A

MAJOR PROJECT REPORT

on

A Smart Restaurant System

Submitted in partial fulfilment of the requirements of the degree of

BACHELOR OF TECHNOLOGY

Under Guidance of

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR

Sep - 2021

Department of Electronics and Communication Engineering
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Certificate

This is to certify that this Major Project report entitled **A Smart Restaurant System**by **Ishana Dadheech, Tapesh Menaria, Sana Mev, Sudheer Dabgr** have completed the work under my supervision and guidance, hence approved for submission in partial fulfilment for the award of degree of Bachelor of Technology in Electronics and Communication to the Department of Electronics and Communication Engineering, Techno India NJR Institute of Technology, Udaipur during academic session 2017-2021.

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ACKNOWLEDGEMENT

We take this opportunity to record our sincere thanks to all who helped us to successfully complete this work. Firstly, We are grateful to our **supervisor Mr. Yogendra Solanki** for his invaluable guidance and constant encouragement, support and most importantly for giving us the opportunity to carry out this work.

We would like to express our deepest sense of gratitude and humble regards to our

Head of Department Mr. Vivek Jain for giving invariable encouragement in our endeavors and providing necessary facility for the same and for encouraging us in this project work. Also a sincere thanks to all faculty members of ECE, TINJRITfor their help in the project directly or indirectly.

Finally, We would like to thank my friends for their support and discussions that have proved very valuable for us. We are indebted to our parents for providing constant support, love and encouragement. We thank them for the sacrifices they made so that we could grow up in a learning environment. They have always stood by us in everything we have done, providing constant support, encouragement and love

Ishana Dadheech
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PREFACE

Traditional method that is used commonly in hotels is by taking the customer's orders and writing it down on a piece of paper and then giving the order in the kitchen section. The food ordering system is proposed with the use of a handheld device placed on each table which is used to make an order at the restaurant.

The system uses a TFT touch plus LCD display module which is placed on each customers table for them to make orders. Order is made by selecting the items displayed on LCD. The order will be sent from the customer section using Bluetooth communication, and automatically will be displayed on a screen at the kitchen.

The bill will be displayed with table number at the manager/billing section. The project will reduce the time spent on making the orders and paying the bills, whereby the cost and manpower also can be reduced.

In this smart restaurant we are using 4 modules:

- Automatic ordering system
- Automatic parking system
- Smart plantation for restaurant
- Smart energy saving system in restaurant

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ABSTRACT

The Internet of Things Training Course, IoT Training covers What the IoT is about, innovation

patterns, organizations and joining. Figure out how to function with Building Connected Devices. IoT Training Course participants will find out about the elements of the IoT markets, innovation, patterns, arranging, outline and the meeting of stages and administrations, with an exceptional spotlight on the item plan, design, and execution. Programming is an increasingly important skill, whether one aspires to a career in software development, or in other fields. Programming is fundamentally about figuring out how to solve a class of problems and writing the algorithm, a clear set of steps to solve any problem in its class. This course introduces a powerful problem-solving process—the Seven Steps—which one can use to solve any programming problem. In this course, one will learn how to develop an algorithm, then progress to reading code and understanding how programming concepts relate to algorithms. Computer networks are a system of interconnected computers for the purpose of sharing digital information. The concept of a network began in 1962 when a server at the Massachusetts Institute of Technology was connected to a server in Santa Monica, California. Since that time the proliferation of computers and computer networks has increased significantly. One of the most significant challenges to networks is attacks on their resources caused by inadequate network security.

CHAPTER 1INTRODUCTION

1.1 INTRODUCTION

Traditional method that is commonly been used in hotels is by taking to customer's orders and writing it down on a piece of paper. Many solutions have been proposed for solving this issue. This Project is again one attempt in the same direction. In this paper we discuss the automation for food ordering system. This system makes use of Bluetooth as a communication device and TFT LCD touch plus display module compatible with Arduino Mega 2560 as hardware.

The main aim of this project is to provide an automation in the restaurants sensor and servo motor to replace the traditional restaurant system in which the customers has to wait for a long time to give their orders to the waiters and there may be mistakes while taking and delivering food items to the customers and there will be a lot of work on the w during festival seasons. So, if we provide a drawback and leading to smart city which is also the aim of our government.

Parking has become a major problem in metro cities like Chennai, Mumbai, and other big cities, especially for the parking spaces for hotels, restaurants, and movie theatres. So the aim of the project is to design an intelligent system that keeps a track of vacant parking spaces and shows the route to those specific parking space locations to avoid wastage of time and fuel to find an empty spot in a parking lot. The car will enter the parking entrance. Once car arrives, sensors will be activated to represent arrival of new vehicle. Then the microcontroller checks for availability of parking space. If there is no vacant parking space, then the gate does not open and displays no vacant space message on the LCD board. If parking space is available, then the system allots the parking space nearer to the exit. Once the parking space is allotted, led sign boards will show direction to the driver as of where to park. Once the car is parked, the system updates the number of vacant spaces as reduced byone.

Similarly, when a car leaves the parking space, the system detects which space is now empty and increases the vacant space by one. In this project an automation of farm irrigation and soil moisture control by Arduino using soil moisture sensor and.

This automatic irrigation system senses the moisture content of the soil and automatically switches the pump when the power is on. A proper usage of irrigation system is very necessary because the main reason is the shortage of land reserved water due to lack of rain, spontaneous use of water as a result large amounts of water goes waste [1]. For this reason, we use this automatic plant watering and soil moisture monitoring system, and this system is very useful in all climatic conditions.

So, the project is mainly divided into four modules-

- Automatic ordering system
- Automatic parking system
- Smart plantation for restaurant
- Smart energy saving system in restaurant

1.1.1 Smart Restaurant System

The country is said to be developed when the standard of living in that country improved. we can improve our lifestyle by using automation in each sector. By using technology, we can reduce the efforts of the people. Now a days IOT is a popular technology which enables us to exchange information though the internet. By using IOT we can replace the traditional method of taking orders using paper and pen as in traditional restaurant system. In IOT based smart restaurant as the customer enters restaurant the door will automatically open. The customer can sit anywhere in the restaurant and they can select the items from display provided at every table. The corresponding LED will glow at kitchen section which is in the site of chefs.

The members in the kitchen section will place the food items on the LINE FOLLOWING ROBOT. It will stop at the corresponding table based on IR sensor at each table. The advancement of information and communication technology has led to an increasing number of industries to use electronic media and corresponding application for information exchange.

1.1.2 Smart Parking System

As the number of vehicles constantly increases and the resources provided by current parking infrastructures are also limited, vehicle parking has become an important issue. Hence we focus on the optimization of better parking systems mostly in metro cities using an Arduino based intelligent parking assistance system which tries to reduce the confusion caused during parking and which eventually saves the time and cost of the fuel to a greater extent. The prototype contains sensors and Arduino microcontroller to keep track on the number of vehicles. Based on the vehicle count the microcontroller takes decisions and updates the vacant spaces on the LCD screen and assists the car driver as where to park which is indicated by the corresponding LED mounted near every parking slot.

