AUTOMATIC MEDICINE VENDING SYSTEM

A Project Report Submitted in partial fulfillment of the requirements for the award of degree of

Bachelor of Technology

in

ELECTRONICS AND COMMUNICATION ENGINEERING

by

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Academic Year 2021-22

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CERTIFICATE

Date: _____

*This is to certify that the project work entitled "**AUTOMATIC MEDICINE VENDING SYSTEM**" is being submitted by* **P.Gayathri (19K65A0418), A.Durga Vasavi (19K65A0401),K.Narendra (18K61A04C0),** ***and*** **M.Suresh (19K65A0413)** *in partial fulfillment for the award of Degree of **BACHELOR OF TECHNOLOGY** (B.Tech) in **ELECTRONICS & COMMUNICATION ENGINEERING** to the Jawaharlal Nehru Technological University, Kakinada during the academic year 2021- 22 is a record of bona fide work carried out by them under our guidance and supervision .*

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Assistant Professor	**Professor & HOD**

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DECLARATION

W**e P Gayathri (19K65A0418), A Durga Vasavi (19K65A0401), K Narendra (18K61A04C0) and M Suresh(19K65A0413)** hereby declare that this thesis titled ***"Design and implementation of Smart Trolley System using Arduino"*** under the guidance and supervision of ***Mrs.N. Sannjaji, Assistant Professor, ECE Department, Sasi Institute of Technology & Engineering, Tadepalligudem.,*** is a bonafied research work submitted in partial fulfilment of the requirements for the award of the degree of Bachelor of Technology. The work carried out by them and results embodied in this thesis have not been reproduced or copied from any source.

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With gratitude,

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2.A. Durga Vasavi (19K65A0401) …….

3.K. Narendra (18K61A04C0) ……..

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CONTENTS

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PSO2: Signal & Image Analysis: An ability to perform Signal & Image processing in the field of communication.

PSO3: Digital System design: An ability to design a system or process to meet desired needs in embedded systems.

ABSTRACT

Medicine plays an important role in human's life for every situation. An automated medical system is introduced to reduce the manpower time and energy. It is similar to an ATM through which we get the required money at any time & any place. The same system is followed for the pharmaceuticals also. Medicines for B.P, diabetics, cold, fever, headache, and first aid medicines like bandage, cotton, ointments, and other routinely used tablets can be obtained. When RFID card is inserted, the details of the particular user are read by the RFID reader and displayed. After the identification of the valid person, list of medicines will be displayed on the TFT display, then user selects the required medicines by entering the corresponding number of selected medicines by using the keypad. After entering the required list, the amount will be calculated according to the medicine and their quantity. The amount will be deducted from the RFID card and immediately the transaction details will be sent through GSM to the user. After payment deduction the selected medicine are delivered automatically from the system. For this delivery system the Arduino controller uses a slider arrangement with the help of servo motors which provide rotational mechanism.

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NOMENCLATURE

Acronym	Description
RFID	Radio frequency identifier
LCD	Light crystal display
GSM	Global service for mobile communication

Chapter 1

INTRODUCTION

1.1 Introduction

Medical Informatics is a subdivision of Biomedical Engineering defined as “the scientific field that deals with biomedical information, data, and knowledge -their storage, retrieval, and optimal use for problem solving and decision making”. An enormous leap has been witnessed in this field with the advent of the computer age and the booming era of computer science around the end of the twentieth century. Thus, to serve its needs, Medical Informatics has leapfrogged towards employing complex methods such as systems engineering, expert systems, artificial intelligence, neural networks, database design, and applied mathematics and statistics. On the other hand, the advances in digital technologies have permitted the storage of massive amount of information on small electronic surfaces - relieving large areas within hospitals that were used as repositories to these medical records; hence, leading to the growing shift of medical records from being paper based to electronic databases. Within the same context, the advancement and proliferation in healthcare, subsequent to the Second World War period, and the growing influx of patients requiring healthcare, particularly with the booming population, have acted as a hindrance to the management of such enormous medical records.

Health ATM will be one stop single integrated machine to provide diagnosis to all the basic medical problems. medicines like for B.P, diabetics, cold, fever, headache, and first aid required medicines like ointments, here most commonly required cotton, bandages ATM machine and lifesaving medicines in case of emergency. It will do the same work for a Hospital as an ATM machine do for a Bank. Thus it will make easy to get diagnose medical problem for people where hospitals are not in easy reach and also provide a central platform for the patients to interact with the specialist of the fields through telemedicine (video conferencing). Health ATM will be having many benefits over the present system as it will be an integrated machine that will provide solutions to all medical problems, requiring very small space for installation and

working. It will also help government hospitals such as AIIMS in providing their servicesto the people living in the different areas including rural India by installing their H-ATM countrywide sothat people may excess the hospital information system from various remote locations.

For many years, there have been calls for interoperability within health care systems. The technology currently exists and is being used in business areas like banking and commerce, to name a few. Yet the question remains, why has interoperability not been achieved in health care?

This paper examines issues encountered and success achieved with interoperability during the development of the Digital Access to Medication (D-ATM) project, sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA).

1.2 Aim of the project:

This project surveys the Automatic medicine vending system.

- ◆ This research aims to bring one step solution to the people for their medical treatment which includes online diagnosis, online consultation with medical experts and providing generic medicines.
- ◆ Implementation of this system reduces man power 24 hours availability service.

Diagnosis is always a concern for the people living in rural area. At the same time medicine availability also has a major impact excluding the factor about complete cure. The aim of this prototype is that temporary relief is to be given out that can give people a better chance for resisting the health from withdrawing before they are able to reach doctor. Major advantage is that people would be able to access the drugs via patient kiosks in public places such as drug stores, malls, bus, railway stations, on highways, areas where medical stores are limited. Initially the user has to swipe his/her smart card to activate the machine. Once he has an access to the device, he can submit his disease's symptoms through the touch screen. Then once his medicine is decided by the s/w, he will be given some coin like tokens from an outlet. Once he receives the tokens, a message will be displayed on the screen that the user has to put these tokens in particular medicine box area. As the user puts the tokens in the specified boxes, he will receive one.

1.3 Methodology:

The methodology of the system includes whenever a RFID card is inserted, the details are displayed of the particular user. After the identification of the valid person. List of medicines displayed on the screen then the user selects the required medicine by entering the corresponding number of the corresponding

medicines. After entering the required list, the amount will be calculated according to the medicine and number of medicines selected the amount will be deducted from the RFID card after the payment is deducted the selected medicine are delivered automatically from the system.

1.4 Significance of Work:

This research aims to bring one step solution to the people for their medical treatment which includes online diagnosis, online consultation with medical experts and providing generic medicines. The major advantage is that people can access this ATMAMVM in public places available 24x7. This project provides basic medical treatment facilities within the reach of the people not benefited so far due to their location and also in concern of physically challenged and aged people. It is mainly focused to treat minor health ailments and to provide first aid.

1.5 Organization of the Report:

Chapter1: It gives the basic information of automatic medicine vending system, motivation, and objective of the project.

Chapter2: It gives the information of the previous system of automatic medicine vending system and the disadvantages of previous system and the proposed system.

Chapter3: It explains about the hardware and software requirements, block diagram of the project, flowchart and algorithm.

Chapter4: It gives the introduction of hardware system and its application areas, overview of hardware system architecture and schematic diagram and module organization.

Chapter5: In this chapter we represent the final output of the project, advantages and applications of the project

1.6 Conclusion:

Automated medical ATM system plays its major role in hostel areas, railway platforms, airports, and rural areas. Implementation of this system reduces man power 24 hours availability service and also reduces time consumption.

Chapter 2

LITERATURE REVIEW

Albert Jaison et.al [1]. Proposed Automated dispensing machines decentralized medication distribution systems that provide computer-controlled storage, dispensing, and tracking of medicines arerecommended together as a potential mechanism to enhance efficiency and patient safety, and they are now widely utilized in many hospitals. There is no doubt that these medicine vending machines can improve the efficiency of medication distribution, but their capacity to decrease medication errors is controversial and it depends on many factors, including how users can design and implement these systems.

From this concept, we conclude that the automatic medicine vending machine is technically feasible to the peoples. It gives the availability of medicines all the time, also in rural areas. It is very helpful; it gives ease of access also. It is sales person less service that is based on a smart card. In order to overcome the disadvantages of the existing method this automatic Medical Vending Machine using Arduino AT Mega 2560 is introduced to develop a system to deliver medicine 24x7 to the people. The machine can deliver mainly Over the Counter (OTC) drugs, pain killer etc., so it will be very useful to the society.

H.-M. Gross et.al [2] proposed the progress in developing a socially assistive home robot companion for elderly people with mild cognitive impairment (MCI) living alone at home. The spectrum of required assistive functionalities of such a robot companion is broad and reaches from reminding functions (e.g., taking medication or drinking) and cognitive stimulation exercises, via mobile video phony with relatives or caregivers, up to the detection and evaluation of critical situations, like falls. The paper is addressing several aspects of our work as part of the European FP7 project Companionable, as for example the developed robot hardware and its software and control architecture, the implemented skills for robust user detection and tracking and user-centered navigation in the home environment, and reports on already conducted and still ongoing functionality testings and pending usability studies with the end-user.

Pei-Hsuan Tsai et.al [3] Implemented to presents the architecture and implementation of an automatic medication dispenser specifically for users who take medications without close professional supervision. By relieving the users from the error-prone tasks of interpreting medication directions and administrating medications accordingly, the device can improve rigor in compliance and prevent serious medication errors. By taking advantage of scheduling flexibility provided by medication directions, the device makes the user's medication schedule easy to adhere and tolerant to tardiness whenever possible. This work is done collaborative by the medication scheduler and dispenser controller in an action-oriented manner. An

Advantage of the action-oriented interface between the components is extensibility, as new functions can be added and existing ones removed with little or no need to modify the dispenser control structure. The paper first describes the action-oriented design, major components and hardware and software structuresof the smart device. It then provides an overview of the heuristic algorithms used by the medication scheduler and their relative merits.

M Sangeetha et.al [4] Medicine plays an important role in humans' life for every situation. An automated medical system is introduced to reduce the man power time and energy. It is similar to an ATM through which we get the required money at any time & any place. The same system is followed for the pharmaceuticals also. Medicines for B.P, diabetics, cold, fever, headache, and first aid medicines like bandage, cotton, ointments, and other routinely used tablets can be obtained. When RFID card is inserted, the details of the particular user are read by the RFID reader and displayed. After the identification of the valid person, list of medicines will be displayed on the TFT display, then user selects the required medicines by entering the corresponding number of selected medicines by using the keypad.

