International Journal of Electrical and Electronics Engineers
Volume 14, Issue No. 01, Jan-June 2022
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

EXAMINATION ROOM GUIDE USING RFID

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ABSTRACT:

Seating Arrangement of students during examinations is distributed. Students face difficulties as they have to scrounge for their examination hall numbers and seating arrangement while they are wits end. An innovation which could aid the students in finding their exam halls and seats would be welcoming and very rewarding. This paper ―EXAMINATION ROOM GUIDE USING RFID, presents a modernized method of examination hall management. It is possible for a student to identify the particular exam hall from any other hall, when they swipe RFID card in a card reader located there. This helps them to identify the floor or get directions to their respective halls without delays. The card reader is provided at the entrance of the building, if the students enters wrongly a buzzer alarm sets off, otherwise the room number is displayed on the LCD, connected to controller.

KEYWORDS: RFID, ATMEGA328P Micro-controller.

1.INTRODUCTION:

RFID (Radio Frequency Identification) technology is an emerging technology is used in a wide range of applications, is a member in the family of Automatic Identification and Data Capture (AIDC) technologies which is fast and reliable means for identification of objects. The RFID is composed of two main components: The Interrogator (RFID Reader) which transmits and receives the signal and the Transponder (tag) that is fixed to the object. In an RFID system, RFID tags are "interrogated" by an RFID reader. The tag reader initiates a radio frequency "interrogation" communicates with the tags. The reader also has a receiver that captures a reply signal from the tags, and decodes that signal. The reply signal from the tags reflects, the tag's information content. An RFID tag is collection of a miniscule microchip and antenna. The RFID alone has numerous application but when is spliced with microcontroller the boundaries expands further.

EXISTING SYSTEM:

Using Fingerprint Module: Fingerprint processing includes two parts: fingerprint enrolment and fingerprint matching. When enrolling user need to enter the finger two times the system will process the two time finger image. The system is designed to pass only users verified by their fingerprint scan and block non verified users. In registration mode the system allows to register up to 20 users and save their identity with respective id numbers in the system memory. After storage the person needs to first scan his finger on the scanner. The microcontroller now checks the persons fingerprint validity. If the fingerprint is authorized the microcontroller now sends a signal to a motor driver. The motor driver now operates a motor to open a gate. This ensures only authorized users are allowed to enter the examination section and un-authorized users are not allowed to enter without any human intervention.

Fig 1.1 Fingerprint module

Using Barcode Scanner: QR or Quick Response Codes are matrix barcodes that can be easily read by smart phones and dedicated QR reading devices. QR code was designed by Denso-Wave or the automotive industry in Japan, 1994. The nventor has made open source and free or human being. Bar codes are optical machine- readable labels and have a wide range of applications such

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as attachment to text, emails, websites, phone numbers, magazines, broachers, leaflets and business cards. Ramsden has explained the following core types of content that a QR code can store: Uniform Resource Locators (URLs), which is a website on the internet, alphanumeric text information, Automated Short Message Services (SMS) or text messages and telephone numbers which may be immediately dialled. QR codes are excessively used on products, and billboard advertisements due to its quick readability and greater storage capacity compared to standard UPC barcodes. The code consists of black square dots arranged in a square grid on a white background. The encoded information contains different types of data like binary, numeric, alphanumeric etc. QR code file may be in HTML, PNG, Tiff, SVG or EPS file.