When a vehicle approaches the entry gate, the Entry IR sensor-1 send a signal to Arduino1 and the Arduino1 sends a command to operate the servo motor by 90 deg, Subject to space availability is greater than or equivalent to vehicle approaches Entry IR sensor -21. This sends a signal to Micro controller and the gate is closed and the available space is decremented. When the space becomes zero, the Micro controller inhibits the entry gate servo motor. After passing the Entry IR sensor-2, the car approaches to Parking IR sensor-5, 6 and 7 it sends a signal to the Arduino2, hence Arduino2 assists the driver the place of parking with the help of Led at the respective parking lot mostly near the exit. When any of the vehicles goes out, first it approaches the Exit IR sensor 1. This sensor sends a signal to Arduino1 and the Arduino1 commands the Exit servo motor to rotate by 900. When the vehicle approach Exit IR sensor -2 the gate is closed, and the available space is incremented in the microcontroller.

1.1.3 Automatic Irrigation System

The main aim of this project was to provide water to the plants or gardening automatically using microcontroller (Arduino Uno). We can automatically water the plants when we are going on vacation or do not, we must bother my neighbors, Sometimes the neighbors do too much of watering and the plants end up dying anyway. There are timer-based devices available in India which waters the soil on

set interval. They do not sense the soil moisture and the ambient temperature to know if the soil needs watering or not. Assimilation is that the artificial application of water to the land or soil It is used to assist in the growing of agricultural crops, maintenance of landscapes, and re vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. When a zone comes on, the water flows through the lateral lines and ultimately finally ends up at the irrigation electrode (drip) or mechanical device heads. Several sprinklers have pipe thread inlets on the lowest of them that permits a fitting and the pipe to be connected to them. The sprinklers are usually used in the top of the head flush with the ground surface. As the method of dripping will reduce huge water losses it became a popular method by reducing the labor cost and increasing the yields. When the components are activated, all the components will read and gives the output signal to the controller, and thein formation will be displayed to the user (farmer). The sensor readings are analog in nature so the ADC pin in the controller will convert the analog signals into digital format. Then the controller will access information and when the motors are turned On/Off itwill be displayed on the LCD Panel, and serial monitor windows. There are many systems are available to Water savings in various crops, from basic ones to more technologically advanced ones. For instance, in one system plant watering status was monitored and irrigation scheduled based on temperature presents in soil content of the plant.

1.1.4 Smart Energy Saving System In Restaurant

The traditional light system has been limited to two options: ON and OFF only, which are not efficient because these kinds of operations meant power loss due to continuing to work on maximum voltage. With the negligence of the operator or by some other technical problems, restaurant lights are continuously kept 'ON', even when there is no light required and this leads to the wastage of electricity. Hence, the wastage of power in restaurants is one of the noticeable power losses, but with the use of automation, it leads to many new methods of energy and money saving.

1.2MARKET BENEFITS

Smart irrigation systems offer a variety of advantages over traditional irrigation systems. Smart irrigation systems can optimize water levels based on things such as soil moisture and weather predictions. This is done with wireless moisture sensors that communicate with the smart irrigation controls and help inform the system whether the landscape needs water. Additionally, the smart irrigation controlled receives local weather data that can help it determine when a landscape should be watered. If you have ever returned home during a storm only to see your sprinklers spraying water, you know how beneficial this is. Rather than wasting water resources and your valuable money on watering your landscape you can take advantage of the nature moisture from the storm and save that water for another day when it is more needed. The advantages of these smart irrigation systems are wide reaching. The smart irrigation system will help you have better control of your landscape and irrigation needs as well as peace of mind that the smart system can make decisions independently if you are away. The opportunity to save dramatically, have better control and be more eco-friendly while maintaining a lush and beautiful landscape are just a few of the advantages a smart irrigation system provides and would make wonderful addition to any home.

1. Optimized parking – Users find the best spot available, saving time, resources, andeffort. The parking lot fills up efficiently and space can be utilized properly by commercial and corporateentities.
2. Reduced traffic – Traffic flow increases as fewer cars are required to drive around in searchof an open parkingspace.
3. Reduced pollution – Searching for parking burns around one million barrels of oil a day. An optimal parking solution will significantly decrease driving time, thus lowering the amountof daily vehicle emissions, and ultimately reducing the global environmentalfootprint.
4. Enhanced User Experience – A smart parking solution will integrate the entire userexperience into a unified action. Driver's payment, spot identification, location search and time notifications all seamlessly become part of the destination arrivalprocess.

5. New Revenue Streams – Many new revenue streams are possible with smart parking technology. For example, lot owners can enable tiered payment options dependent on parking space location. Also, reward programs can be integrated into existing models to encourage repeatusers.
6. Integrated Payments and POS – Returning users can replace daily, manual cash payments with account invoicing and application payments from their phone. This could also enable customer loyalty programs and valuable userfeedback.
7. Increased Safety – Parking lot employees and security guards contain real-time lot data that can help prevent parking violations and suspicious activity. License plate recognitioncameras can gather pertinent footage. Also, decreased spot-searching traffic on the streets can reduce accidents caused by the distraction of searching forparking.
8. Real-Time Data and Trend Insight – Over time, a smart parking solution can produce data that uncovers correlations and trends of users and lots. These trends can prove to be invaluable to lot owners as to how to adjust and improvements todrivers.
9. Decreased Management Costs – More automation and less manual activity saves on labor cost and resourceexhaustion.
10. Increased Service and Brand Image – A seamless experience can really skyrocket acorporate or commercial entities brand image to the user. Whether the destination is a retail store, an airport or a corporate business office, visitors will surely be impressed with the cutting-edge technology and conveniencefactors.

1.3ADVANTAGES

- Low power consumption
- No need of a person to take order from the table.
- Long life
- Highly sensitive
- Easy to install because of wireless interface

- Usage of Android touch screen smart phone in performing the task. Wi-Fi wireless transmission.
- Fast response
- Efficient and low-cost design

CHAPTER 2LITERATURE REVIEW

2.1 PAPER 1

Title- Smart Restaurant.

Author Name-Tuhin Ghosh, Shubham Bhoir, Prashant Patel,Nikhil Mehta and Amruta Mhatre.

Summary-In this paper, an automated food ordering system with-real time customer feedback was presented. That system is convenient, effective, and easy to use thereby improving the performance of restaurant's staff. This smart food ordering system for the restaurant sector is made by combining the Android and Wireless technology.

2.2 PAPER 2

Title- Design of Intelligent Restaurant with a Touch Screen Based Menu Ordering System.

Author Name- Ashwini Bankar andMamta Mahajan.