After entering the required list, the amount will be calculated according to the medicine and their quantity. The amount will be deducted from the RFID card and immediately the transaction details will be sent through GSM to the user. After payment deduction the selected medicine are delivered automatically from the system. For this delivery system the Arduino controller uses a slider arrangement with the help of servo motors which provide rotational mechanism

Prajakta Bhise et.al [5] proposed to provide medication to the aged in time. Automatic medication dispenser is designed specifically for users who take medications without close professional supervision. It relieves the user of the error-prone tasks of administering wrong medicine at wrong time. The major components of this medication dispenser area AT mega16 interfaced with an alphanumeric keypad, an LED display, an IR sensor, a multiple pill container and dispenser. The overall operation is to facilitate the user to set the timings to dispense multiple pills at required timings. The major objective is to keep the device simple and cost efficient. The software used is reliable and stable. Elderly population can benefit from this device as it avoids expensive in-home medical care.

A Brolin et al [6] An automatic medicine vending machine with a self-contained on-site pill dispensing mechanism and a storage facility for the plurality of pills that can be dispensed based on the user requirement. Major components of the machine are, a scanner to take the input from user, a system that includes servo motors for dispensing the medication, large storage space to store the pills, sensors to detect the motion of pills, an inventory monitoring system to keep track of the storage, an industrial standard

vertical foam fill machine to pack the medication separately and a non-contact laser inkjet printer to print the description which includes the time at which the medicine must be taken. The inventory monitoring system also keeps track of the expiry date of each batch of medicine and sends alert to refill the storage when the pills run out. It also holds an inbuilt system to receive money from the user for the drugs that are dispensed. All these systems are monitored by a central microprocessor, which is programmed to receive input from the user via the scanner and to actuate and control all the necessary components required to dispense the medication requested by the user. The machine can be viewed as an automated pharmacy placed on a commercial scale so that infinite number of users will be able to access it anytime.

Kunal Jagdaleet.al [7] proposed to remind and dispense medicine at right time to the right person automatically from a single machine. The ratio of nurses per patient in developing countries is very low along with this the availability of 24 hours medical staff is also ambiguous which has led to the occurrence of easily avoidable death as well critical situation leading to a ruckus in the health industry. The medical dispensers which are available today are expensive and there is less availability of products that are a combination of a reminder and a dispenser. Automatic medication dispenser is designed for people, who undertake medication without professional supervision; The product can be used by an individual as well as multiple patients. It saves the person from the error-prone task of administrating wrong medicine at the wrong time.

The prominent components of this project are push buttons interfaced with a microcontroller, LCD Display, a motor controller, an alarm system, multiple pill container, and dispenser. The prominent operation is to facilitate the patient in taking correct medication and avoid any mishap due to negligence or improper care. The Alarm system is designed to\ provide two types of indications one by lighting an LCD and the other by providing a beep sound. The major goal is to keep the device easy to use and economic. The software that works is dependable and stable. The elderly population will be gain enormously from the device as it can replace sumptuous medical care. This can be a boon for the elderly as well as the poor sector of the society.

D.J. Patra et.al [8] Implement a vending machine is a machine which dispenses different products such as food materials beverages etc. just by fulfilling certain inputs required for the machine. This paper includes design of an intelligent vending machine which dispenses medicine as per instructions. Our system modifies existing designs and discusses the role of technologies in these industry transformations. A medicine dispenser is a machine which dispenses medicine strips to the consumer automatically after the consumer tap the button associated with the prescribed medicine type and quantity. The machine has

been implemented on the Arduino microcontroller board. This paper aims to design medicine dispenser an it compares different aspects like timing, efficiency and device utilization of the machine. This new System indicates a future possibility of betterment over existing vending machine models.

J. Paruvatha vardhini et.al [9] Implemented automatic vending machine can be used to serve the essential needs to the people in the commercial areas. The vending machine is based on EMBEDDED SYSTEM, the usage of this machine is inevitable and its demand is increasing rapidly. In today's busy world people forget to carry their own essential needs with them, they opt to get the things from where they are, and so the vending machines can solve their urge. But nowadays people prefer to use digital payment options instead of cash to avoid the cashless associated with carrying cash. So, to mitigate the demand for modern payment modes, we implement digital payment system that uses RFID tag. This system gives the access only through RFID which avoids the misuse of machine. Here, we have designed a vending machine for the educational institutions which can be used by the students to vend the essential needs like first aid medicines, masks, sanitary napkins, etc. The RFID tag can be accessed and the particular product can be selected, then the machine will dispense the product while the corresponding amount will be deduced in t The tag. A single RFID tag is given to the particular class in common which can be used by all, the RFID tag can be recharged using a master card by the person in-charge. The remaining amount and the balance number of the products can be displayed in the LCD display.

Siddarth BMet.al [10] Medicines is an essential part in looking after wellbeing, averting ailment, overseeing, interminable conditions and curing sickness. Unsurpassed Medicine (ATM) is a machine which conveys the medication in crisis cases and guarantee accessibility of medications 24x7 and thus thename "Record-breaking Medicine". ATM will be extremely valuable in sparing life if there should arise an occurrence of a mischance on parkways, remote ranges, provincial territories and spots wheretherapeutic stores are not inside the compass in the event of crisis. In any event first help can be made effectively open with the assistance of this framework. This venture comprises of Advanced RISC Machine (ARM) processor which controls the other sub frameworks, for example, RFID Reader, Global System for Mobile correspondence (GSM), pharmaceutical allocator, and stock control. RFID tagidentifies the specific client. GSM sends the message to the stock control when the solutions should be refill. Pharmaceutical allocator is the capacity part of the machine which stores the prescription.

2.2 Conclusion

This chapter explains existing problem that the society is facing. Under medicines legislation, General Sale List (GSL) medicines (i.e., those that may be purchased from ordinary retail outlets such as

supermarkets) may be sold or supplied from a vending machine. Life will become a little easier with an innovative vending machine that dispenses medicines. Users will be able to get basic Over The Counter (OTC) medicine at any time (24x7). Minor illnesses have a strange way of inviting people in the middle of the night when pharmacies are already closed. Over-the-counter (OTC) drugs are a class of medicines sold directly to a consumer without a prescription from a health care professional, as compared to prescription drugs, which may be sold only to consumers possessing a valid prescription.

People will able to access the medicine with the help of this machine even at the night time. With this, first aid can be provided in time to the user. Medicines sold or supplied from a vending machine should satisfy the condition laid down by the Medical Council of India. Medicines which these restrictions apply are mainly aspirin and paracetamol. Products containing these substances should not exceed 16 tablets in a package for sale.