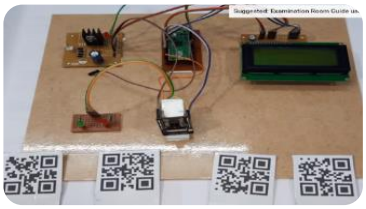


Fig 1.2 Barcode scanner

1.2 PROPOSED SYSTEM:

Block Diagram

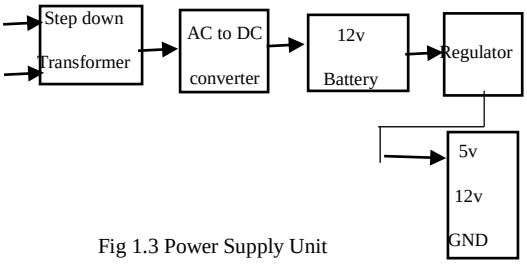


Fig 1.3 Power Supply Unit

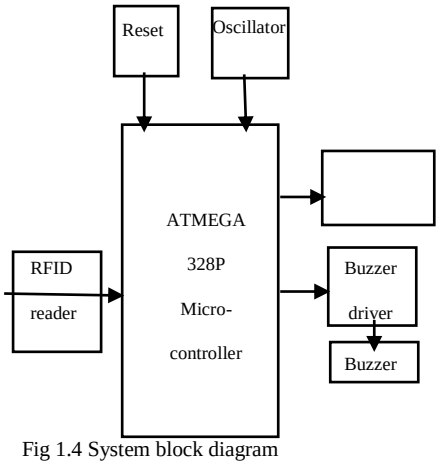
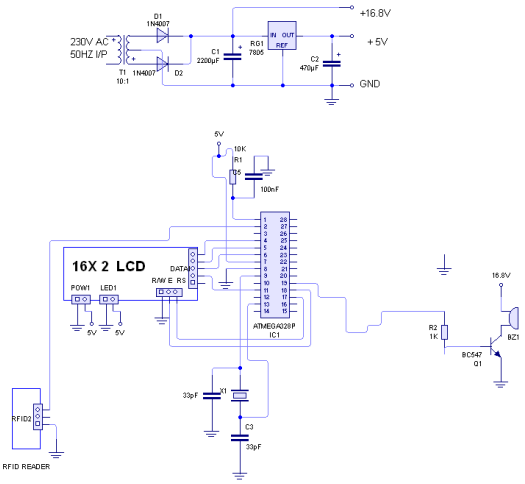


Fig 1.4 System block diagram

Circuit diagram:



2. WORKING

The Power Supply is a Primary requirement for the project work. For this purpose centre tapped secondary of 12V-012V transformer is used. From this transformer we getting 5V power supply. In this +5V output is a regulated output and it is designed using 7805 positive voltage regulator. This is a 3 Pin voltage regulator, can deliver current up to 800 milliamps. Rectification is a process of rendering an alternating current or voltage into a unidirectional one. The component used for rectification is called 'Rectifier'. A rectifier permits current to flow only during positive half cycles of the applied AC voltage.Thus, pulsating DC is obtained to obtain smooth DC power additional filter circuits required.

LM 78XX SERIES VOLTAGE REGULATORThe LM 78XXX series of the three terminal regulations is available with several fixed output voltages making them useful in a wide range of applications. One of these is local on card regulation. The voltages available allow these regulators to be used in logic systems, instrumentation and other solid state electronic equipment. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents. The LM78XX series is available in aluminium to 3 packages which will allow over 1.5A load current if adequate heat sinking is provided. Current limiting is included to limit the peak output current to a safe value. The LM 78XX is available in the metal 3 leads to 5 and the plastic

16x2 LCD display

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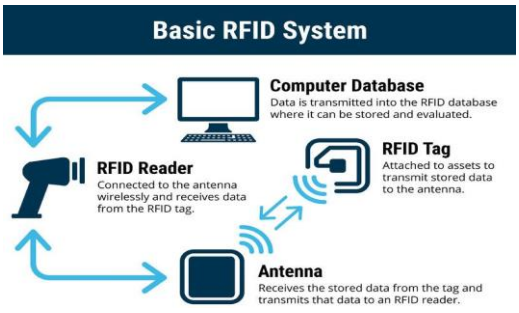
to 92. For this type, with adequate heat sinking. The regulator can deliver 100mA output current.

ATMEGA328P Micro-controller: ATMEGA328P is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards. ATMEGA328 is used similar to any other controller. All there to do is programming. Controller simply executes the program provided by us at any instant. Without programming controller simply stays put without doing anything.

