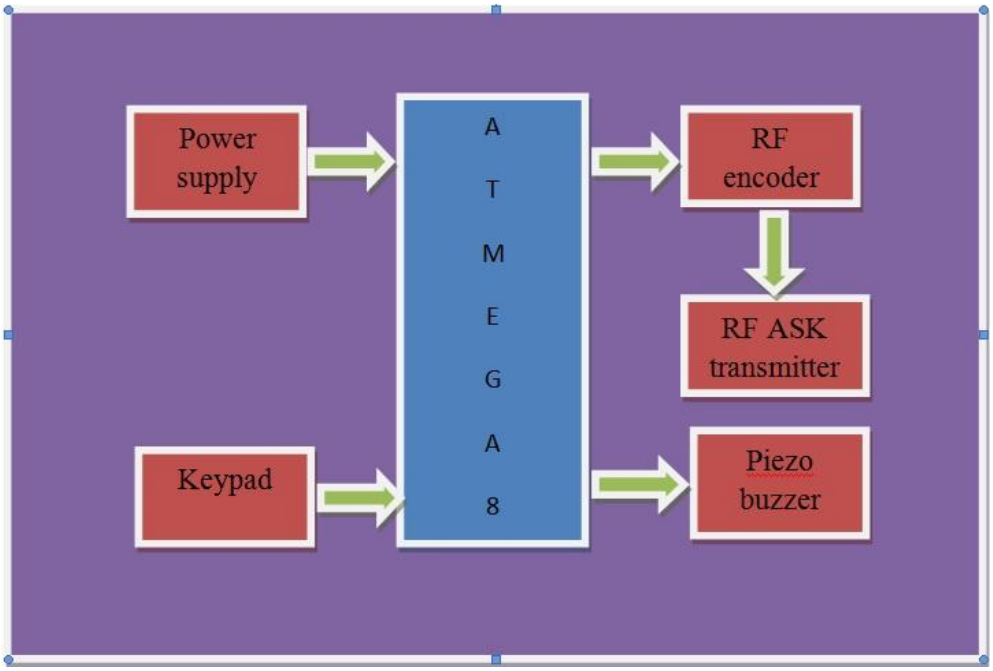

Fig 1: Transmitter section

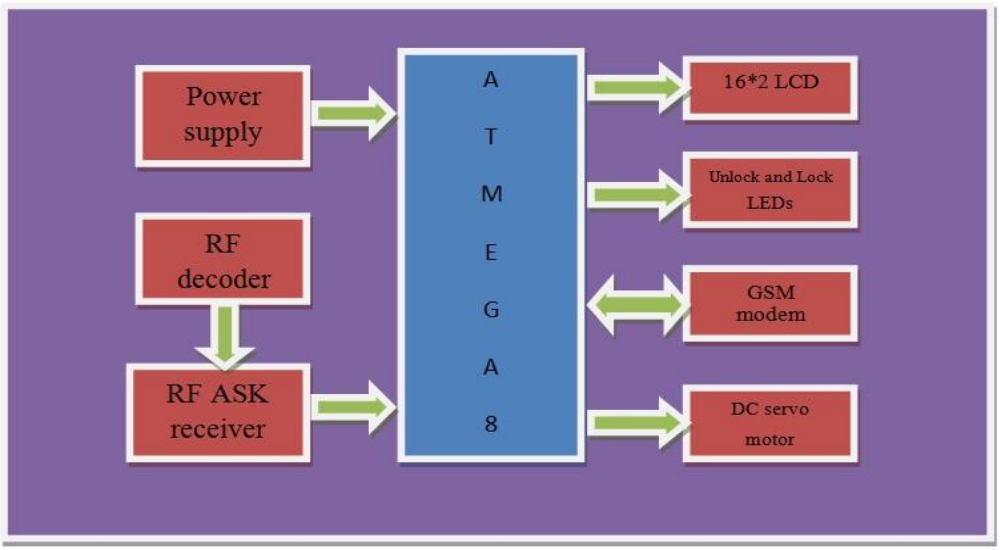

Fig 2: Receiver section

IV. ATMEGA 8 MICROCONTROLLER:

The Atmega8 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle.

Power supply:

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU.

Keypad switches:

The key board here we are interfacing is a matrix keyboard. This key board is designed with a particular rows and columns. These rows and columns are connected to the microcontroller through its ports of the micro controller ATMEGA 8.

