DEVELOPMENT OF ARDUINO-BASED DOOR SURVEILLANCE SYSTEM

ABSTRACT

Everyone wants to feel safe within their home and work environment. Over the years, home and office securities were achieved by employing watch dogs and security personnel to safeguard lives and properties. These methods worked for the time being but failed in some aspect as both the watch dogs and security personal could be overpowered, drugged and even be hurt by these attackers. This pilot research work titled "Development of Arduino-based door surveillance system" is aimed to increase the security of home and offices by capturing the image of the person at the door and displaying same in the television kept inside. This system is designed to capture, and displays the images of individual that came to the door all the time. This will help in monitoring and showing the person entering the environment, through which an unknown individual or intruder can easily be identified. Using the camera, one can see every person who enters and leaves the place just by watching on the television from another room The system was implemented using a PIR sensor and an Arduino microcontroller with software assistance of Arduino IDE and Processing Development Environment (PDE) required for its control. The system was tested satisfactorily.

Keywords: Surveillance, door, security, crime, intruders

INTRODUCTION

Over the years, home security was achieved by employing watch dogs and security personnel to safeguard lives and properties. These methods worked for the time being but failed in some aspect as both the watch dogs and security personal could be overpowered, drugged and even be hurt by attackers (Bing, et al., 2001; Meyer, et al., 1996). However, security in our homes and offices can be improved upon by introduction of simple but smart advanced system and hence the development of this system.

The PIR sensor used in this project is basically a motion sensor or detector and captures any person that moves within the area mounted while the buzzer triggers an alarm in the receiver. The Arduino Uno microcontroller board based on the ATmega328P has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button (Jun, et al., 2011). An encoder is a device used to change a signal or data into a code while the code may serve any of a number of purposes such as compressing information for transmission or storage, encrypting or adding redundancies to the input code, or translating from one code to another. In digital electronics this would mean that an encoder is a multiple-input, multiple-output logic circuit (2n-n) (Lit, et al., 2011, Sivagamasundari and Janani , 2012).

A decoder is a device which does the reverse of an encoder, undoing the encoding so that the original information can be retrieved. The same method used to encode is usually just

reversed in order to decode. In digital electronics this would mean that a decoder is a multiple-input, multiple-output logic circuit (n-2n) (Lit, et al., 2011, Sivagamasundari and Janani , 2012).

MATERIAL AND METHODS

Requirements

The system is made up of the following hardware component-PIR sensors, HT12E encoder, HT12D decoder, RF 434 transmitter, RF 434 receiver, buzzer, relay module and Arduino Uno board programmed with C language that is executable in Arduino UNO.

Block Diagram of the System

This work consists of two sub-systems which include the transmitting and receiving units respectively. When the system is switched on, the transmitter's red light (mounted at the door entrance) and the receiver green light (mounted inside the house) glows. When someone comes to the door and strikes the door bell, the receiver's buzzer triggers an alarm and the relay, the relay then, switches on the camera outside the house and the television inside the house to capture the image of the person outside the door. If the television is already switched on, only the camera will be switched on. Once the person enters through the door, the buzzer and the camera turns off.

The block diagrams of the transmitter and receiver section is as shown in figure 2 and figure 3 below.