3. RFID

3.1 Introduction

Radio Frequency Identification (RFID) refers to a wireless system comprised of two components: tags and readers. The reader is a device that has one or more antennas that emit radio waves and receive signals back from the RFID tag. Tags, which use radio waves to communicate their identity and other information to nearby readers, can be passive or active. Passive RFID tags are powered by the reader and do not have a battery. Active RFID tags are powered by batteries. RFID tags can store a range of information from one serial number to several pages of data. Readers can be mobile so that they can be carried by hand, or they can be mounted on a post or overhead. Reader systems can also be built into the architecture of a



cabinet, room, or building.

Fig 3.1 Basic RFID system

3.2 RFID Working:

Every RFID system consists of three components: a scanning antenna, a transceiver and a transponder. When the scanning antenna and transceiver are combined, they are referred to as an RFID reader or interrogator. There are two types of RFID readers -- fixed readers and mobile readers. The RFID reader is a network-connected device that can be portable or permanently attached. It uses radio waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antenna, where it is translated into data. The transponder is in the RFID tag itself. The read range for RFID tags varies based on factors including the type of tag, type of reader, RFID frequency and interference in the surrounding environment or from other RFID tags and readers. Tags that have a stronger power source also have a longer read range.

Fig 3.2 Working

3.3 RFID TAGS

RFID tags are made up of an integrated circuit (IC), an antenna and a substrate. The part of an RFID tag that encodes identifying information is called the RFID inlay. RFID tags are a type of tracking system that uses radio frequency to search, identify, track, and communicate with items and people. Essentially, RFID tags are smart labels that can store a range of information from serial numbers, to a short description, and even pages of data. Some RFID tags include cryptographic security features for a high level of verification and authentication. RFID tags are usually identified by their radio frequencies: low frequency (LF), high frequency (HF), and ultra-high frequency (UHF).

There are two main types of RFID tags:

• Active RFID. An active RFID tag has its own power source, often a battery.

• Passive RFID. A passive RFID tag receives its power from the reading antenna, whose electromagnetic wave induces a current in the RFID tag's antenna. There are also semi-passive RFID tags, meaning a battery runs the circuitry while communication is powered by the RFID reader. Low-power, embedded non-volatile memory plays an important role in every RFID system. RFID tags typically hold less than 2,000 KB of data, including a unique identifier/serial

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number. Tags can be read-only or read-write, where data can be added by the reader or existing data overwritten. The read range for RFID tags varies based on factors including type of tag, type of reader, RFID frequency, and interference in the surrounding environment or from other RFID tags and readers.

Active RFID tags have a longer read range than passive RFID tags due to the stronger power source. Smart labels are simple RFID tags. These labels have an RFID tag embedded into an adhesive label and feature a barcode. They can also be used by both RFID and barcode readers. Smart labels can be printed on-demand using desktop printers, where RFID tags require more advanced equipment.

There are three main types of RFID systems:

Low frequency (LF), high frequency (HF) and ultra-high frequency (UHF). Microwave RFID is also available. Frequencies vary greatly by country and region.

• Low-frequency RFID systems. These range from 30 KHz to 500 KHz, though the typical frequency is 125 KHz. LF RFID has short transmission ranges, generally anywhere from a few inches to less than six feet.

• High-frequency RFID system these range from 3 MHz to 30 MHz, with the typical HF frequency being 13.56 MHz The standard range is anywhere from a few inches to several feet.

• UHF RFID systems. These range from 300 MHz to 960 MHz, with the typical frequency of 433 MHz and can generally be read from 25-plus feet away.

• Microwave RFID systems. These run at 2.45 Ghzand can be read from 30- plus feet away. The frequency used will depend on the RFID application, with actual obtained distances sometimes varying from what is expected. For example, when the U.S. State Department announced it would issue electronic passports enabled with an RFID chip, it said the chips would only be able to be read from approximately 4 inches away. However, the State Department soon received evidence that RFID readers could skim the information from the RFID tags from much farther than 4 inches -- sometimes upward of 33 feet away. If longer read ranges are needed, using tags with additional power can boost read ranges up to 300plus feet.

3.4 FEATURES

The main features of RFID are as follows:

- Able to Read and Write data without direct contact
- By "combining an item with its information", a highly flexible and reliable system configuration becomes possible
- With the adoption of space transmission technology and protocols, highly reliable communication is made possible
- Reading and writing is possible without line of sight, using electric and electromagnetic wave transmission
- Can simultaneously access information of different RF tags

3.5 USES OF RFID

RFID systems use radio waves at several numerous frequencies to transfer data. In health care as well as hospital settings.