Chapter 3
ARCHITECTURAL DESIGN

3.1 BLOCK DIAGRAM:

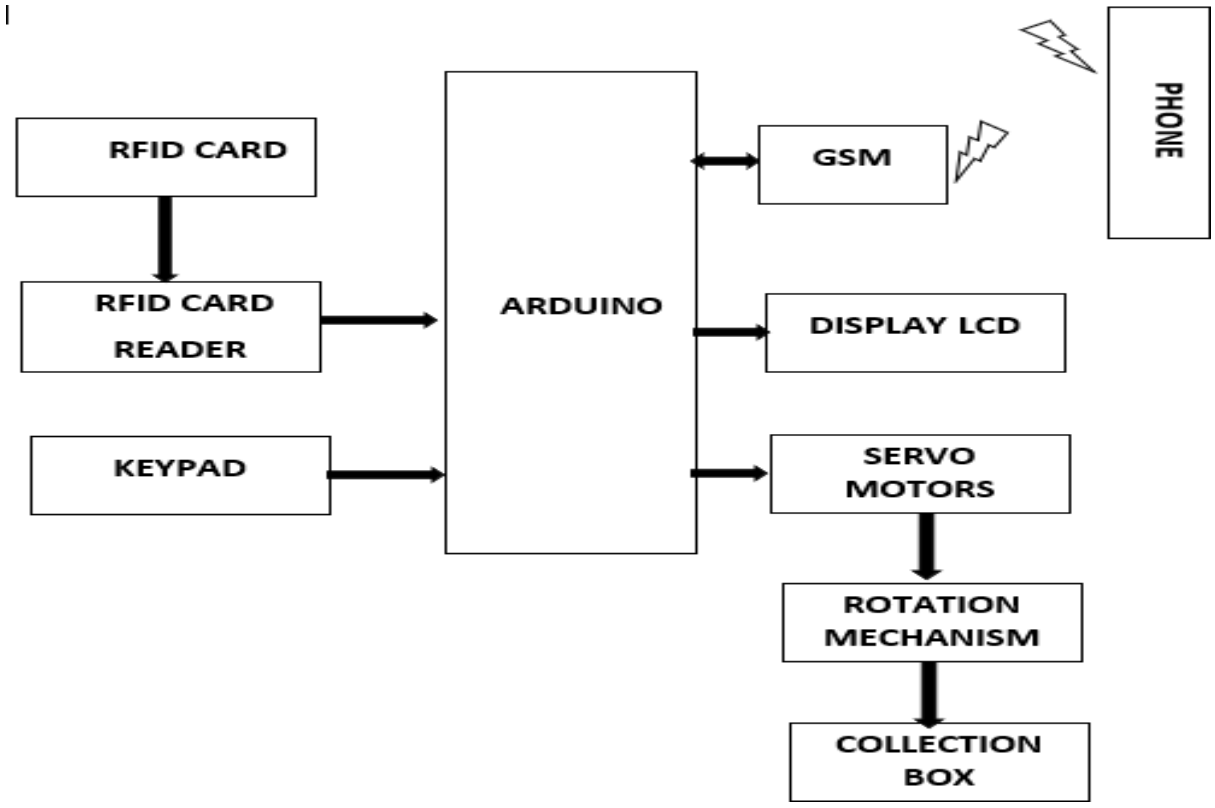


FIG 3.1 BLOCK DIAGRAM OF THE AUTOMATIC MEDICINE VENDING SYSTEM

3.2 FLOW CHART:

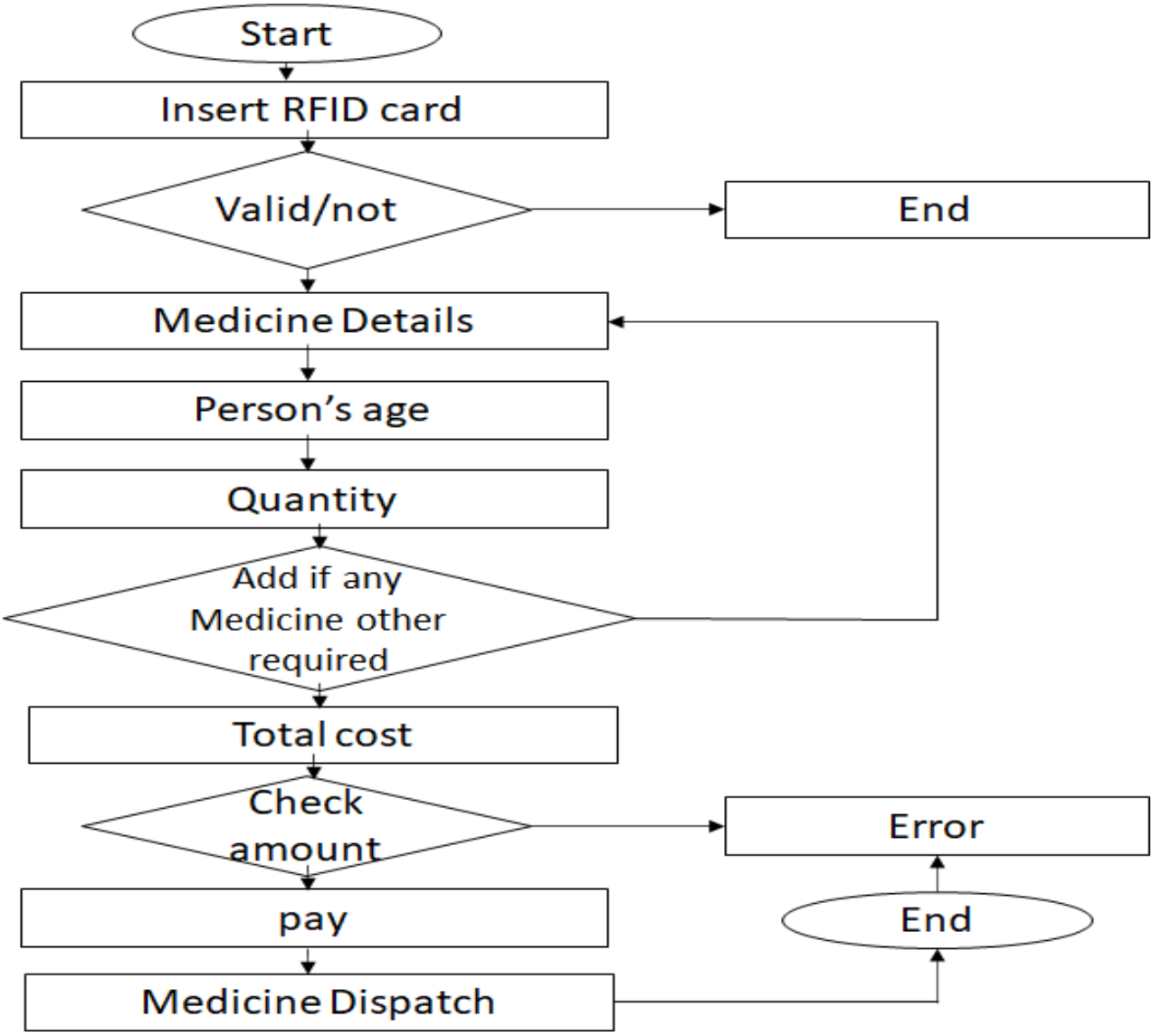


FIG 3.2 FLOW CHART FOR AUTOMATIC MEDICINE VENDING SYSTEM

3.3 ALGORITHM:

Step 1: START

Step 2: RFID card is inserted.

Step 3: RFID card is read by the system.

Step 4: Determine whether the RFID card inserted is valid or not.If it is invalid then error message will be displayed.

Step 5: If card is valid then list of medicines present are displayed on the display.

Step 6: The list of ages will be displaced on the screen and their ages are selected by using keypad.

Step 7: The list of items required and their quantity are selected using keypad.

Step 8: The Amount is calculated and deducted from the card.

Step 9: Required items are delivered out through the collection box.

Step 10: stop.

3.4 CONCLUSION:

Hence, we learned about the hardware and software requirements, content diagram of project, algorithm and flow chart.

Chapter 4

HARDWARE & SOFTWARE DESCRIPTION

4.1 INTRODUCTION:

A microcontroller can be compared to a powerful device which is capable of executing a series of preprogrammed tasks and interacting with other hardware devices embedded systems are electronic devices that incorporate microprocessors with in their implementations. The main purposes of the microprocessors are to simplify the system design and provide flexibility. Having a microprocessor in thedevice helps in removing the bugs, making modifications, or adding new features are only matter of rewriting the software that controls the device. Or in other words embedded computer systems are electronic systems that include a microcomputer to perform a specific dedicated application. The computeris hidden inside these products. Embedded systems are ubiquitous. Every week millions of tiny computerchips come pouring out of factories finding their way into our everyday products.

Embedded systems are self-contained programs that are embedded within a piece of hardware. Whereasa regular computer has many different applications and software that can be applied to various tasks, embedded systems are usually set to a specific task that cannot be altered without physically manipulating the circuitry. Another way to think of an embedded system is as a computer system that is created with optimal efficiency, thereby allowing it to complete specific functions as quickly as possible. Embedded systems designers usually have a significant grasp of hardware technologies. They use specific programming languages and software to develop embedded systems and manipulate the equipment. When searching online, companies offer embedded systems development kits and other embedded systems tools for use by engineers and businesses.

Embedded systems technologies are usually fairly expensive due to the necessary development time and built-in efficiencies, but they are also highly valued in specific industries. Smaller businesses may wish to hire a consultant to determine what sort of embedded systems will add value to their organization.

4.2 HARDWARE REQUIREMENT SPECIFICATION:

4.2.1 Arduino uno:

The Arduino Uno 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 crystal oscillator, 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 Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest ina series of USB Arduino boards, and the reference model for the Arduino platform.

4.2.1.1 Features:

The features of Arduino are listed below:

- Arduino programming is a simplified version of C++, which makes the learning process easy.
- The Arduino IDE is used to control the functions of boards. It further sends the set of specificationsto the microcontroller.
- Arduino does not need an extra board or piece to load new code.
- Arduino can read analog and digital input signals.
- The hardware and software platform is easy to use and implement.

FIG 4.1 ARDUINO UNO PIN DIAGRAM

A common alternative to the ATmega328 is the "Pico Power" ATmega328P. A comprehensive list of all other members of the mega AVR series can be found on the Atmel website.

- ATmega328
- ATmega328P and ATmega328P-AUTOMOTIVE
- ATmega328PB and ATmega328PB-AUTOMOTIVE (superset of ATmega328P) - has moreUART, I2C, and SPI peripherals than ATmega328P

4.2.1.2 Advantages:

- Ready to Use:

  The biggest advantage of Arduino is it's ready to use structure. As Arduino comes in a complete package form which includes the 5V regulator, a burner, an oscillator, a microcontroller, serial communication interface, LED and headers for the connections.

- Another big advantage of Arduino is its library of examples present inside the softwareof Arduino. I'll explain this advantage using an example of voltage measurement.
- Effortless functions:

  During coding of Arduino, you will notice some functions which make life so easy.

- Large community:

  There are many forums present on the internet in which people are talking about the Arduino. Engineers, hobbyists and professionals are making their projects through Arduino.

4.2.1.3 Applications:

ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed. Perhaps the most common implementation of this chip is on the popular Arduino development platform, namely the Arduino Uno, Arduino Pro Mini and Arduino Nano models.

4.2.1.4 Arduino Uno Technical Specifications:

Input/Output Pins	Digital Pins 0-13	Can be used as input or output pins.
Serial	0(Rx), 1(Tx)	Used to receive and transmit TTL serial data
External Interrupts	2,3	To trigger an interrupt.
PWM	3, 5, 6, 9, 11	Provides 8-bit PWM output.
SPI	10(SS),11(MOSI), 12(MISO) and 13(SCK)	Used for SPI communication.
Inbuilt LED	13	To turn on the inbuilt LED.
TWI	A4 (SDA), A5 (SCA)	Used for TWI communication.
AREF	AREF	To provide reference voltage for input voltage.
Microcontroller	ATmega328P – 8 bit AVR family microcontroller	

4.2.2 RFID (RADIO FREQUENCY IDENTIFICATION)

RFID (Radio Frequency Identification) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is a small object that can be attached to or incorporated into a product, animal, or person. RFID tags contain silicon chips and antennas to enable them to receive and respond to radio-frequency queries from an RFID transceiver. Passive tags require no internal power source, whereas active tags require a power source.

FIG 4.2 RFID CARDS

FIG 4.3 RFID TAG

4.2.2.1 Purpose of RFID:

The purpose of an RFID system is to enable data to be transmitted by a mobile device, called a tag, whichis read by an RFID reader and processed according to the needs of a particular application. The data transmitted by the tag may provide identification or location information, or specifics about the product tagged, such as price, color, date of purchase, etc.

4.2.2.2 RFID TAG:

An RFID tag, or transponder consists of a chip and an antenna. A chip can store a unique serial number or other information based on the tag‟s type of memory, which can be read-only, read write, or write once read-many (WORM). The antenna, which is attached to the microchip, transmits information from the chip to the reader typically, a larger antenna indicates a longer read range. The tag is attached to or embedded in an object to be identified, such as a product, case, or pallet, and can be scanned by mobile or stationary readers using radio waves.

4.2.2.3 TYPES OF RFID TAGS

1 Active RFID tag:

An RFID tag is an active tag when it is equipped with a battery that can be used as a partial or complete source of power for the tag's circuitry and antenna. Some active tags contain replaceable batteries for years of use; others are sealed units. (Note that it is also possible to connect the tag to an external power source).

FIG 4.4 ACTIVE RFID CARD

The major advantages of an active RFID tag are:

It can be read at distances of one hundred feet or more, greatly improving the utility of the device. It may have other sensors that can use electricity for power. The problems and disadvantages of an active RFI tag are:

1. The tag cannot function without battery power, which limits the lifetime of the tag.

2. The tag is typically more expensive, often costing $20 or more each

3. The tag is physically larger, which may limit applications.

Active RFID tags may have all or some of the following features:

1. Longest communication range of any tag.

2. The capability to perform independent monitoring and control.

3. The capability of initiating communications.

4. The capability of performing diagnostics.

5.The highest data bandwidth.

6.Active RFID tags may even be equipped with autonomous networking; the tags autonomously

determine the best communication path.

2 Passive RFID tag:

A passive tag is an RFID tag that does not contain a battery; the power is supplied by the reader. When radio waves from the reader are encountered by a passive RFID tag, the coiled antenna within the tag forms a magnetic field. The tag draws power from it, energizing the circuits in the tag. The tag then sends the information encoded in the tag's memory.

1. The major disadvantages of a passive RFID tag are:

2. The tag can be read only at very short distances, typically a few feet at most. This greatly limits the device for certain applications.

3. It may not be possible to include sensors that can use electricity for power.

4. The tag remains readable for a very long time, even after the product to which the tag is attached has been sold and is no longer being tracked.

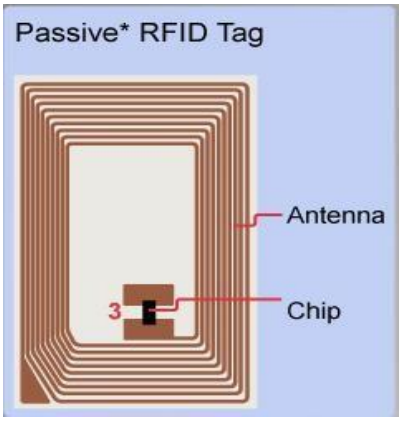


FIG 4.5 PASSIVE RFID TAG

The advantages of a passive tag:

1. The tag functions without a battery; these tags have a useful life of twenty years or more.

2. The tag is typically much less expensive to manufacture.

3. The tag is much smaller (some tags are the size of a grain of rice). These tags have almost unlimited applications in consumer goods and other areas.