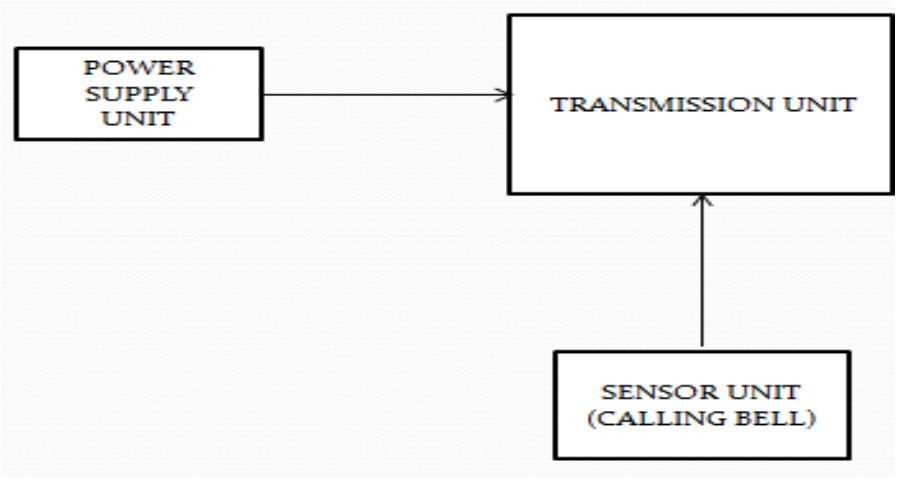

Figure 1: Block diagram of the transmitter section

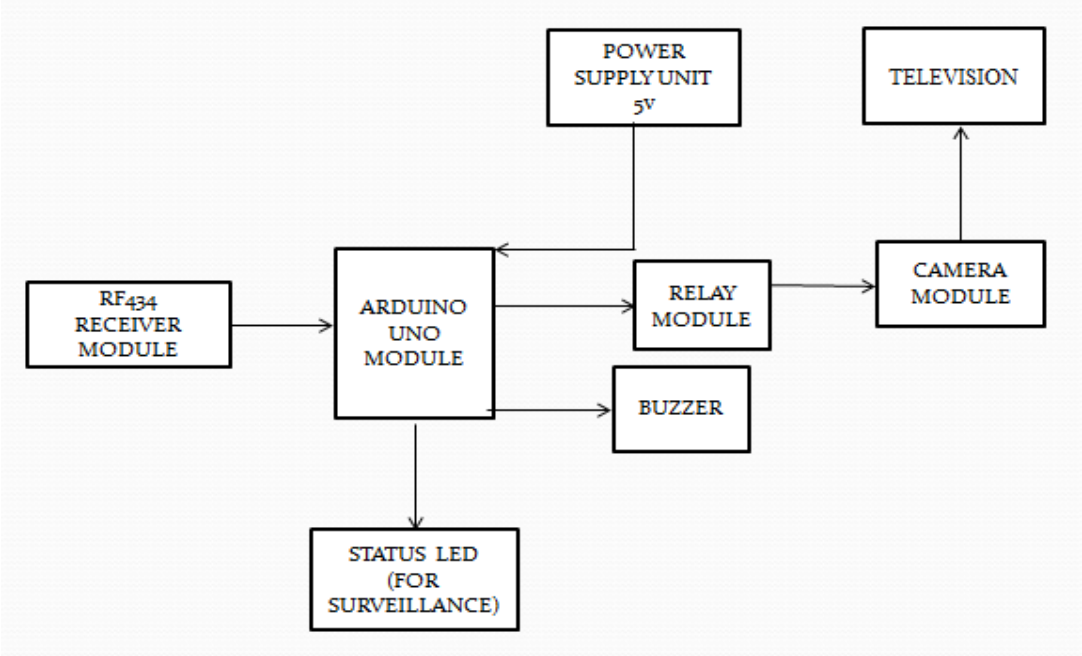

Figure 2: Block diagram of the receiver section

The transmitter circuit utilizes the radio frequency (RF) module operating a wireless remote, which is used to drive an output from a distant place. The RF module uses radio frequency to send signals which is transmitted at 434 mHz. Encoder IC (HT12E) receives parallel data in the form of address bits and control bits. The control signals from remote switches along with 8 address bits constitute a set of 12 parallel signals. The encoder HT12E encodes these parallel signals into serial bits. The transmitted signals are received by the receiver module mounted inside.

The receiver module receives serial input and sends these signals through pin2 to the decoder. The signal is received and decoded by HT12D decoder module of the controller. The decoders receive data that are transmitted by an encoder and interpret the first N bits of code period as addresses and the last 12_N bits as data, where N is the address code number.

IMPLEMENTATION AND RESULT

The circuit diagram as shown in figure 3 was used to produce a prototype as shown in figure 5. Figure 4 shows the implementation and wiring of the circuit diagram in the veroboard.

