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Finger Print Door Lock System and Voice Controlled Home Appliances Using Arduino

Hathi Manasa Priya*, B Baskar Reddy, G S Surendra Babu, Praveen K
Bheema Institute of Technology and Sciences, Adoni, Andhra Pradesh, India

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ABSTRACT

The study of different papers have helped to propose a system which will monitor the home appliances like light, fan, door and bulb without remote control. In this system, we are additionally using the fingerprint module RC03 for finger enrolment of person. Connect the Bluetooth to the smart phone wirelessly open AMR App. Connect Bluetooth to the smart Phone. Open the 'AMR app' and connect the host address it will show 'connected' and then it will show MIC symbol and need to place enrolled finger on fingerprint module. If Finger is detected the LCD display shows DETECTED and solenoid door opens. Now open AMR app in mobile and click MIC icon and give voice commands. After receiving commands the appropriate loads, gets turned ON/OFF.

Keywords: Audiono UNO, IoT, RC03 Finger Print Module

I. INTRODUCTION

Home automation is anything that enables to use home's lighting, heating and appliances more conveniently and efficiently .It is simple automatic control of lights. Home automation has been a feature of science writing for many years, but it is become practical since the early 20th Century following extended introduction of electricity into the home, and the rapid advancement of information technology. Home automation is nothing but the application of computer and information technology for control of home appliances easily. Home automation which include centralized control of Light, Appliances, Temperature and other systems, to provide improved convenience, comfort, energy, efficiency and security. Home automation can provide increased quality of life for persons in recent years due to much higher affordability and simplicity through Smartphone and tablet connectivity. The concept of the "Internet of Things" has tied in closely with the popularization of home automation. Through the integration of information technologies with the home environment systems and appliances are able to communicate in an integrated manner which results in convenience, energy efficiency and safety benefits. By using Arduino Uno, It is a popular open source single board microcontroller, descendant of the open-source Wiring platform, designed to make the process of using electronics in multidisciplinary projects more accessible.

II. MOTIVATION

Smart Home System provide interface between various types of home and electrical appliances like windows, fans etc. It provides control and ease of use of appliances as per users need. After analysing other existing systems, we propose the novel technique for better human interaction and for providing better utilization of android and ARDUINOUNO. By using Home automation system, we can manage cost, flexible and energy efficient smart homes.

III. LITERATURE REVIEW

1. An "Sensor Based Home Automation and Security System" by Mansour H. Assaf, Ronald Mootoo, Sunil R. Das, Emil M. Petriu, VoicuGroza, and Satyendra Biswas. The conventional design of home security systems typically monitors only the property and lacks physical control aspects of the house itself. Also, the term security is not well defined because there is a time delay between the alarm system going on and actual arrival of the security personnel. This paper discusses the development of a home security and monitoring system that works where the traditional security systems that are mainly concerned about curbing burglary and gathering evidence against trespassing fail. The paper presents the design and implementation details of this new home control and security system based on field programmable gate array (FPGA) The user here can interact directly with the system through a web-based interface over the Internet, while home appliances like air conditioners, lights, door locks and gates are remotely controlled through a user-friendly web page. An additional feature that enhances the security aspect of the system is its capability of monitoring entry points such as doors and windows so that in the event any breach, an alerting email message is sent to the home owner instantly.
2. "I-Learning IoT: An Intelligent Self Learning System for Home Automation Using IoT" by VishwajeetHariBhide, Dr. SanjeevWagh. Internet of Things (IoT) is extension of current internet to provide communication, connection, and inter-networking between various devices or physical objects also known as "Things." In this paper we have reported an effective use of IoT for Environmental Condition Monitoring and Controlling in Homes. We also provide fault detection and correction in any devices connected to this system automatically. Home Automation is nothing but automation of regular activities inside the home. Now a day's due to huge advancement in wireless sensor network and other computation technologies, it is possible to provide flexible and low cost home automation system. However there is no any system available in market which provides home automation as well as error detection in the devices efficiently. In this system we use prediction to find out the required solution if any problem occurs in any device connected to the system. To achieve that we are applying Data Mining concept. For efficient data mining we use Naive Bayes Classifier algorithm to find out the best possible solution. This gives a huge upper hand on other available home automation system, and we actually manage to provide a real intelligent system.
3. "Smart Home System Using Android Application" by R.A.Ramlee, M.A.Othman, M.H.Leong, M.M.Ismail, S.S.S.Ranjit. This paper presents the overall design of Home Automation System (HAS) with low cost and wireless remote control. This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home. The main control system implements wireless Bluetooth technology to provide remote access from PC/laptop or smart phone. The design remains the existing electrical switches and provides more

safety control on the switches with low voltage activating method. The switches status is synchronized in all the control system whereby every user interface indicates the real time existing switches status. The system intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation.