Summary-The project referred in this paper integrated HTML for restaurant menu page designing, embedded C for code of touch screen module, PayPal for online payment and a robot is implemented in intelligent restaurant to fulfil the requirement of customer. The following system allows customers to order food by LCD module surface which is programmed by embedded C, which is wirelessly connected to the kitchen and the cash counter via RF module. A line following robot is used to carry meal from kitchen to customer. An android mobile is used in which PayPal is integrated for online payment.

2.3 PAPER 3

Title- A Review Paper on Smart Restaurant Ordering System.

Author Name- Shraddha G. Malviya, Nikita D. Deshpande, Shivani G. Mahalle and Prof. SharvariTantarpale.

Summary- This paper mainly covers the need of the new advanced ordering systems, the technologies needed to set up the system like TFT display and Arduino. It also explains the working of the system.

2.4 PAPER 4

Title- Digital Smart System for Restaurants Using Wireless Technology.

Author Name- Kunal P. Gundle, Anuja A. Harshe, Kajol B. Kinage and Niraj L. Ghanawat.

Summary- In this paper, an automated touch based digital Smart system for the restaurant is proposed to overcome the traditional method of pen and paper. It prevents from queue formation. The customer can use any language they are comfortable with, to operate the system. The system gives fast parking service to the customers that as soon as they finish billing, a check out message is sent to the parker and he is ready with the customers car which will also save customers time. It gives fine dining experience to the customers.

2.5 PAPER 5

Title- IOT Based Smart Restaurant.

Author Name- S.Dharani, G.Mamatha, P.Kavya and P.Shameera Anjum.

Summary-The project referred in the paper provides an efficient method that can help all the people, especially dumb/illiterate people to communicate easily and it is user friendly device. It will also help in transforming the whole catering industry around the world. The following system will help in reducing the waiting time of the customer and will also reduce the manual service given by waiters and serving staff and eliminating the mistakes.

2.6 PAPER 6

Title- Implementation of Smart Restaurant with e-menu Card.

Author Name- Mayur D. Jakhete and Piyush C. Mankar.

Summary-Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed

carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Smart restaurant is developed to provide easy interaction between customers through wireless technology. Thus, the project has been successfully designed and tested. Similarly, the system can also be implemented with Graphical LCD for displaying the menu as we have used android phone. However, the system becomes bulkier and more delicate to handle because each table is going to consist of such module for ordering.

2.7 PAPER 7

Title- Smart Restaurant System.

Author Name- Jedidiah Harpanahalli, Kevin Bhingradia, Pranav Jain and JayasudhaKoti

Summary-To avoid the confusion, long queues and bottlenecks caused by cashiers during peak hours, we the authors presented a novel system that performs automatic food scanning and payment, focused on improving service quality at restaurants. The proposed smart restaurant system has been addressed and implemented using Arduino, Raspberry pi, Python, SQLite database and RFID technology. The same has been tested for different conditions like start-up and scanning process, database transactions and payment execution, the results have been discussed in the results section. It further improves the system by endorsing cashless transactions and streamlining the otherwise chaotic restaurant environment. In addition to that, it also aids to diminish human intervention in restaurant operations. Thus, this system comes in handy as an admirable solution in restaurant operations.

2.8 PAPER 8

Title- The Internet of Things (IoT): Applications, investments, and challenges for enterprises.

Author Name-In Lee A andKyoochun Lee b.

Summary-Because the IoT is such a recent development, there is still a paucity of studies on the social, behavioural, economic, and managerial aspects of the IoT. This makes it very challenging for companies to make informed decisions as regards IoT adoption/ implementation. Our article is one of the first studies on a conceptual model of IoT applications for enterprises. In this article we identified three categories of IoT applications: monitoring and control, big data and business analytics, and information sharing and collaboration. We also presented investment opportunities and investment evaluation with NPV and real options. Finally, we discussed five challenges in implementing IoT applications for enterprises.

2.9 PAPER 9

Title- Smart Menu Ordering System in Restaurant.

Author Name- Shreya Umap, ShiwaniSurode, Prajakta Kshirsagar, Manjusha Binekar and Prof. Nakul Nagpal.

Summary-Integrating all the hardware components used has been developed in it. The presence of each module has been reasoned out and placed here very carefully, thus contributing to the best and efficient working of the unit. Secondly, using very highly advanced IC's with the help of up growing technology, the project has been successfully developed and implemented. This project provides an efficient device that helps to all people, especially dumb/illiterate to communicate easily and it is a user-friendly device. This is our proposed system which reduces the cost of running the restaurant as it does not require any waiters. This project also helps in transforming the whole catering industry in the world. This system will help in reducing the waiting time of customer in the restaurants. It will also reduce manual service given by waiters and serving staff and eliminating the human mistakes.

2.10 PAPER 10

Title- Near-Field Communication Sensors and Cloud-Based Smart Restaurant Management System.

Author Name- Hassain Saeed, Ali Shouman, MaisElfar, Mostafa Shabka, Shikharesh Majumdar and Chung Horng-Lung.

Summary- In this paper, we have presented an efficient and user-friendly solution that will solve many of the problems faced by restaurants, by effectively using technologies of mobile and web applications, Internet of Things, Near-Field Communication sensors, and cloud computing. Different from previous approaches, our solution of a Smart Restaurant Management System does not require restaurants to purchase multiple iPads/PDAs to give customers for ordering. Instead it allows customers to bring their own device and wirelessly order food from an Android application on their mobile smartphone or tablet.

2.11 PAPER 11

Title- Design of Restaurant Billing System (E Bill Resto) by Applying Synchronization of Data Billing in Branch Companies to Main Companies Based on Rest API.

Author Name- MahaputraHidayat and Alek Siswanto.

Summary- E Bill Resto is a restaurant billing system that was developed by involving several selling places/restaurants with the name of a brand that is connected to the parent company by a database server with an integrated system, all revenue from restaurant sales can be monitored in real time.

2.12 PAPER 12

Title- Design and Implementation of a Smart Home Energy Saving System.

Author Name- CM Lin and MT Chen.

Summary-In this paper, a smart home electric energy saving system is implemented by combining smart meter, smart plug, smart mobile devices, and database server. The smart meter consists of a power metering unit, a data storage unit, a meter interface unit and a ZigBee module.

2.13 PAPER 13

Title- NFC-based mobile application design restaurant ordering system APP.

Author Name- Kuan-Yu Lin, Chih-Hun Chen, Zhe-Ming Zhang and Sheng-ChuanOu

Summary-As smartphones grow rapidly and wireless communication technology develops maturely, mobile applications of all sorts keep emerging. At present, the wireless communication technology that smart phones incorporate most often is Near Field Communication, NFC.

2.14 PAPER 14

Title-Home Appliance Control Using Power Saving Wireless Smart Switch.

Author Name- Pallav Singh and Nishant Parth.

Summary- The Internet of Things (IoT) conceptualizes the idea of remotely connecting and monitoring a network of real-world objects (things) through the Internet. The 'Thing' in IoT can be any device with any kind of built-in-sensors having the ability to collect and transfer data over a network without manual intervention.