RF transmitter [STT 433]:

The STT-433 is ideal for remote control applications where low cost and longer range is required. The transmitter operates from a 1.5-12v supply, making it ideal for battery-powered applications. The transmitter employs a SAW-stabilized oscillator , ensuring accurate frequency control for best range performance. Output power and harmonic emissions are easy to control, making FCC and ETSI compliance easy. The manufacturing-friendly SIP style package and low-cost make the STT-433 suitable for high volume applications.

RF receiver [STR 433]:

The STR-433 is ideal for short-range remote control applications where cost is a primary concern. The receiver module requires no external RF components except for the antenna. It generates virtually no emissions, making FCC and ETSI approvals easy. The super-regenerative design exhibits exceptional sensitivity at a very low cost. The manufacturing-friendly SIP style package and low-cost make the STR-433 suitable for high volume applications.

RF encoder [HT12E]:

The HT 12E Encoder ICs are series of CMOS LSIs for Remote Control system applications. They are capable of Encoding 12 bit of information which consists of N address bits and 12-N data bits. Each address/data input is externally trinary programmable if bonded out.

RF decoder [HT12D]:

The HT 12D ICs are series of CMOS LSIs for remote control system applications. This ICs are paired with each other. For proper operation a pair of encoder/decoder with the same number of address and data format should be selected. The Decoder receive the serial address and data from its corresponding decoder, transmitted by a carrier using an RF transmission medium and gives output to the output pins after processing the data.

GSM modem:

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily.

LCD display:

A program must interact with the outside world using input and output devices that communicate directly with a human being. One of the most common devices attached to an controller is an LCD display. Some of the most common LCDs connected to the controllers are 16X1, 16x2 and 20x2 displays. This means 16 characters per line by 1 line 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

V. SOFTWARE REQUIREMENTS:

Arduino is an open source electronics platform accompanied with a hardware and software to design, develop and test complex electronics prototypes and products. The hardware consists of a microcontroller with other electronic components which can be programmed using the software to do almost any task. The simplicity of the Arduino language makes it very easy for almost everyone who has an interest in electronics to write programs without the understanding of complex algorithms or codes.

Figure-a: Arduino script editor

VI. OPERATIONAL PROCEDURE:

The code will be initialized whenever the power is ON. The controller continuously scan the data from the keypad and whenever the password is entered through the digital keypad interfaced to the controller, the RF encoder which is a parallel to serial convertor encodes the data and is given to the RF transmitter. The RF transmitter modulates the signal using ASK technique and transmits the data signal into the free space. The RF receiver at the receiver section receives the signal that is transmitted from the transmitter and the received signal is demodulated to recover the transmitted data. The data from the RF receiver is given to the RF decoder where it decodes the data and if the code matches with the predefined code, the necessary action will be performed by using the micro controller. The message corresponding to the particular action is sent to the mobile of the authenticated or authorized user whose mobile number is predefined in the system code by using the GSM modem at the receiver section.

VII. RESULT:

The experimental prototype of the transmitter module will be as shown in the figure-b.

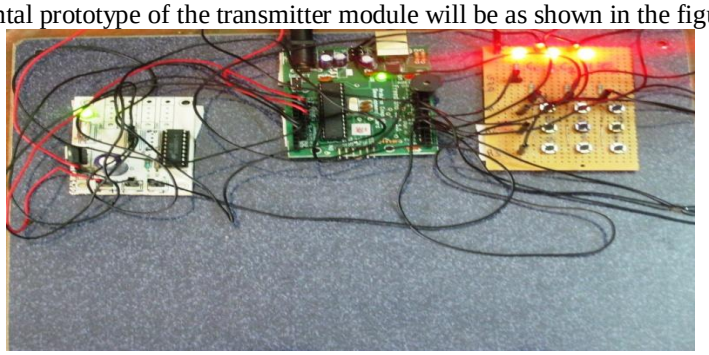

Figure-b: Transmitter module

The prototype of the receiver module will be as shown in the figure-c.