4. "Smart Home Automation System Using Wi-Fi Low Power Devices" by SilviuFolea, Daniela Bordencea, Casiana Hotea, HonoriuValean. Home automation is gaining popularity nowadays. A smart home automation system is based on ensuring security and making user life easier. It contains a large number of sensors which can control or monitor objects distributed in three-dimensional space. The sensors can be specialized in measuring temperature, humidity, pressure, light, noise, dust air, and so on. In this paper, a solution to transform a normal house in a smart house while reducing the energy consumption is proposed. This can be realized with the help of wireless sensor networks and of the Lab VIEW™ graphical programming environment, which use the NI Lab VIEW™ State chart Module for collecting data from sensors.

5. Agent Based System for Home Automation, Monitoring and Security" by D. Bordencea, H. Valean, S. Folea, A. Dobircau. Collecting data from sensors, for various applications and scenarios, is becoming a norm. Each sensor is connected to an Access Point (AP), which forwards the data to a host computer. When an AP fails, it causes all sensors connected to it to be offline for a while. In this paper, an adaptive and fault-tolerant system that continues to function in presence of AP failures and sensor joins (churn) is proposed. As a case study, it is showed how the system can be used to automate a building. The APs have associated software agents that use Paxos protocol to allocate the sensors to APs under churn. Virtual redundancy is implemented via Paxos, thus when an AP fails, its role will be taken by another AP. Hence, it is achieved high reliability by using software agents with wireless sensors, and employing the Paxos protocol, without any component redundancy and with low implementation cost.

IV. PROJECT DESCRIPTION

This chapter deals with working of "Implementation and recent progress in smart home automation". It can be simply understood by its block diagram

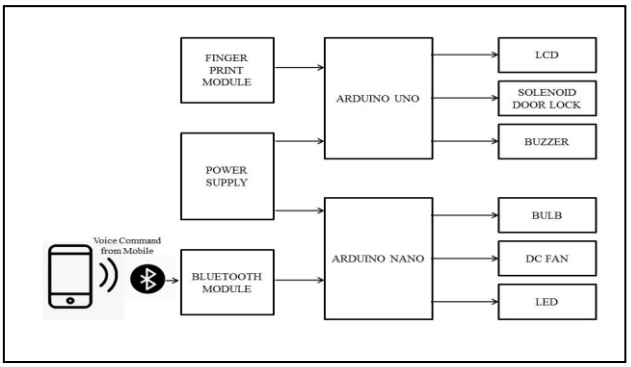


Fig 3.1: Block diagram

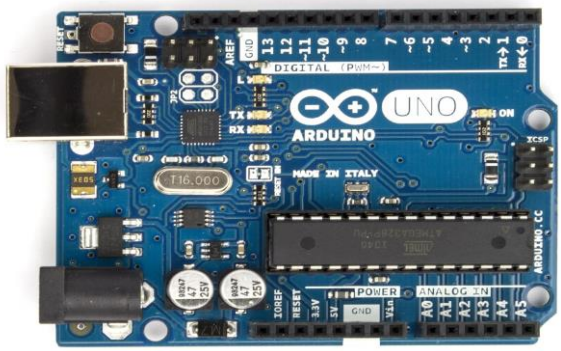
Description:

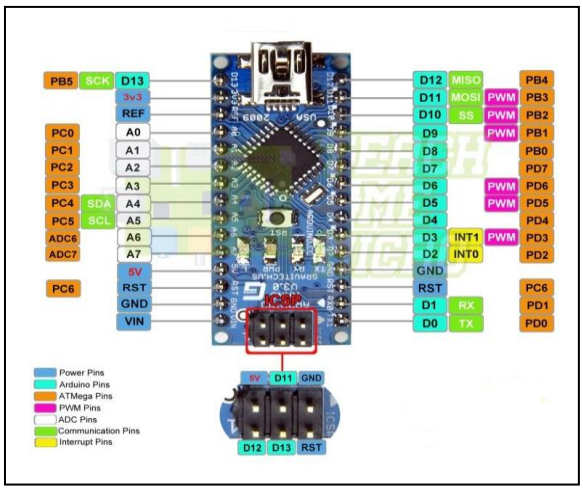
- First and foremost all the components Arduino Uno, fingerprint module, Bluetooth module, Arduino Nano LCD Display are initialized by connecting the whole system to the power supply.
- Connect the Bluetooth to the smart phone wirelessly open AMR App.
- After connecting the Bluetooth to the smart Phone. After open the 'AMR app' and connect the host address it will show 'connected' and then it will show MIC symbol.
- First we need to place enrolled finger on fingerprint module.
- If Finger is detected the LCD display shows DETECTED and solenoid door opens.

- Now open AMR app in mobile and click MIC icon and give voice commands.
- After receiving commands the appropriate loads gets turned ON/OFF.

V. DESIGN OF HARDWARE

ATMEGA328 MICROCONTROLLER





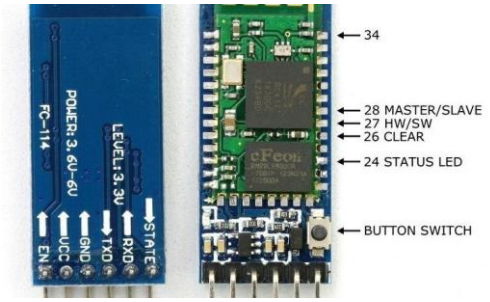
The Arduino Uno/ Nano is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2up to version R2) programmed as a USB-to-serial converter. Revision 2of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode

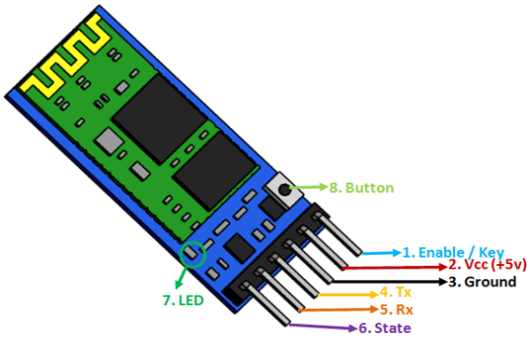
FEATURES OF ATMEGA 328 MICRO CONTROLLERS

- High Performance, Low Power Atmel ® AVR ® 8-Bit Micro controller Family
- Advanced RISC Architecture
- 131 Powerful Instructions
- Most Single Clock Cycle Execution
- 32 x 8 General Purpose Working Registers
- Fully Static Operation– Up to 20 MIPS Throughput at20MHz
- On-chip 2-cycleMultiplier
- High Endurance Non-volatile Memory Segments
- 32KBytes of In-System Self-Programmable Flash program Memory
- 1Kbytes EEPROM
- 2KBytes Internal SRAM
- Write/Erase Cycles: 10,000 Flash/100,000EEPROM
- Data Retention: 20 years at 85°C/100 years at25°C(1)
- Optional Boot Code Section with Independent Lock Bits
- In-System Programming by On-chip Boot Program
- True Read-While-Write Operation
- Programming Lock for Software Security
- Atmel® Q Touch® Library Support
- Capacitive Touch Buttons, Sliders and Wheels
- Q Touch and Q Matrix® Acquisition
- Up to 64 sense channels
- Peripheral Features
- Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
- One 16-bit Timer/Counter with Separate

Prescaler, Compare Mode, and Capture Mode
- Real Time Counter with Separate Oscillator
- Six PWM Channels
- 8-channel 10-bit ADC in TQFP and QFN/MLF package
- Temperature Measurement
- 6-channel 10-bit ADC in PDIP Package
- Temperature Measurement
- Two Master/Slave SPI Serial Interface
- One Programmable Serial USART
- One Byte-oriented 2-wire Serial Interface (Philips I2C compatible)
- Programmable Watchdog Timer with Separate On-chip Oscillator
- One On-chip Analog Comparator
- Interrupt and Wake-up on Pin Change Special Microcontroller Features
- Power-on Reset and Programmable Brown-out Detection
- Internal Calibrated Oscillator
- External and Internal Interrupt Sources
- Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby
- I/O and Packages– 23 Programmable I/O Lines
- 28-pin PDIP, 32-lead TQFP, 28-pad QFN/MLF and 32-pad QFN/MLF
- Operating Voltage
- 1.8 – 5.5V
- Temperature Range:– -40°C to105°C
- Speed Grade:– 0 - 4MHz @ 1.8 –5.5V
- 0 - 10MHz @ 2.7 – 5.5V
- 0 - 20MHz @ 4.5 –5.5V