2.15 PAPER 15

Title- Mobile Integrated Smart Irrigation Management and Monitoring System Using IOT.

Author Name- Vaishali S, Suraj S, Vignesh G, Dhivya S and Udhayakumar S.

Summary-Agriculture has been the most important practice from very beginning of the human civilization. Traditional methods .that are used for irrigation, such as overhead sprinkler and flood type, is not that much efficient. They result in a lot of wastage of water and can also promote disease such as fungus formation due to over moisture in the soil. Automated irrigation system is essential for conservation of the water and indirectly viability of the farm since it is an important commodity.

CHAPTER 3DESIGN AND IMPLEMENTATION

3.1 ARCHITECTURAL DESIGN OF THE WORK

3.1.1 Ordering System

The system uses a touch module which is placed on each table for the customer to make orders. Order is made by selecting item made available in the menu code on the touch lcd display. Then, the code is decrypted by using Arduino mega 2560. Later it transmits the data via Bluetooth communication once order is confirmed. The processed data is sent to the PC in kitchen section for ordering purpose, and to the manager section for the billing purpose. This system will be done after the customer completed their orders.

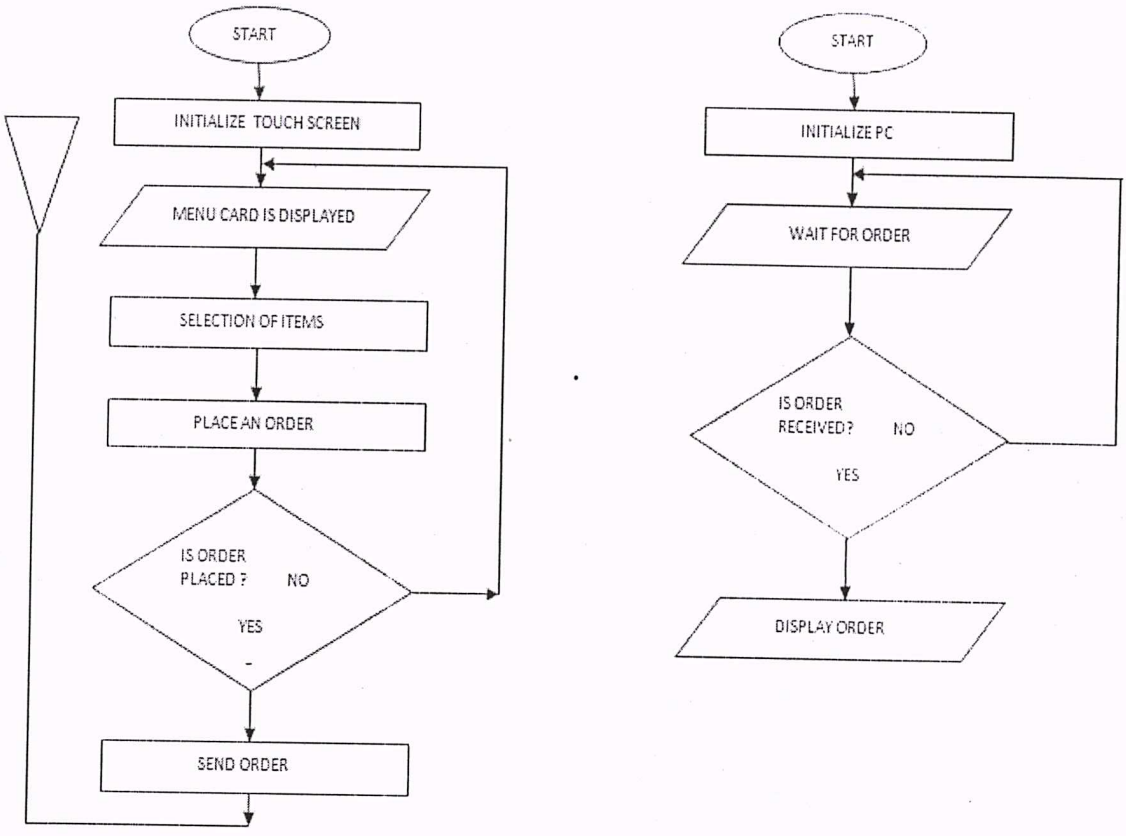

Figure 1 BlockDiagram for Ordering System

This project helps to solve the problem faced by the restaurant entrepreneur in the attempt to organize the restaurant more efficiently skilled. It can also be used to reduce the lateness and the error caused on ordering foods by the customer's by waiters. By using this system, the complaints about the services are eliminated.

Delivering system is simply the line following robot. As the LED glows in the kitchen section the chefs will place the food on the line following robot, and they will press the corresponding button to stop at the respective table.

This block concerns about the automatic opening and closing of a gate. This includes IR sensor for sensing the person or object approaching the gate. The systems and methods a are common for enter and exit the door.This system is controlled by Arduino uno microcontroller and includes the DC motor which makes door to slides during opening or closing.

Menu ordering system consists of LCD display at each table which consists of food items in that restaurant. The customer can select the required food items from that LCD display then the corresponding LED will glow at the receiver section. There will be one display board for each table. For this it uses the blink application, and it is controlled by the node MCU.

3.1.2 Parking System

Our system is an Arduino based parking system which contains IR sensors to detect the empty parking spaces and sends this data to Arduino, which is further display on the desktop. This enhances the user to check the status/availability of parking spaces before entering parking area. Here the challenge is to use the existing resources at an optimum level to reduce the searching time, traffic congestion in the city. A few existing parking systems uses video sensors to collect the information but using video sensors in a parking system are expensive, so our aim is to develop a system which is cost effective and provides high performance.

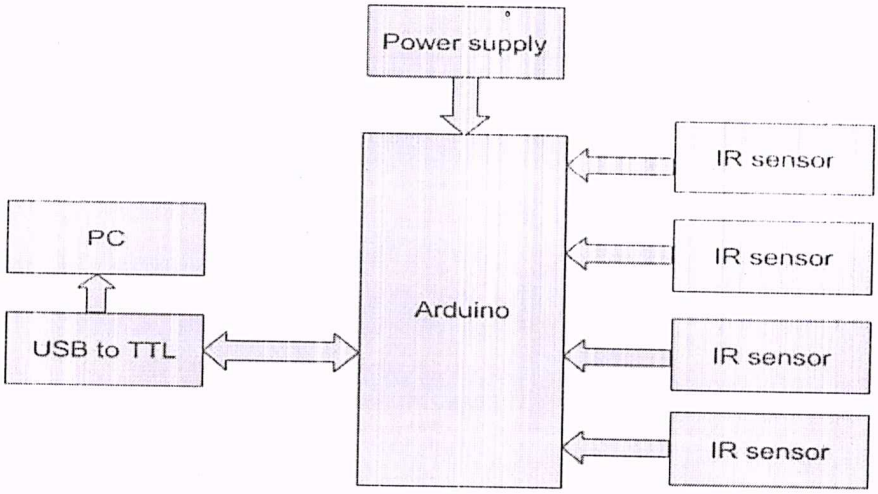

Figure 2Block Diagram for Parking System

Circuit Description- An infrared sensor is an electronic device that emits to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances, and these output voltages, change in proportion to the magnitude of the IR light received. Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. In the electromagnetic spectrum, the infrared portion is divided into three regions: near infrared region, mid infrared region, and far infrared region. The frequency range of infrared is higher than microwave and lesser than visible light. For optical sensing and optical communication, photo optics technologies are used in the near infrared region as the light is less complex than RF when implemented as a source of signal. Optical wireless communication is done with IR data transmission for short range applications. An infrared sensor emits and/or detects infrared radiation to sense its

surroundings. The basic concept of an Infrared Sensorwhich is used as Obstacle detector is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.