RFID technologies consists the following applications:

• Inventory control

• Equipment tracking

• Out-of-bed detection and fall detection

• Personnel tracking

• Ensuring that patients meet with the correct medications and medical devices

• Preventing the spread of counterfeit drugs and medical devices • Monitoring patients

• Providing information for electronic medical records systems

4. Liquid Crystal Display

4.1 LCD Introduction

In 1968, RCA Laboratories developed the first liquid crystal display (LCD). Since then, LCD's have been implemented on almost all types of digital devices, from watches to computer to projection TVs .LCD's operate as a light "valve", blocking light or allowing it to pass through. An image in an LCD is formed by applying an electric

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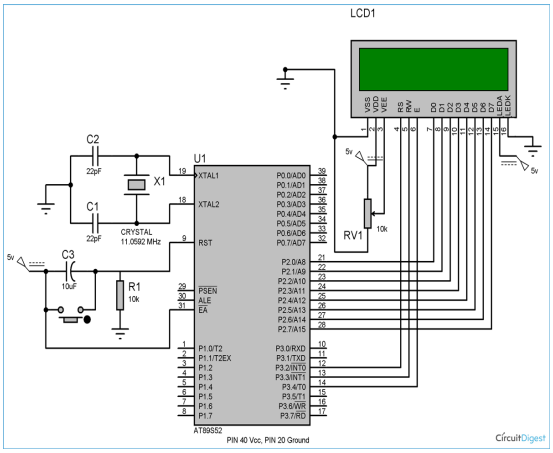
field to alter the chemical properties of each LCC (Liquid Crystal Cell) in the display in order to change a pixel's light absorption properties. These LCC's modify the image produced by the backlight into the screen output requested by the controller. Modern laptop computer displays can produce 65,536 simultaneous colors at resolution of 800 X 600.

To understand the operation of an LCD, it is easiest to trace the path of a light ray from the backlight to the user. From this source, the light ray will pass through a light polarizer to uniformly polarize the light so it can be acted upon by the liquid crystal (LC) matrix. The light beam will then pass through the LC matrix, which will determine whether this pixel should be "on" or "off". If the pixel is "on", the liquid crystal cell is electrically activated, and the molecules in the liquid will align in a single direction. This will allow the light to pass through unchanged. If the pixel is "off", the electric field is removed from the liquid, and the molecules with in scatter. This dramatically reduces the light that will pass through the display at that pixel.

Fig 4.1 interfacing LCD to the micro-controller



Pin number	Name	Function
1	VSS	Ground voltage
2	VEE	+5V
3	VCC	Contrast voltage
4	RS	Register select 1-Data register 0-Instruction register
5	R/W	Read/Write mode, to select read/write mode 0-write mode 1-read mode
6	E	Enable 0-Start to latch data to LCD character 1-Disable
7	DB0	Data bit 0 (LSB BIT)
8	DB1	Data bit 1
9	DB2	Data bit 2
10	DB3	Data bit 3
11	DB4	Data bit 4
12	DB5	Data bit 5
13	DB6	Data bit 6
14	DB7	Data bit 7 (MSB)
15	BPL	Black Plane Light (+5V) or lower (optional)
16	GND	Ground voltage (optional)

5. LED and Buzzers

5.1 LED

It was a semiconductor diode having radioactive recombination. It needs a definite amount of energy to generate an electron hole pair. The same energy is released when an electron recombines with a hole. Alternatively the released energy may result in a series of photons causing lattice liberation. Finally the released energy may be transferred to another electron. The recombination radiation may be lie in the infra-red and visible light spectrum. In forward is peaked around the band gap energy and the phenomenon is called injection luminescence. In a junction biased in the avalanche break down region, there results a spectrum of photons carrying much higher energies. Diodes having radioactive recombination are termed as Light Emitting Diode, abbreviated as LEDs.