4.2.3 RFID READER:

In order for an RFID system to function, it needs a reader, or scanning device, that frequency and within range that is capable of reliably reading the tags and communicating the results to a database. A reader

uses its own antenna to communicate with the tag. When a reader broadcasts radio waves, all tags designated to respond to will respond. A reader also has the capability to communicate with the tag without a direct line of sight, depending on the radio frequency and the type of tag (active, passive, or semi passive) used.

FIG 4.6 RFID READER

Readers can process multiple items at once, allowing for increased read processing times. They can be mobile, such as handheld devices that scan objects like pallets and cases, or stationary, such as point of sale devices used in supermarkets.

4.2.3.1 EM-18 Pin Configuration:

EM-18 is a nine-pin device. Among nine pins, 2 pins are not connected, so we basically have to considerseven terminals.

Pin Number	Description
VCC	Should be connected to positive of power source.
GND	Should be connected to ground.
BUZZ	Should be connected to BUZZER
NC	No Connection
NC	No Connection
SEL	SEL=1 then o/p =RS232 SEL=0then o/p=WEIGAND
TX	DATA is given out through TX of RS232
DATA1	WEIGAND interface DATA HIGH pin
DATA0	WEIGAND interface DATA LOW pin

4.2.3.2 Specifications and Features of EM-18 RFID Reader Module: -

- Operating Voltage: 5V DC Supply
- Reading Distance: 6-10 cm.
- Read frequency: 125 kHz.
- EM4001 64 – bit RFID tag compatible.
- 9600bps ASCII output.
- Current: <50 mA
- Operating Frequency: 125 Khz
- Read Distance: 5 cm
- Compatible Tags: 125KHz EM4100 Tags
- Size: 32mm(length) * 32mm(width) * 8mm(height)

4.2.3.3 Application of EM-18 RFID Reader Module: -

- Smart Access Control System.
- Card Based Entry System.
- Attendance System.
- DIY projects requiring need for RFID based System

4.2.4 KEYPAD (3*4)

3x4 Matrix Membrane Keypad

This 16-button keypad provides a useful human interface component for microcontroller projects. Convenient adhesive backing provides a simple way to mount the keypad in a variety of applications.

FIG 4.7 KEYPAD

4.2.4.1 Features:

Ultra-thin design

Adhesive backing

Excellent price/performance ratio

Easy interface to any microcontroller.

Example programs provided for the BASIC.

Stamp 2 and Propeller P8X32A.

Microcontrollers.

4.2.4.2 Specifications

Maximum Rating: 24 VDC, 30 Ma.

Interface: 8-pin access to 4x4 matrix.

Operating temperature: 32 to 122 °F. (0 to 50°C).

Dimensions:

Keypad, 2.7 x 3.0 in (6.9 x 7.6 cm)

Cable: 0.78 x 3.5 in (2.0 x 8.8 cm).

4.2.4.4 Applications

Security systems

Menu Selection

Data Entry for embedded systems

4.2.5 GSM SHIELD:

The GSM shield by Arduino is used to send/receive messages and make/receive just like a mobile phone by using a SIM card by a network provider. We can do this by plugging the GSM shield in to the Arduino board and then plugging in a SIM card from an operator that offers GPRS coverage. The shield employs the use of a radio modem by SIM Comm. We can communicate easily with the shield using the AT commands. The GSM library contains many methods of communication with the shield. This GSM Modem can work with any GSM network operator SIM card just like a mobile phone with its own unique phone number. Advantage of using this modem will be that its RS232 port can be used to communicate and develop embedded applications. like SMS Control, data transfer, remote control and logging can be developed easily using this.

4.2.5.1 Specifications for SMS via GSM/GPRS:

Point to point MO and MT.

SMS cell broadcast.

Text and PDU mode.

4.2.5.2 Power requirements:

The board should be powered with an external power supply that can provide current between 700mA and 1000mA. Powering an Arduino and the GSM shield from a USB connection is not recommended, as USB5 cannot provide the required current when the modem is in heavy use. So instead, we have to use 12V adapter. The modem can pull up to 2A of current at peak usage, which can occur during data transmission.

AT COMMANDS FOR USING THE SHIELD:

Checking the operation and connection of Gsm shield:

AT Press ENTER This would print OK which signifies of working connection and operation of the GSM shield.

MAKING AVOICE CALL:

ATD+ (country code) mobile number; Press ENTER.

DISCONNECTING THEACTIVECALL:

ATH Press ENTER.

RECEIVING THE CALL

AT A Press ENTER.

SENDING A MESSAGE:

For sending SMS in text Mode:

AT+CMGF=1PressENTER

AT+CMGS=" mobile number" Press ENTER.

Once the AT command s is given">" prompt will be displayed on the screen. Type the message to be sent via

SMS. After this, Press CTRL+Z to send the SMS. If, "OK" will be displayed along with the message

number.

RECEIVING A MESSAGE:

The SMS sending is successful For reading SMS in the text mode:

AT+CMGF= 1

Press ENTER

AT+CMGR=num.

Number (num.) is the message index number stored in the SIM card. For new SMS, URC will be received on

the screen as +MTI:SM „num". After this AT+CMGR=1PressENTER.

This displays the message on the screen along with sender details, number and timing too.

4.2.5.3 Advantages Of GSM:

- GSM is used all over the world with more than 450 million users.
- International roaming facility permits the use of one phone throughout the world unlike CDMA which will work in Asia, but not European nations.
- GSM is established, started in the mid-80s due to which a more stable network with healthy features are available.
- The accessibility of Subscriber Identity Modules (SIM cards), which are smart cards; provide
- secure data encryption to give GSM m-commerce advantages.
- GSM service is in more than 200 different countries, so it is quite easy to simply use your GSM phone when you are in one of these countries.

4.2.5.4 Applications:

- SMS based Remote Control and Alerts.
- Security Applications.
- Sensor Monitoring.
- GPRS Mode Remote Data logging
- SMS cell broadcast.
- Text and PDU mode.

Fig 4.8 GSM

4.2.6 LCD:

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly,[1] instead using a backlight or reflector to produce images in color or monochrome.[2] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary image are made from a matrix of small pixels, while other displays have larger elements.

4.2.6.1 Specifications:

Operating Voltage	4.7V-5.3V
Operating Current	1mA with no backlight
Controller	HD47780
Number of columns	16 each row, total 16 x2 = 32 columns
Number of rows	2
Every character pixel box	5×8 pixel
Number of Character	32
Character font-size	0.125″W x 0.200″H

Work Modes	4-bit & 8-bit
Backlight LED color	Blue or Green
Number of Pins	16
Module PCB Size	80 x 36 x 10 (LxWxH) mm.
Display Bezel	72 x 25mm (2.8 x 1″)

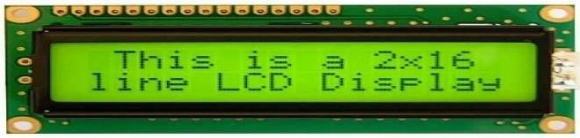


FIG 4.9 LCD DISPLAY

4.2.6.2 Pin Description:

PIN NUMBER	PIN NAME	DESCRIPTION
1	Vss (Ground)	VSS pin connected to microcontroller ground
2	Vdd (+5 Volt)	VDD pin connected to microcontroller + 5V power supply
3	VE (Contrast V)	Adjusts the contrast of the LCD display. It is Connected to a variable POT that can provide 0-5V power supply. Connect itto the ground to get maximum contrast.
4	RS (Register Select)	Toggles between Command/Data Register. Connect a microcontroller data pin and obtains either 0 or 1(0 = data mode, and 1 = command mode).
5	RW (Read/Write)	Used to read or write data. Normally grounded to write datato LCD
6	E (Enable)	This pin should be held high to execute the Read/Write process, and it is connected to the microcontroller data pin &constantly held high.
7	D0 (Data Pin 0)	These 8 Pins are used to sending commands or data to the LCD. These pins are connected in two-wire modes like 4- wire mode and 8-wire mode. In 4-wire mode, only four pinsconnected to the microcontroller data pin 0 to 3. And in 8-wire mode, 8-pins are connected to microcontroller data pin 0 to 7.
8	D1 (Data Pin 1)	
9	D2 (Data Pin 2)	
10	D3 (Data Pin 3)	
11	D4 (Data Pin 4)	
12	D5 (Data Pin 5)	
14	D7 (Data Pin 7)	

15	LED + (+5V)	This is the positive terminal of the backlight LED of the display. It's connected to +5V to turn on the backlight LED.
16	LED – (Ground)	This is the negative terminal of the backlight LED of the display. It's connected to the ground to turn on the backlight LED.

4.2.6.3 Advantages:

The main advantages of using module are

- Inexpensive
- Simply programmable
- Animations
- There are no limitations for displaying custom characters, special and even animations.

4.2.6.4 Applications:

It is used in many electronic projects and devices to display messages.

4.2.7 SERVO MOTOR:

This is nothing but a simple electrical motor, controlled with the help of servomechanism. If the motor as controlled device, associated with servo mechanism is DC motor, then it is commonly known DC Servo Motor. If the controlled motor is operated by AC, it is called AC Servo Motor. There are some special types of application of electrical motor where rotation of the motor is required for just a certain angle not continuously for long period of time. For these applications some special are required with some special arrangement which makes the motor to rotate a certain angle for a given electrical input (signal). For this purpose, servo motor comes into picture.

This is normally a simple DC motor which is controlled for specific angular rotation with help of additional servomechanism (a typical closed loop feedback control system). Now day's servo system has huge industrial application

FIG 4.10 SERVO MOTOR

4.2.7.1 Servo motor working principle

A servo system mainly consists of three basic components - a controlled device, a output sensor, a feedback system. This is an automatic closed loop control system. Here instead of controlling a device by applying variable input signal, the device is controlled by a feedback signal generated by comparing output signal and reference input signal. When reference input signal or command signal is applied to the system, it is compared with output reference signal of the system produced by output sensor, and a third signal produced by feedback system.

This third signal acts as input signal of controlled device. This input signal to the device presents as long as there is a logical difference between reference input signal and output signal of the system.After the device achieves its desired output, there will be no longer logical difference between reference input signal and reference output signal of the system. Then, third signal produced by comparing theses above said signals will not remain enough to operate the device further and to produce further output of the system until the next reference input signal or command signal is applied to the system. Hence the primary task of a servomechanism is to maintain the output of a system at the desired value in the presence of disturbances.

4.2.7.2 Advantages:

- High output power relative to motor size and weight.
- Encoder determines accuracy and resolution.
- High efficiency. It can approach 90% at light loads.

- High torque to inertia ratio. Servo Motors can rapidly accelerate loads.
- Has 2-3 times more continuous power for short periods.
- Has 5-10 times more rated torque for short periods.
- Servo motors achieve high speed at high torque values.
- Quite at high speeds.
- Encoder utilization provides higher accuracy and resolution with closed-loop control.