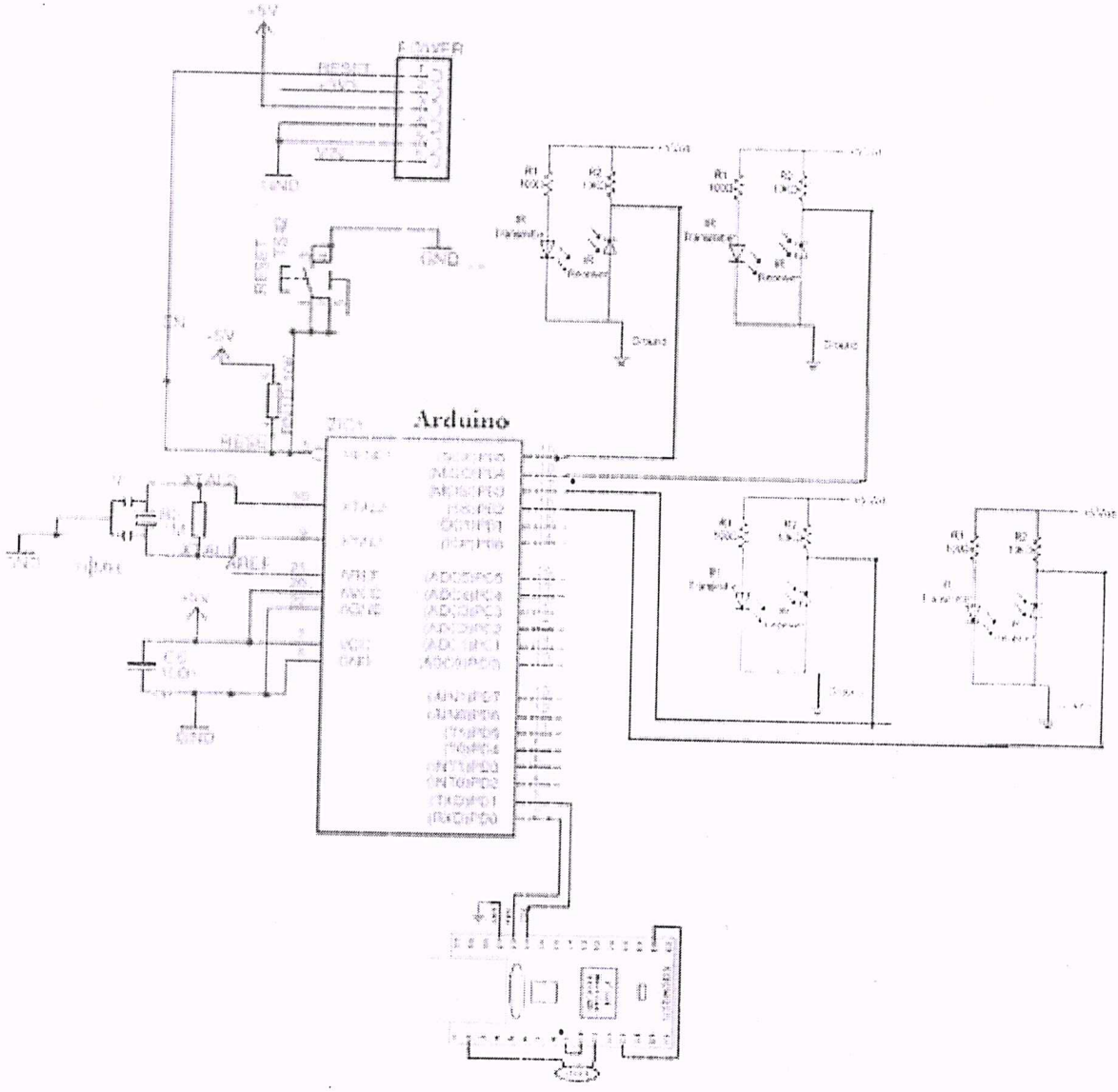

Figure 3Circuit Diagram of Parking Module

3.1.3 Irrigation System

The Arduino Uno is a link between the soil moisture sensor and pumping motor. Arduino is supplied with a power of 7V to 12V. The pump motor is given a separate supply of 9V. The soil moisture sensor is used in this project because it must check soil moisture to measure the electrical conductivity of soil. The moisture sensor

provides an analogue output which can be easily interfaced with Arduino. In this project two sensors are connected to analogue pins A0 and A1 of the Arduino board. The system receives a signal from the soil moisture sensor and compares with the preset threshold value. If the value detected by the sensor is below the threshold value, the Arduino sends a message signal to the motor to fetch water. But when the value detected by the sensor is above the preset value, the motor does not rotate. The Arduino always accepts the signal from the sensor and keeps updating its data.

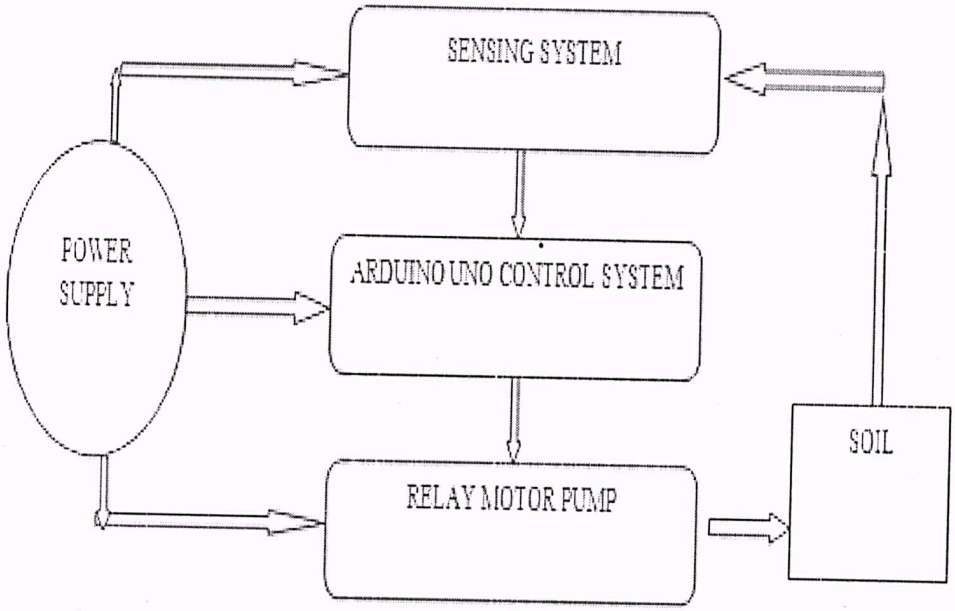

Figure 4Block Diagram for Plantation System

Circuit Description- Soil moisture sensors are connected to Arduino A0 pin for analog input, so we can get temperature ,content present in soil. VCC pin is connected through 5V Arduino pin; GND pin is representing ground to connect all components. D7 is known as a digital pin, so it connected with transistors to amplifying low power. Motor driver module VCC pin connected through D13 pin of Arduino board, based on temperature monitor it pass the current to the motor pump, D7 pin is used for Ground. We can write values as output. D7 connected through resistors 1k and same connection goes through transistors for low