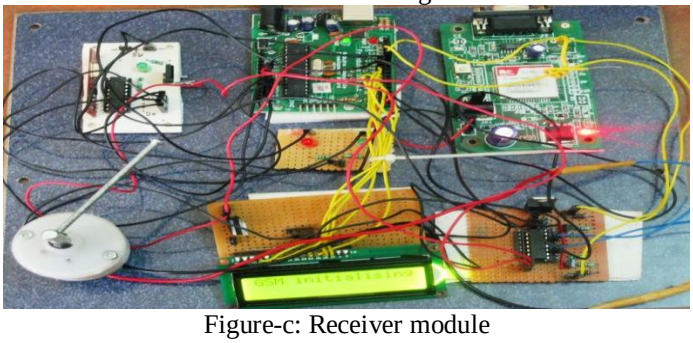

Figure-c: Receiver module

The status of the system will be displayed using the LCD display as shown in below figures-d & e.

Figure-d: System unlocked

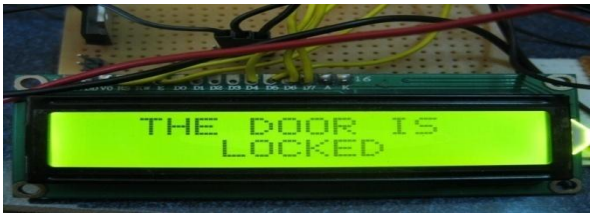

Figure-e: System locked

VIII. APPLICATIONS:

- This system can be employed in banks for enhancing locker door security.
- It can be employed in police stations and prisons in order to enhance the security of the criminals.
- It can be used as a door lock where the security is the major concern.
- It can be used to prevent the hacking as we are provided with acknowledgement of the status of the locking system.
- It can be employed in ATM's for improving the security protocol.
- It can also be used in corporate offices as a digital code lock for restricted areas.
- It can be employed in home security system.

IX. FUTURE WORK:

The future work of this project is to design a system such that the system scans the photo of the person entering the password and by using the "Digital Image Processing", the scanned photo gets compared with the predefined image of the authorized user in the system. If the both images match, then the system operation takes place or else the access will be denied. This future design will still enhance the security of the system because only authorized persons should enter the password so that intruder or hacker cannot access the system even though he knows the password.

AUTHORS PROFILE:

Dr.P.HariKrishnaPrasad, MIEEE, MACSIT, MISTE, at present is a Principal in Priyadarshini Institute of Technology, Nellore, Andhra Pradesh, India. He received B.Tech. degree in Electrical and Electronics Engineering from Nagarjuna University in2000 , M.Tech (Power Electronics) from O.U University, Belgaum India in 2002 and Doctoral Degree in Electrical & Electronics Engineering from Bangalore University, Bangalore, India . He published more than 20 papers in various National, International Conferences and Journals.

Mr. A.Dasthagiraiah- He completed his Master of Technology in Electronics and communication Engineering from Hindustan University,Chennai in the year 2011 with specialization in Embedded Systems. He has given guidance to many students in their thesis work of M.Tech. He has also contributed in the research work on Embedded Systems with his papers. He has four years teaching Experience and presently working as Asst. Professor in Priyadarshini Institute of Technology,SPSR Nellore. He has done Bachelor's of Technology from JNTUA University in the year 2009 in Electronics and Communication Engineering

Mrs. E.Supraja:- She completed her Master of Technology in Electronics and communication Engineering fromPBRVITS,Kavali in the year 2013 with specialization in VLSI Systems. She has given guidance to many students in their thesis work of M.Tech She has 6 years teaching Experience and presently working as Asst. Professor in Priyadarshini Institute of Technology,SPSR Nellore. She has done Bachelor's of Technology from JNTUA University in the year 2006 in Electronics and Communication Engineering.

Mr. N.Subramanyam- He completed his Master of Technology in Electronics and communication Engineering from JNTUA in the year 2011 with specialization in Embedded Systems. He has given guidance to many students in their thesis work of M.Tech. He has also contributed in the research work on Embedded Systems with his papers. He has four years teaching Experience and presently working as Asst. Professor in Priyadarshini Institute of Technology,SPSR Nellore. He has done Bachelor's of Technology from ANNA University in the year 2009 in Electronics and Communication Engineering

Mr.K.V.Goutham:- He completed his Master of Technology in Electronics and communication Engineering from JNTUA in the year 2010. He has given guidance to many students in their thesis work of M.Tech. He has also contributed in the research work on Embedded Systems with his papers. He has four years teaching Experience and presently working as Asst. Professor in Priyadarshini Institute of Technology,SPSR Nellore. He has done Bachelor's of Technology from JNTUA University in the year 2008 in Electronics and Communication Engineering