4.2.7.3 Applications:

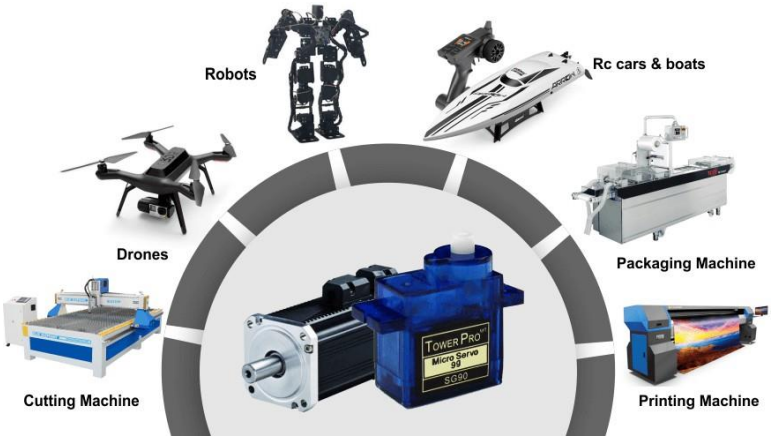


FIG 4.11 APPLICATIONS OF SERVO MOTOR

- Industries, they use in the machine tools, packaging, factory automation, material handling, printing converting, assembly lines. In many other demanding applications robotics, CNC machinery or automated manufacturing.
- uses in radio-controlled airplanes to control the positioning and movement of elevators.
- In robots because of their smooth switching on and off and accurate positioning.
- In the aerospace industry to maintain hydraulic fluid in their hydraulic systems.
- uses in many radio-controlled toys.
- used in electronic devices such as DVDs or Blue ray Disc players to extend or replay the disc trays.

- used in automobiles to maintain the speed of vehicles.

4.2.8 POWER SUPPLY:

A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another and, as a result, power supplies are sometimes referred to as electric power converters. Some power supplies are discrete, stand-alone devices, whereas others are built into larger devices along with their loads. Examples of the latter include power supplies found in desktop computers and consumer electronics devices. Every power supply must obtain the energy it supplies to its load, as well as any energy it consumes while performing that task, from an energy source. Depending on its design, a power supply may obtain energy from various types of energy sources, including electrical energy transmission systems, energy storage devices such as a batteries and fuel cells, electromechanical systems such as generators and alternators, solar power converters, or another power supply.

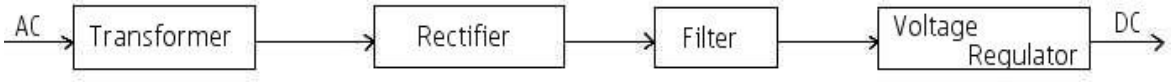


FIG 4.12 BLOCK DIAGRAM OF POWER SUPPLY

All power supplies have a power input, which receives energy from the energy source, and a power output that delivers energy to the load. In most power supplies the power input and output consist of electrical connectors or hardwired circuit connections, though some power supplies employ wireless energy transfer in lieu of galvanic connections for the power input or output. Some power supplies have other types of inputs and outputs as well, for functions such as external monitoring and control.

4.2.8.1 Specifications:

- The suitability of a particular power supply for an application is determined by various attributes of the power supply, which are typically listed in the power supply's specification. commonly specified attributes for a power supply include.
- Input voltage type (AC or DC) and range.
- Efficiency of power conversion.
- The amount of voltage and current it can supply to its load. How stable its output voltage or current is under varying line and load conditions. How long it can supply energy without refueling or recharging (applies to power. supplies that employ portable energy sources). Operating and storage temperature ranges.

4.2.8.2 Power Supply Applications:

There is a huge depth of applications using power supplies, due to the necessity of electronic design. This list is a simple sampling of the many applications requiring power supplies.

Computer power supply:

A modern computer power supply is a switch-mode power supply that converts AC power from the mains supply, to several DC voltages. Switch-mode supplies replaced linear supplies due to cost, weight, and size improvement. The diverse collection of output voltages also have widely varying current draw requirements.

Electric Vehicle power supply:

Electric vehicles are those which rely on energy created through electricity generation. A power supply unit is part of the necessary design to convert high voltage vehicle battery power.

Welding power supply:

Arc welding uses electricity to melt the surfaces of the metals in order to join them together through coalescence. The electricity is provided by a welding power supply, and can either be AC or DC. Arc welding typically requires high currents typically between 100 and 350 amperes. Some types of welding

can use as few as 10 amperes, while some applications of spot-welding employ currents as high as 60,000 amperes for an extremely short time. Older welding power supplies consisted of transformers or engines driving generators. More recent supplies use semiconductors and microprocessors reducing their size and weight.

4.3 INTERFACING OF RFID READER WITH ARDUINO AT MEGA328P:

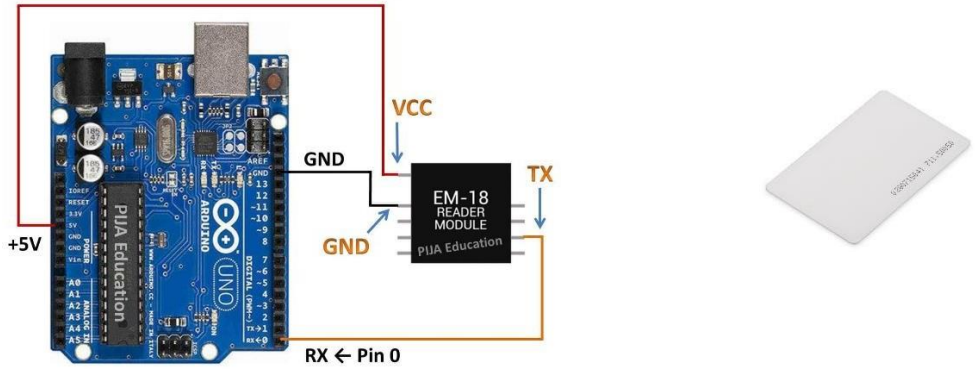


FIG 4.13 INTERFACING OF RFID READER WITH ARDUINO ATMEGA328P

The RFID reader has RS-232 port as well as GND, TX and 5V pins. Here Arduino ATMEGA328P Board. Here we connect the TX, GND of RFID reader to RX3 pin 15 / GND (pin) of Arduino. And supplying 12 V to RFID via an adapter

4.4 INTERFACING OF KEYPAD WITH ARDUINO ATMEGA328P:

Well, it's a pretty useful device to input numbers and letters, it can also be used for security measures like a keypad door lock, and its prefect when you need a low-cost and accessible interface for your next idea.

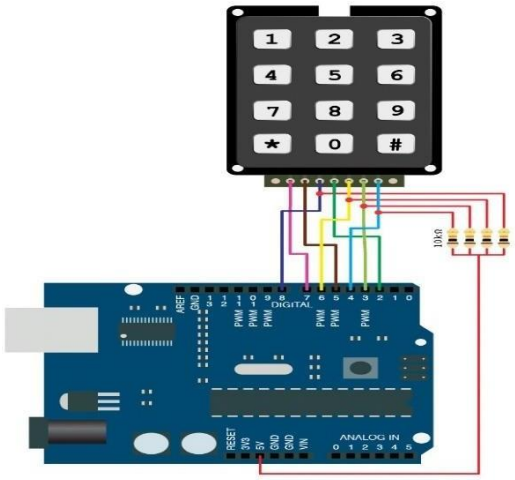


FIG 4.14 INTERFACING OF KEYPAD WITH ARDUINO ATMEGA328P

- Keypad Pin 1 –> Arduino Pin 7
- Keypad Pin 2 –> Arduino Pin 5
- Keypad Pin 3 –> Arduino Pin 8
- Keypad Pin 4 –> Arduino Pin 2
- Keypad Pin 5 –> Arduino Pin 6
- Keypad Pin 6 –> Arduino Pin 3
- Keypad Pin 7 –> Arduino Pin 4

4.5 INTERFACING OF GSM MODEM WITH ARDUINO MEGA 328:

Here we use GSM SIM 900. We connect TX, RX and GND of GSM modem to RX3, TX3 and GND of Arduino respectively.

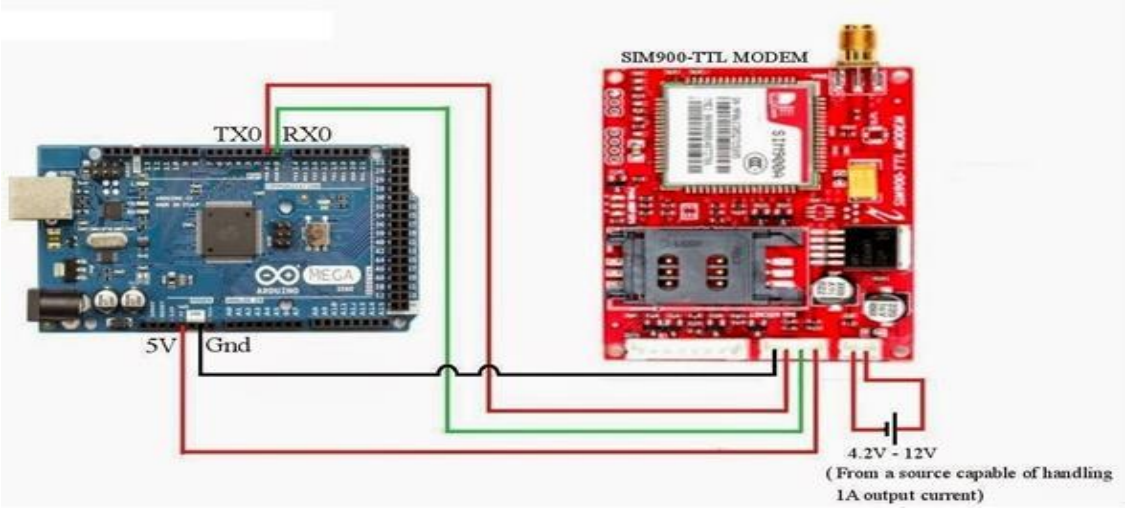


FIG 4.15 INTERFACING OF RFID READER WITH ARDUINO ATMEGA328P

4.6 INTERFACING LCD WITH ARDUINO AT MEGA328P:

RS pin of the LCD module is connected to digital pin 12 of the Arduino. R/W pin of the LCD is grounded. Enable pin of the LCD module is connected to digital pin 11 of the Arduino. In this project, the LCD module and Arduino are interfaced in the 4-bit mode. This means only four of the digital input lines (DB4 to DB7) of the LCD are used. This method is very simple, requires less connections and you can almost utilize the full potential of the LCD module. Digital lines DB4, DB5, DB6 and DB7 are interfacedto digital pins 5, 4, 3 and 2 of the Arduino. The 10K potentiometer is used for adjusting the contrast of thedisplay. 560-ohm resistor R1 limits the current through the back light LED. The Arduino can be poweredthrough the external power jack provided on the board. +5V required in some other parts of the circuit canbe tapped from the 5V source on the Arduino board. The Arduino can be also powered from the PC throughthe USB port. The full program for interfacing LCD to Arduino is shown below.