amplifying current. In transistor has three pin which we called as Emitter, base, and collector.

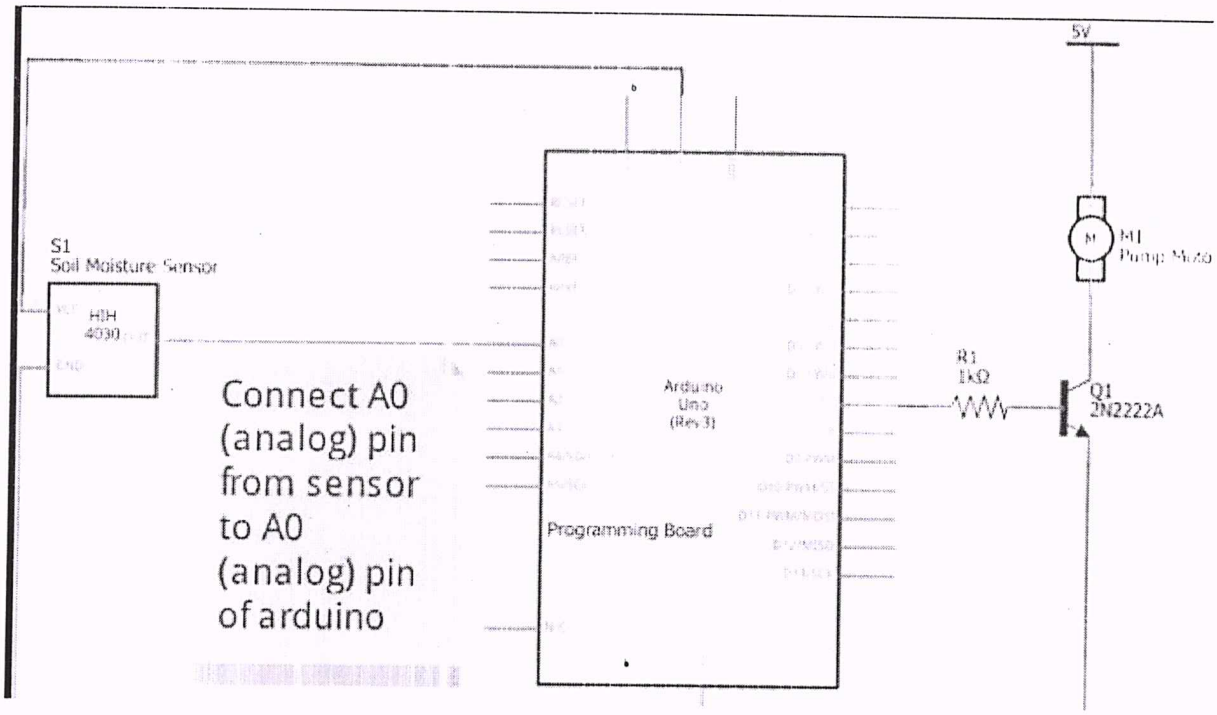

Figure 5Circuit Diagram of Irrigation Module

3.2 DETAILS OF HARDWARE

3.2.1 Arduino

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also like the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and

version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

❖ Hardware Features

- Typical -80dBm sensitivity
- Up to +4dBm RF transmit power
- Low Power 1.8V Operation ,1.8 to 3.6V I/O
- PIO control
- UART interface with programmable baud rate
- With integrated antenna
- With edge connector

❖ Software Features

- Default Baud rate: 38400, Data bits:8, Stop bit:1, Parity: No parity, Data control: has supported baud rate: 9600,19200,38400,57600,115200,230400,460800.
- Given a rising pulse in PIO0, device will be disconnected.
- Status instruction port PIO1: low-disconnected, high-connected.
- PIO10 and PIO11 can be connected to red and blue led separately. When master and slave are paired, red and blue led blinks 1time/2s in interval, while disconnected only blue led blinks 2times/s.
- Auto-connect to the last device on power as default.
- Permit pairing device to connect as default.
- Auto-pairing PINCODE:"0000" as default

- Auto-reconnect in 30 min when disconnected because of beyond the range of connection.

❖ General Pin Functions

- LED: There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it is off.
- VIN: The input voltage to the Arduino/Genuino board when it is using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V: This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator and can damage the board.
- 3V3: A 3.3-volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND: Ground pins.
- IOREF: This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.
- Reset: Typically used to add a reset button to shields which block the one on the board.

❖ Special Pin Functions

Each of the 14 digital pins and 6 Analog pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller. The Uno has 6 analog inputs,

labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function.

In addition, some pins have specialized functions:

- Serial / UART: pins 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- External Interrupts: pins 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.
- PWM (Pulse Width Modulation): 3, 5, 6, 9, 10, and 11 Can provide 8-bit PWM output with the analogWrite() function.
- SPI (Serial Peripheral Interface): 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- TWI (Two Wire Interface) / I²C: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.
- AREF (Analog Reference): Reference voltage for the analog inputs.

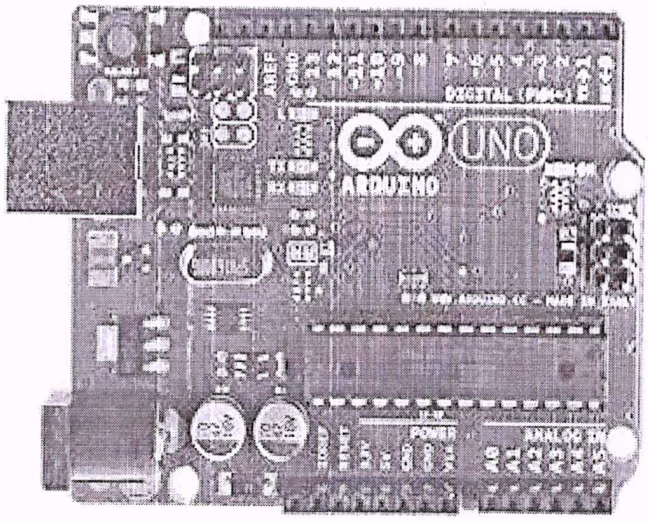

Figure 6 Arduino UNO

3.2.2 Bluetooth Module (HC05)

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.

Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm.

❖ Hardware Features

- Typical -80dBm sensitivity
- Up to +4dBm RF transmit power
- Low Power 1.8V Operation ,1.8 to 3.6V I/O
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- UART interface with programmable baud rate
- With integrated antenna
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- Permit pairing device to connect as default.
- Auto-pairing PINCODE:"0000" as default
- Auto-reconnect in 30 min when disconnected because of beyond the range of connection.

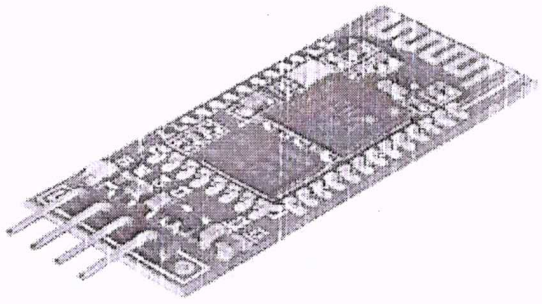

Figure 7 Bluetooth Module

3.2.3 DC Motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

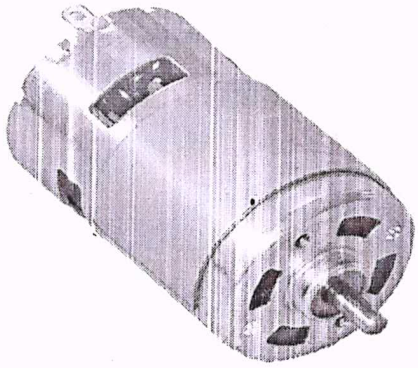

Figure 8 DC Motor

DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances.

Larger DC motors are currently used in propulsion of electric vehicles, elevator, and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

A conveyor belt is the carrying medium of a belt conveyor system (often shortened to belt conveyor). A belt conveyor system is one of many types of conveyor systems. A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium—the conveyor belt—that rotates about them. One or both pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley. There are two main industrial classes of belt conveyors; Those in general material handling such as those moving boxes along inside a factory and bulk material handling such as those used to transport largevolumes of resources and agricultural materials, such as grain, salt, coal, ore, sand, overburden and more.

3.2.4 Conveyor Belt

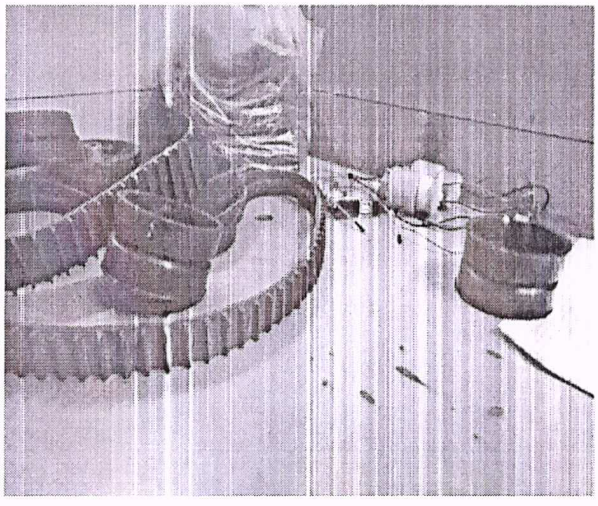

Figure 9 Conveyor Belt

3.2.5 PIR Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most

often used in PIR-based motion detectors. An individual PIR sensor detects changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor. When an object, such as a human, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well.

PIRs come in many configurations for a wide variety of applications. The most common models have numerous Fresnel lenses or mirror segments, an effective range of about ten meters (thirty feet), and a field of view less than 180 degrees. Models with wider fields of view, including 360 degrees, are available—typically designed to mount on a ceiling. Some larger PIRs are made with single segment mirrors and can sense changes in infrared energy over thirty meters (one hundred feet) away from the PIR. There are also PIRs designed with reversible orientation mirrors which allow either broad coverage (110° wide) or very narrow "curtain" coverage, or with individually selectable segments to "shape" the coverage.

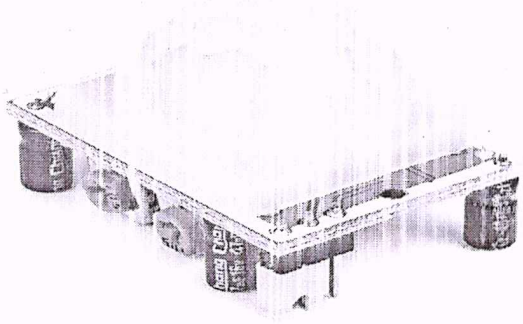

Figure 10 PIR Sensor

3.2.6 Servo Motor

Servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors Servomotors are not a specific class of motor although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing.

A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is a signal (either analogue or digital) representing the position commanded for the output shaft.

The motor is paired with some type of encoder to provide position and speed feedback. In the simplest case, only the position is measured. The measured position of the output is compared to the command position, the external input to the controller. If the output position differs from that required, an error signal is generated which then causes the motor to rotate in either direction, as needed to bring the output shaft to the appropriate position. As the positions approach, the error signal reduces to zero and the motor stops.

The very simplest servomotors use position-only sensing via a potentiometer and bang-bang control of their motor; the motor always rotates at full speed (or is stopped). This type of servomotor is not widely used in industrial motion control, but it forms the basis of the simple and cheap servos used for radio-controlled models.

More sophisticated servomotors use optical rotary encoders to measure the speed of the output shaft and a variable-speed drive to control the motor speed. Both of these enhancements, usually in combination with a PID control algorithm, allow the servomotor to be brought to its commanded position more quickly and more precisely, with less overshooting.

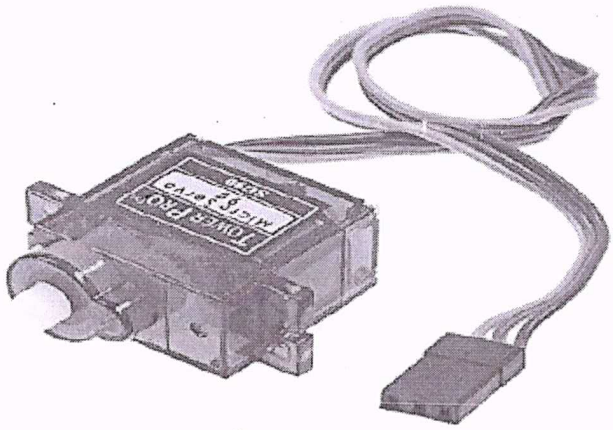

Figure 11 Servo Motor

3.2.7 LCD Module

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

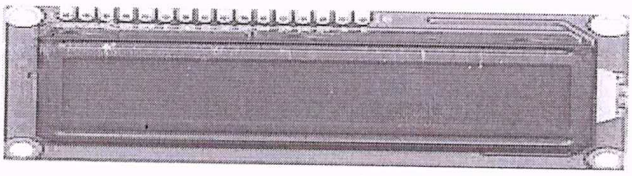

Figure 12 LCD Module

3.2.8 Motor Driver (L293D)

The L293D is quadruple high-current half-H drivers. It is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc, and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