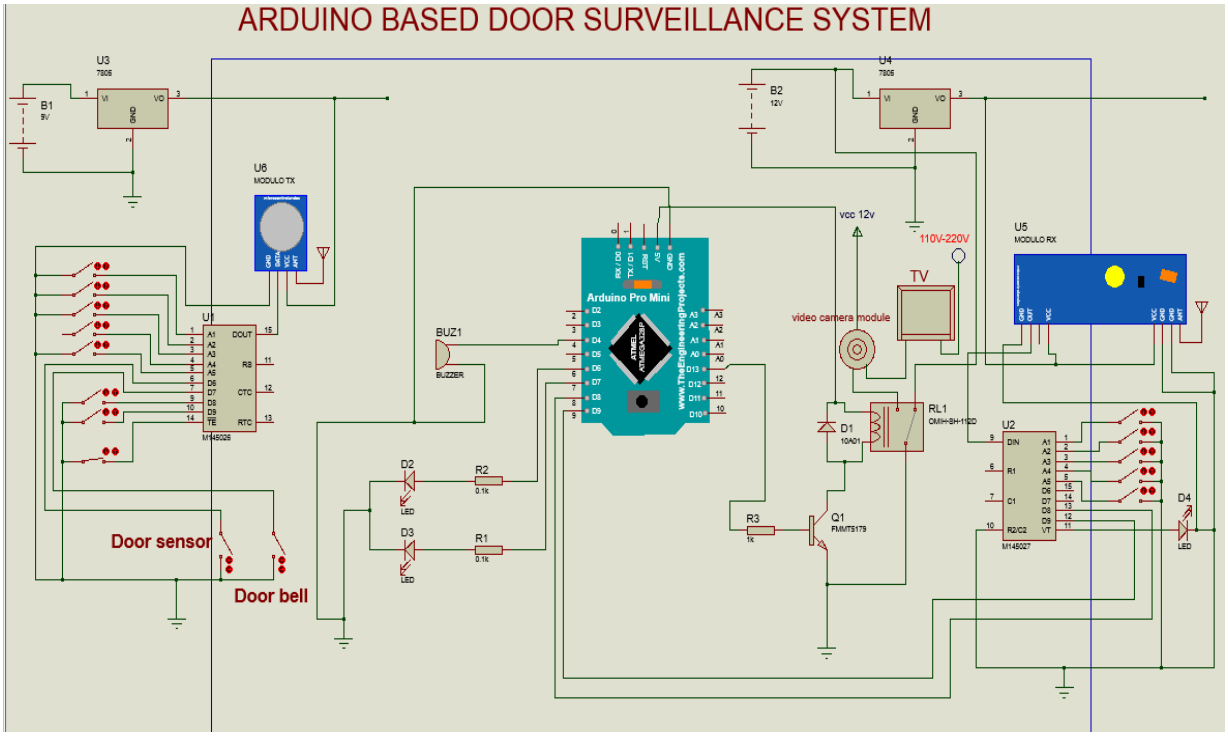

Figure 3: Circuit diagram of the system

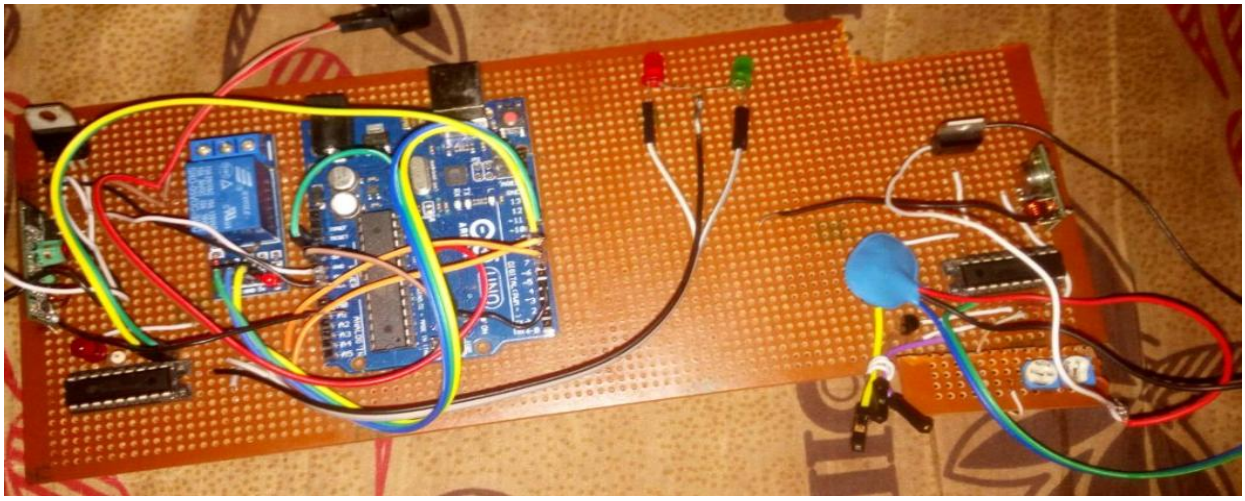

Figure 4: Wiring of the system in a veroboard of the system

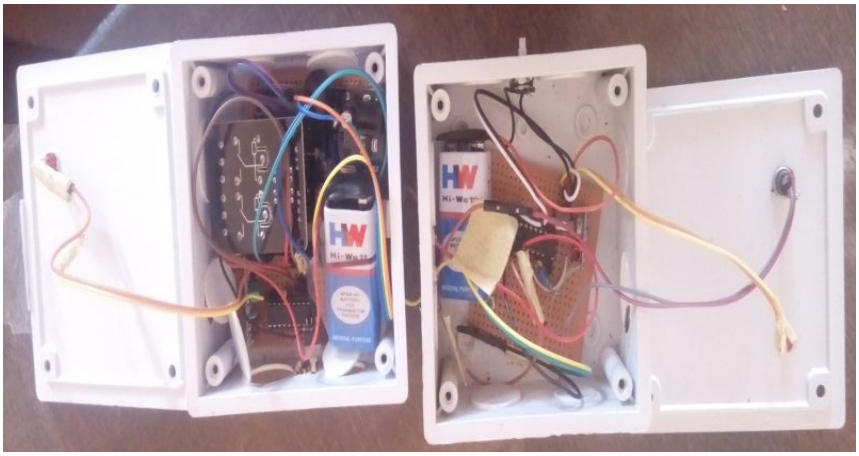

Figure 5: Prototype of the system

CONCLUSION:

A highly technically advanced security system for residential and business area has been developed. However to ensure improvement of the system, there is need to provide a database for storing the videos of captured images. This project provided some solutions to the security shortfall in our homes and offices.

References

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