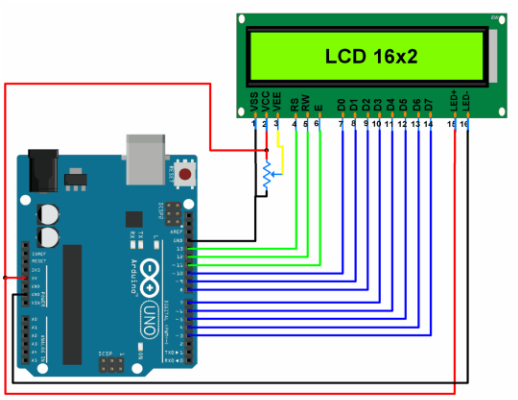


FIG 4.16 INTERFACING OF LCD WITH ARDUINO ATMEGA328P

4.7 INTERFACING OF DC SERVO MOTOR WITH ARDUINO AT MEGA328P:

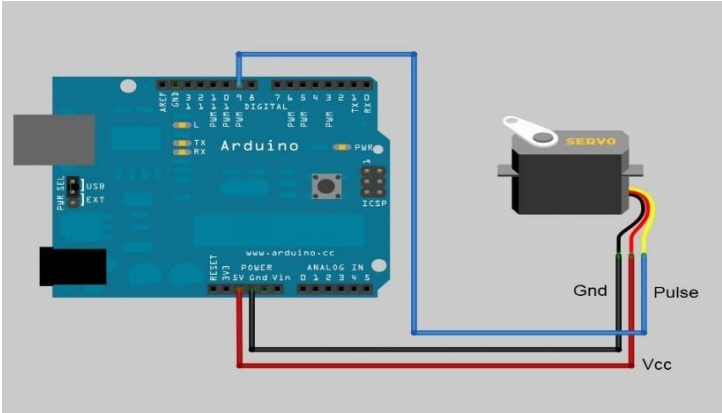


FIG 4.17 INTERFACING OF DC SERVO MOTOR WITH ARDUINO

The best thing about a servo motor is that it can be connected directly to an Arduino. Connect to the motor to the Arduino as shown in the table below:

Servo red wire – 5V pin Arduino.

Servo brown wire – Ground pin Arduino.

Servo yellow wire – PWM (9) pin Arduino

4.8 INTERFACING COLLECTION BOX WITH SERVO MOTOR AND ARDUINO AT MEGA328P:

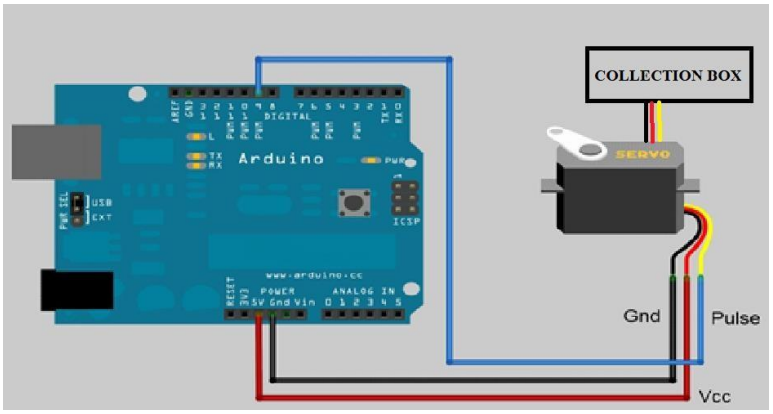


FIG 4.18 INTERFACING COLLECTION BOX WITH SERVO MOTOR AND ARDUINO AT MEGA328P

4.8.1 Operating Speed:

Operating speed of a servo motor is defined as the time required for the shaft to reach a specified position. Common servos have operating speeds in the range of 0.05 to 0.2 s/60 degree.

4.9 SOFTWARE REQUIREMENTS:

4.9.1 Arduino Software:

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources. The Arduino project was started in Italy to develop low-cost hardware for interaction design. An overview is on the Wikipedia entry for Arduino.

4.9.1.1 Specifications:

Arduino Duemilanove board.

USB programming cable (A to B).

External power supply (for stand-alone operation).

Solder less bread board for external circuits, and 22 g solid wire for connections.

Host PC running the Arduino development environment. Versions exist for Windows, Mac and Linux.

The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions. An important feature of the Arduino is that you can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable connection to the PC, and the program will still run from the top each time you push the reset button. Remove the battery and put the Arduino board in a closet for six months. In the editing window that comes up, enter the following program, paying attention to where semi-colons appear at the end of command lines.

4.9.2 LANGUAGE USED:

4.9.2.1 Embedded C:

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as, fixed-point arithmetic, named address spaces, and basic I/O hardware address in Embedded C uses most of the syntax and semantics of standard C, e.g., main () Function, variable definition, data type declaration, conditional statements (if, switch, case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.

4.9.2.2 Advantages:

It is small and simpler to learn, understand, program and debug. Compared to assembly language, C code written is more reliable and scalable, more portable between different plat-form. C compilers are available for almost all embedded devices in use today, and there is a large pool of experienced C programmers.

Unlike assembly, C has advantage of process or independence and is not specific to any particular microprocessor/microcontroller or any system. This makes it convenient for a user to develop programs that can run on most of the systems.

As C combines functionality of assembly language and features of high-level languages, C is treated as a "middle-level computer language" or „high level assembly language.

It supports access to I/O and provides ease of management of large embedded projects.

4.10 CONCLUSION:

It is important to consider how this technology may affect quality of medication delivery and use. With quality as a major focus of the new wave of health care, how will medication be vending machines fare? If such mechanisms are inevitable, how will pharmacists complement this service? Will virtual pharmacist patient consultations be the new norm? Will such technology improve or worsen the existing patient pharmacist relationship? How will the technology affect older adults who may be at increased risk for adverse effects from medications? Many such questions remain unanswered. Nonetheless, as pharmacists looking to our future, we must consider quality services that hold value to our patients and other health professionals.

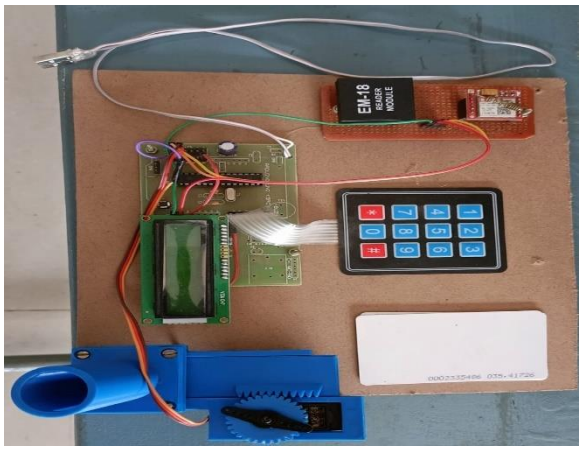
As technology is sure to evolve, pharmacists must look toward quality improvement in patient care services and provide due expertise in medication management so such technology becomes integrated as a fundamental way of pharmacy practice, regardless of setting. In this changing culture of health care and technology, now is an opportune time for pharmacists to drive the expectations of patients and other health professionals about the value of pharmacist services within the patient care continuum

Chapter 5

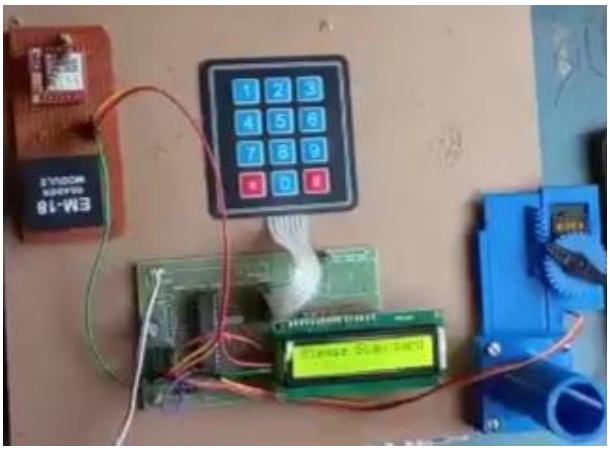
EXPERIMENTAL RESULTS

5.1 RESULT ANALYSIS:

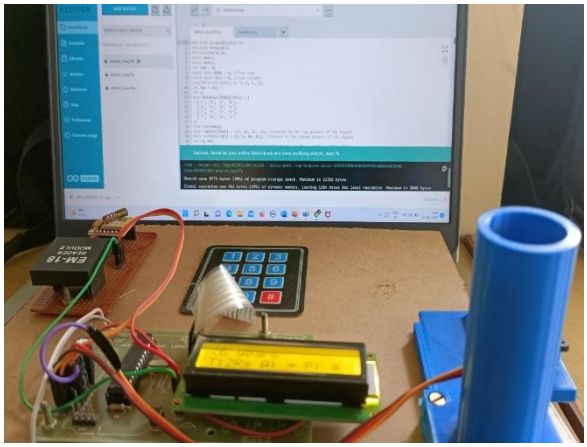
This paper has presented to our knowledge about the machinery and technology involved in the most common vending machines present all over the world. It helps increase efficiency by lowering dependence on manpower. The desired outcome is achieved as per the user's requirements in the form of medicines dispensed by the machine. How easier it would make people to obtain medicines from vending machines rather than waiting in queues for long hours. We also learned about the functioning of various instruments. This includes the functioning of RFID, Arduino Microcontroller, Motor drivers etc. All these have contributed greatly in improving our knowledge about the functioning and performance of a vending machine.



When the system is off

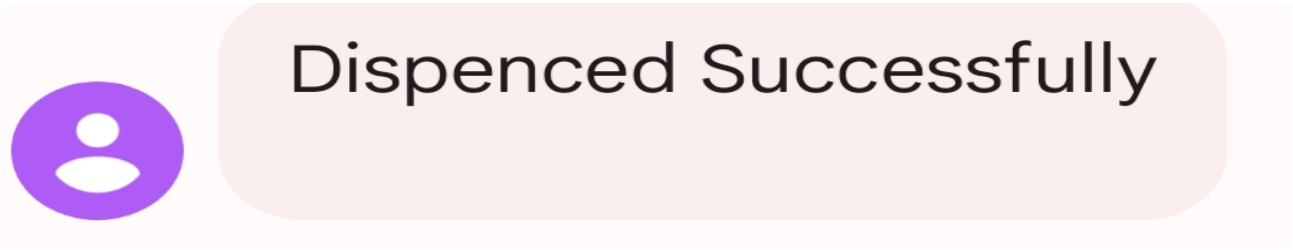


when the system is on



When Board was dumped by program

Collection of Tablets



After Debiting the money We receive a Message to register mobile

5.1.1 Application Areas

1. Its main application area will be healthcare field. It will help in increasing the network of good organizations in worldwide and in providing the medical facility at the doorstep to the required one.
2. It will be useful in providing medical facilities in busy areas such as Railway Stations, Airports, markets etc.
3. Provide facilities to people during their journey as this can be installed in the aircrafts, rails and ships.
4. This system can be used by the defense organization such as military, air force etc.
5. It will help rural India to get better medical facilities at much lower costs.