In gallium arsenide diode, recombination is predominantly a radiation recombination and the probability of this radioactive recombination far exceeds that in either germanium or silicon. Hence GaAs LED has much higher efficiency in terms of Photons emitted per carrier. The internal efficiency of GaAs LED may be very close to 100% but because of high index of refraction, only a small fraction of the internal radiation can usually come out of the device surface. In spite of this low efficiency of actually radiated light, these LEDs are efficiency used as light emitters in visual display units and in optically coupled circuits, The efficiency of light generation increases with the increase of injected current and with decreases in temperature.

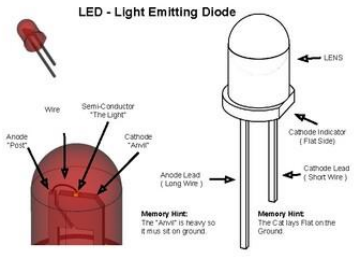


Fig 5.1 LED

5.2 Buzzer:

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or

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game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a present time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the IR LED 1 47Ohm 10k µC Port BC547 ceiling or wall as a sounding board.

Buzzer Driver:

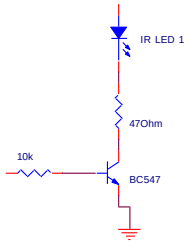

Fig 5.2 Buzzer Driver circuit

The circuit is designed to control the buzzer. The buzzer ON and OFF is controlled by the pair of switching transistors. The buzzer is connected in the Q2 transistor collector terminal. When high pulse signal is given to base of the Q1 transistors, the transistor is conducting and close the collector and emitter terminal so zero signals is given to base of the Q2 transistor. Hence Q2 transistor and buzzer is turned OFF state. When low pulse is given to base of transistor Q1, the transistor is turned OFF. Now 12V is given to base of Q2 transistor so the transistor is conducting and buzzer is energized and produces the sound signal.

Applications

- TIA/EIA-232-F
- Battery powered systems
- Terminals
- Modems
- Computers.

ADVANTAGES & DISADVANTAGES Advantages

- RFID technology automates data collection and vastly reduces human effort and error
- RFID supports tag reading with no line-of-sight or item-by-item scans required
- RFID readers can read multiple RFID tags simultaneously, offering increases in efficiency
- All RFID tags within range can be detected instantly and matched with information in your database
- RFID can be integrated with active scanning and fixed readers for a totally automated tracking solution

Disadvantages

- Active RFID is costly due to use of batteries.
- Privacy is a concern with the use of RFID on products as it can be easily tapped or intercepted.
- RFID devices need to be programmed which requires enough amount of time.
- Use of RFID technology at inventory control and for other such applications lead to loss of jobs for unskilled labourer.
- The external electromagnetic interference can limit the RFID remote reading.
- The coverage range of RFID is limited which is about 3 meters.

Future Scope:

RFID technology is emergent technology which can be used in wide range of applications. By combining both RFID and microcontroller generates a project with wider boundaries and effective solutions. Here a simple but effective system has been designed for the convenience of students using the spliced technology and a prototypeto prove the feasibility and demonstrate the features has beenimproved.This idea can be improved upon byadding more features like - maintaining student's details like fee due, library transactions, attendance etc... The idea is beneficial to both the student and the corporate society depending upon its effective implementation as it sow in the seeds to develop various veritable projects.

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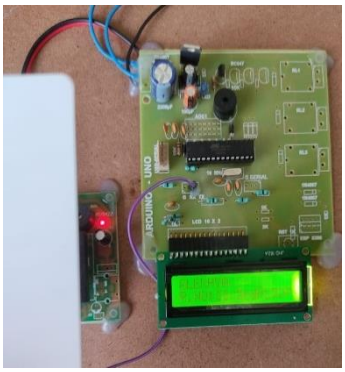
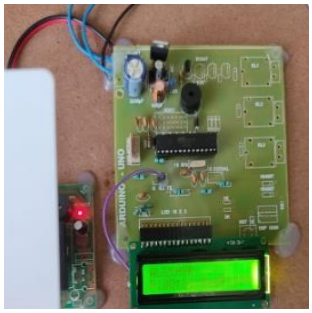
Experimental results:





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