BLUETOOTH HC-05





HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC. HC-05 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data

Features:
- Wide detecting scope
- Fast response and High sensitivity
- Stable and long life
- Simple drive circuit

Specification:
- Model: HC-05
- Input Voltage: DC 5V
- Communication Method: Serial Communication
- Master and slave mode can be switched

VI. EXPERIMENTAL RESULT

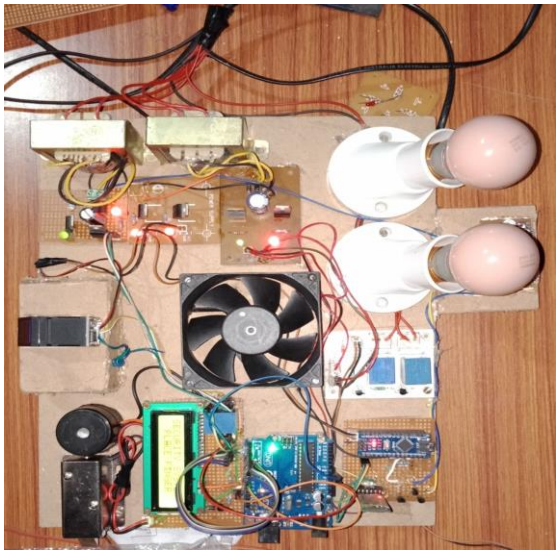


Fig 5.1: Overview of Project

As shown in Fig 5.1 the Overview of the project displays an Arduino Uno, fingerprint module, Bluetooth module, Arduino Nano, solenoid door lock, Fan, and all these are connected to Smart Phone.

Fig 5.2: Fingerprint activated door lock

As shown in Fig 5.2 the enrolled finger is placed and system activates which actuates the 12v solenoid door lock with beep sound and displays in LCD display

Fig 5.3: At Initial Position

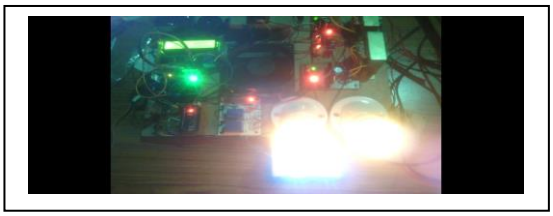


Fig 5.4: Home appliances turned ON

As shown in Fig 5.4 All Home Appliances (Bulbs, Dc fan and LED's) turned ON by giving voice command (GOOD MORNING) and Turned OFF when voice command is (GOOD NIGHT). If we give voice commands as LED ON through mobile, the Bluetooth module gets signal and sends to Arduino and appropriate pin turned ON. As shown in Fig 7.6 If we give voice command has "ONLY STUDY ROOM ON" the appropriate Pin gets high and activates only required load. For ONLY FAN ON voice command, only FAN turned ON as well as if we give voice commands as ONLY BEDROOM OFF, that particular Bulb 2 Gets Turned OFF.

VIII. CONCLUSION

Smart Home System provide interface between various types of home and electrical appliances like windows and fans etc. It provides control and ease of use of appliances as per users need. After analyzing other existing systems, we propose the novel technique for better human interaction and for providing better utilization of android and ARDUINOUNO. By using Home automation system, we can manage cost, flexible and energy efficient smart homes.

IX. FUTURE SCOPE

There is always chance to improve any system as research & development is an endless process. This system is no exception to this phenomenon.

- The various future applications may be used by controlling various household devices of house with internet.
- We can monitor and control the home appliances from anywhere in the world.
- In the future work, the persons other than the residents will also be considered.

We can put camera and it captures the image and sends it to our phone. Improvement of security problems.

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