CONCLUSION & FUTURE SCOPE

Conclusion:

It is important to consider how this technology may affect quality of medication delivery and use. With quality as a major focus of the new wave of health care, how will medication be vending machines fare? If such mechanisms are inevitable, how will pharmacists complement this service? Will virtual pharmacist patient consultations be the new norm? Will such technology improve or worsen the existing patient pharmacist relationship? How will the technology affect older adults who may be at increased risk for adverse effects from medications? Many such questions remain unanswered. Nonetheless, as pharmacists looking to our future, we must consider quality services that hold value to our patients and other health professionals. As technology is sure to evolve, pharmacists must look toward quality improvement in patient care services and provide due expertise in medication management so such technology becomes integrated as a fundamental way of pharmacy practice, regardless of setting. In this changing culture of health care and technology, now is an opportune time for pharmacists to drive the expectations of patients and other health professionals about the value of pharmacist services within the patient care continue**.**

Future Scope:

1. By implementing medical ATM, simple medical problems will be diagnosed with an easy reach. This system can be further improved to diagnose the health problem also. A central platform can be provided for patience to interact with specialists of fields through video conferencing i.e., to provide a health ATM service.

2. One more development is that to provide automated e-emergency diagonisation and pharmacy for patients which can be meant that at the health ATM, when a card being inserted the whole body of the user will be scanned and the problem will be identified and rectification suggestions will be given. If it is unable to identify, then a specialist will be connected through video conference**.**

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APPENDIX – A

PROJECT WORK SCHEDULE

Task	Project Associates				Start time	End time	Duration
	19K65A0418	19K65A0401	18K61A04C0	19K65A0413			
Project Work Phase-I							
Project registration	√	√	√	√	23rd sep 2021	14th Oct 2021	3 Weeks
Project Idea submission & Base Paper	√	√	√	√	15th Oct 2021		3 Weeks
Literature survey	√	√	√	√	13th Nov 2021		5 Weeks
Problem formation	√	√	√	√	18th Dec 2021		1 Week
Project Work Phase-II							
Design and selection of Hardware Tools in module wise							
Identification of Hardware modules and software tools	√	√	√	√	14th Feb 2022	21st Feb 2022	1 Weeks
Block Diagram and its Module Separation	√	√	√	√	22nd Feb 2022	08th Mar 2022	2 Weeks
Testing of Hardware/ Software	√	√	√	√	09th Mar 2022	23rd Mar 2022	2 Weeks
Designand selection of software Tools in module wise							

Identification of Software tools	√	√	√	√	24th Mar 2022	21st Apr 2022	1 Week
Module Integration and Evaluation	√	√	√	√	22nd Apr 2022	29th Apr 2022	1 Week
Verification of Simulation results	√	√	√	√	30th Apr 2022	01st May 2022	1 Week
Testing of Software	√	√	√	√	02nd May 2022	09th May 2022	1 Week
Prototype making and testing in module wise and overall system testing	√	√	√	√	10th May 2022	17th May 2022	1 Week
Documentation	√	√	√	√	18th May 2022	25th May 2022	1 Week

APPENDIX B

POS AND PSOS RELEVANCE WITH PROJECT WORK

	PROGRAM OUTCOMES	RELEVANCE
P01	Engineering knowledge: Apply knowledge ofmathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems	Applied the fundamental knowledge of the course for designing Automatic Medicine Vending System.
P02	Problem analysis: Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.	Studied Different types of medicine vending system in literature work and identified the further improvements to the system.
P03	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.	Designed Automatic Medicine Vending System.
P04	Conduct investigations of complex problems: Research based knowledge and methods including design research of experiments, analysis and interpretation of data and synthesis	Conducted various investigations on previously existing medicine vending Systems and found the limitations from literature survey.
P05	Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an	Used Arduino
P06	The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent	Designed the system based on considering the societal, health safety, legal and cultural issues and the consequent.

P07	Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development	The student gains the insights of the physiological limitations, and practical limitations and situations which arise in formulating the solution
P08	**ETHICS:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice	
P09	**INDIVIDUAL AND TEAM WORK:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings	Effectively worked as team and involved all the team to learn do the work
P010	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective	Able to communicate effectively and able to write effective reports, design documentation, give presentations.
P011	Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments	Understood the problem properly and planned managed the project work within a stipulated time interval.
P012	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change	Our project can be extended based upon the future requirements. Hence it comes under lifelong learning.
P0S1	Practice in Embedded Systems: An ability to recognize and adapt to emerging trends in embedded systems and its applications	Hence designed an efficient system to recognize and adapt to emerging trends in embedded systems and its applications.

PROJECT COURSE OUTCOMES

	Project Course Outcomes	Relevance
C01	Able to build coordination among project supervisor and respective students in problem formulation and idea preparation	Coordination is built between the supervisor and students in problem formulation and idea preparation.
C02	Able to survey on existing and previous literature on the proposed project idea and propose preferable title.	Identified the problem for forecasting in literature survey
C03	Able to develop designated methodology and design procedure for intended solution	Used Arduino tool for implementing code
C04	Able to identify the challenges faced in providing intended solution and apply necessary modifications	Implemented the block diagram and flowchart to solve the problem easily.
C05	Able to enhance team work ability, presentation and communication skills forthe live demonstration of proposed project idea	Presented PPT and documentation as a group.
C06	Able to obtain the results for the proposed idea, collect the documented evidence and record the data	Implemented Automatic Medicine Vending System.

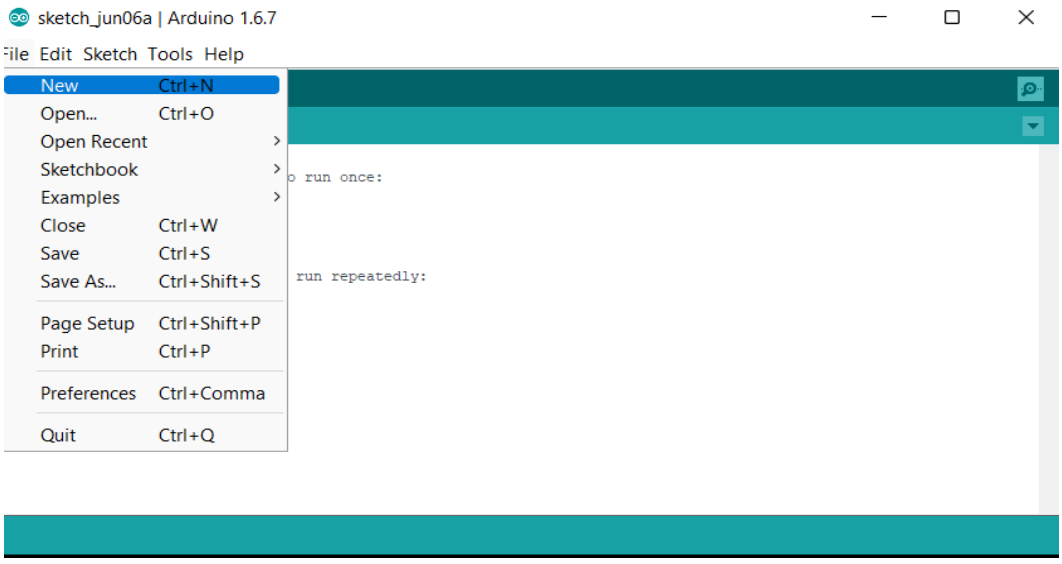
APPENDIX C
SOFTWARE EXPLANATION

In this section, there are steps to set up the Arduino IDE (Integrated Development Environment) on our computer and prepare the board to receive the program via USB cable.

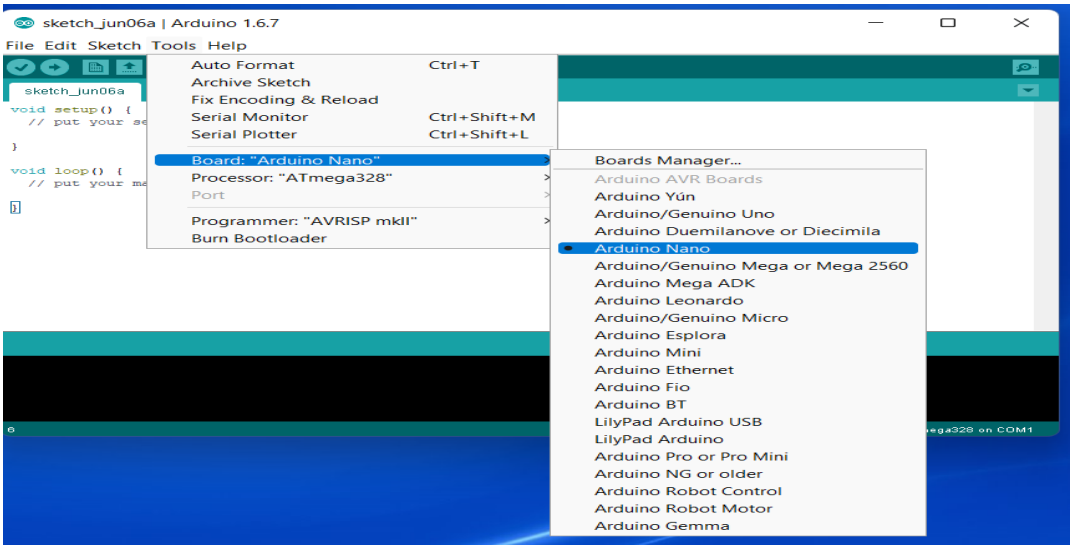
Step 1 – First you must have your Arduino board (you can choose your favorite board) and a USB cable. In case you use Arduino UNO, Arduino Duemilanove, Nano, Arduino Mega 2560, or Diecimila, you will need a standard USB cable (A plug to B plug), the kind you would connect to a USB printer as shown in the following image. In case you use Arduino Nano, you will need an A to Mini-B cable.

Step 2 − Download Arduino IDE Software. You can get different versions of Arduino IDE from the Download page on the Arduino Official website. You must select your software, which is compatible with your operating system (Windows, IOS, or Linux). After your file download is complete, unzip the file.

Step 3 − Power up your board. The Arduino Nano automatically draw power from either, the USB connection to the computer or an external power supply. The power source is selected with a jumper, a small piece of plastic that fits onto two of the three pins between the USB and power jacks. Check that it is on the two pins closest to the USB port. Connect the Arduino board to your computer using the USB cable. The red power LED (labelled PWR) should glow



Step 4 − Launch Arduino IDE. After your Arduino IDE software is downloaded, you need to unzip the folder. Inside the folder, you can find the application icon with an infinity label (application.exe). Double-click the icon to start the IDE.

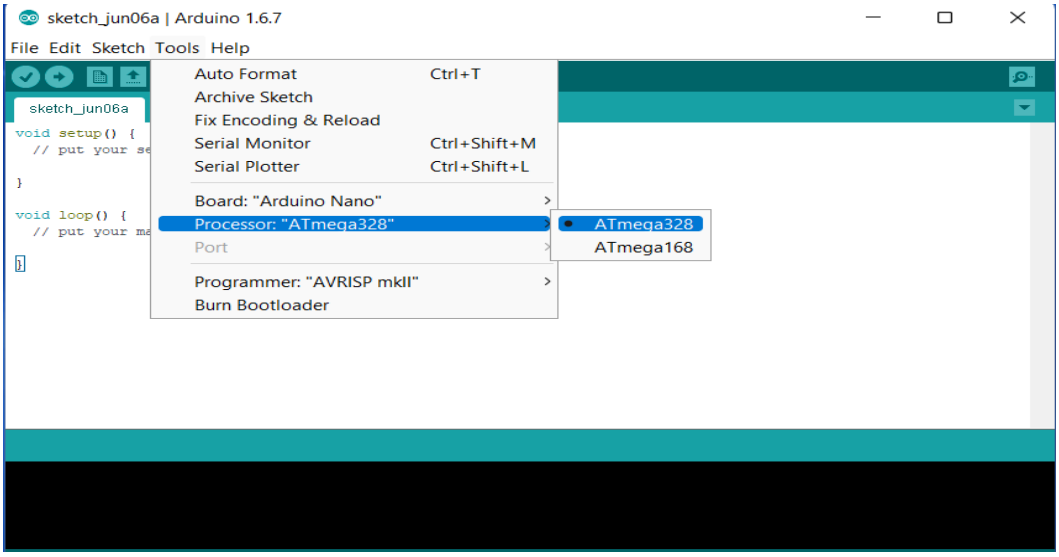


Step 5 − Open your first project. Once the software starts, you have two options –Create a new project. Open an existing project example.

To create a new project, select File → New.

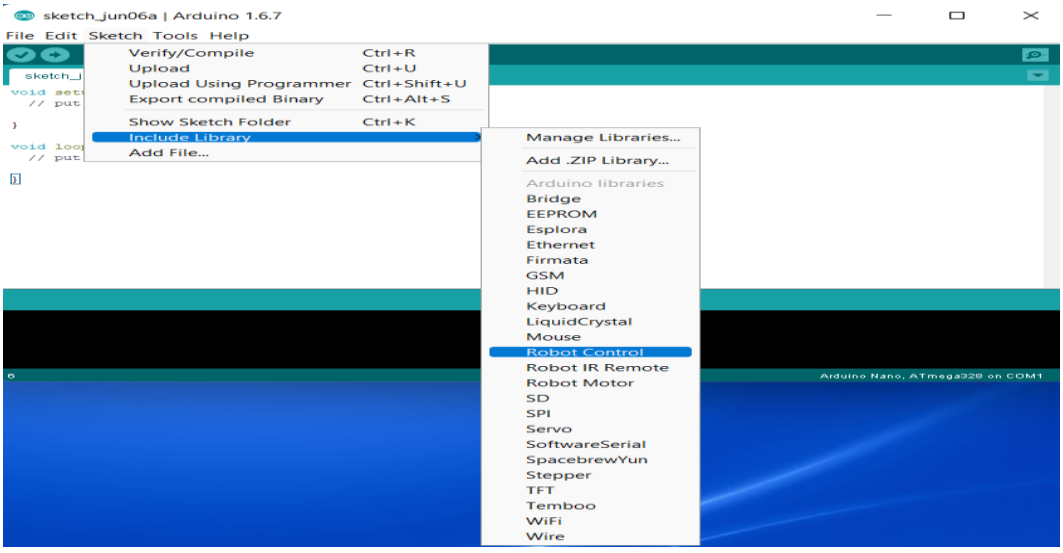
To open an existing project example, select File → Example → Basics → Blink.

Here, we are selecting just one of the examples with the name Blink. It turns the LED on and off with some time delay. You can select any other example from the list.



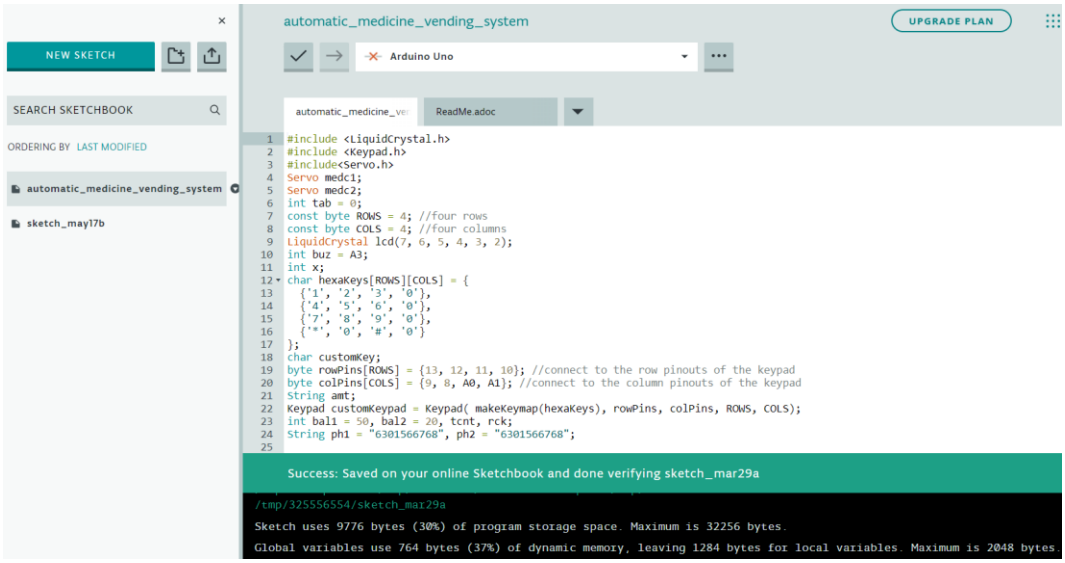
Step 6 − Select your Arduino board. To avoid any error while uploading your program to the board, youmust select the correct Arduino board name, which matches with the board connected to your computer. Go to Tools → Board and select your board.

Here, we have selected Arduino board according to our tutorial, but you must select the name matching the board that you are using.



Step 7 − Select your serial port.

Select the serial device of the Arduino board. Go to Tools → Serial Port menu. This is likely to be COM3 or higher (COM1 and COM2 are usually reserved for hardware serial ports). To find out, you can disconnect your Arduino board and re-open the menu, the entry that disappears should be of the Arduino board. Reconnect the board and select that serial port.



Step 8 − Upload the program to your board. Before explaining how we can upload our program to theboard, we must demonstrate the function of each symbol appearing in the Arduino IDE toolbar.

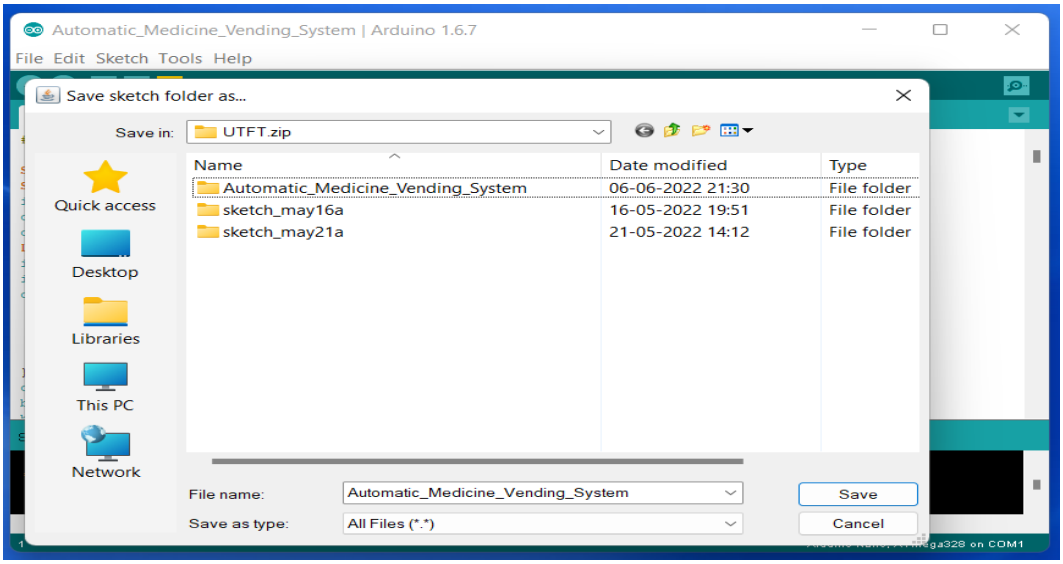
A − Used to check if there is any compilation error. B − Used to upload a program to the Arduino board.

C − Shortcut used to create a new sketch.

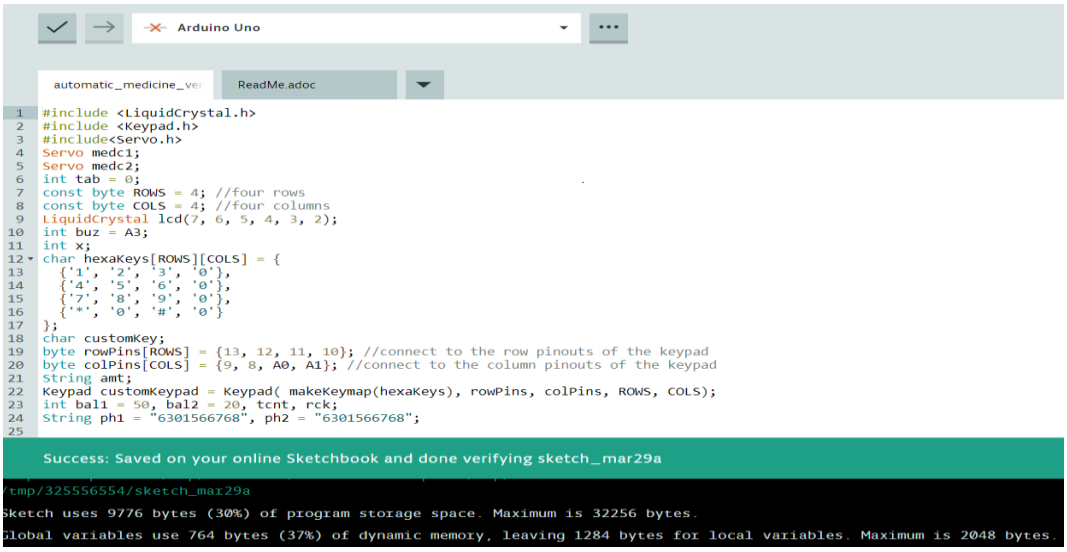
D − Used to directly open one of the example sketches. E − Used to save your sketch.

F − Serial monitor used to receive serial data from the board and send the serial data to the board.

Now, simply click the "Upload" button in the environment. Wait a few seconds you will see the RX and TX LEDs on the board, flashing. If the upload is successful, the message "Done uploading" will appear in the status bar.



Step 9-Now click on tools and select port and click on ‘COM10’.



Step 10- Now click on upload button