❖ Features

- Wide Supply-Voltage Range: 4.5 V to 36 V
- Separate Input-Logic Supply
- Internal ESD Protection
- Thermal Shutdown
- High-Noise-Immunity Inputs
- Output Current 600 mA Per Channel

- Peak Output Current 1.2 A Per Channel
- 8-Bit Serial-In, Parallel-Out Shift
- Wide Operating Voltage Range of 2 V to 6 V
- High-Current 3-State Outputs Can Drive Up To 15 LSTTL Loads
- Low Power Consumption, 80-μA Max ICC
- Typical tpd = 13 ns
- Low Input Current of 1
- Shift Register Has Direct Clear

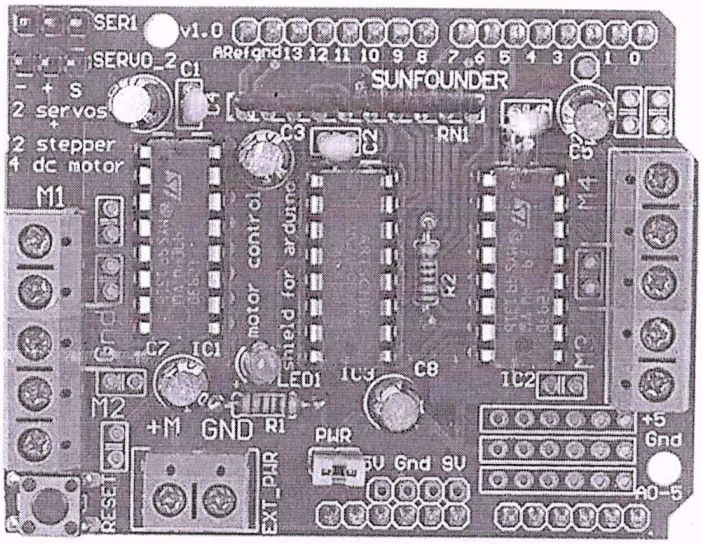

Figure 13 Motor Driver(L293D)

3.2.9 Ultrasonic Sensor

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected toward the sensor this reflected wave is observed by the Ultrasonic receiver module. HC-SR04 distance sensor is commonly used with both microcontroller and microprocessor platforms like Arduino, ARM, PIC, Raspberry Pie etc. The following guide is universally since it must be followed irrespective of the type of computational device used.

Power the Sensor using a regulated +5V through the VCC ad Ground pins of the sensor. The current consumed by the sensor is less than 15mA and hence can be directly powered by the on board 5V pins (If available). The Trigger and the Echo pins are both I/O pins and hence they can be connected to I/O pins of the

microcontroller. To start the measurement, the trigger pin must be made high for 10uS and then turned off. This action will trigger an ultrasonic wave at frequency of 40Hz from the transmitter and the receiver will wait for the wave to return. Once the wave is returned after it getting reflected by any object the Echo pin goes high for a particular amount of time which will be equal to the time taken for the wave to return back to the sensor.

❖ HC-SR04Sensor Features

- Operating voltage: +5V
- Theoretical Measuring Distance: 2cm to 450cm
- Practical Measuring Distance: 2cm to 80cm
- Accuracy: 3mm
- Measuring angle covered: <15°
- Operating Current: <15mA
- Operating Frequency: 40Hz

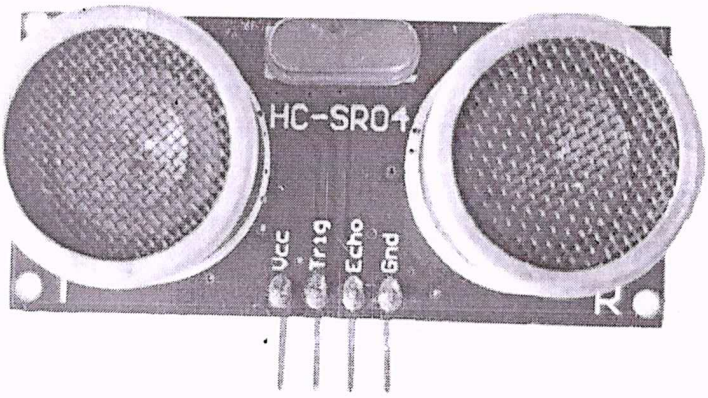

Figure 14 Ultrasonic Sensor

3.2.10 IR Sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These

types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances, and these output voltages, change in proportion to the magnitude of the IR light received.

Figure 15 IR Sensor

3.2.11 Soil Sensor

Soil moisture sensors measure the volumetric water content in soil.[1] Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.

Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential; these sensors are usually referred to as soil water potential sensors and include tensiometers and gypsum blocks.

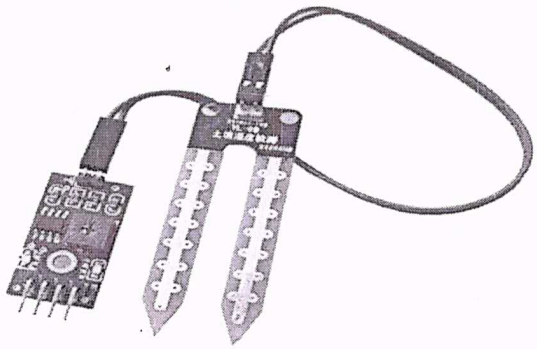

Figure 16 Soil Sensor

3.2.12 DC Water Pump

This is lightweight, small size, high efficiency, low consumption, and low noise water pump. It has been used widely, in household include cooking, cleaning, bathing, space heating and water flowers, etc.

❖ Features

- High Quality Hall Effect Sensor
- Compact, Easy to Install
- Specification :
- Working Voltage: DC10~13V
- No Load Current: 250mA
- Temperature Range: -30~0° C
- Suction Lift: 100mm
- Spit Out Lift: 500mm
- Flow Rate Range: 1.31±0.26L/Min

For any technical support or suggestion, please kindly go to our forum.

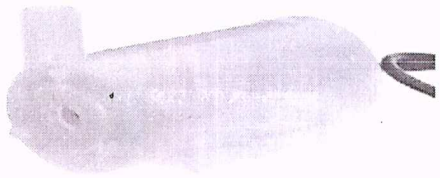

Figure 17 DC Water Pump

3.2.13 5V Relay

Relays are most used switching device in electronics. Since the relay has 5V trigger voltage we have used a +5V DC supply to one end of the coil and the other end to ground through a switch. This switch can be anything from a small transistor to a microcontroller or a microprocessor which can perform switching operating. You can also notice a diode connected across the coil of the relay; this diode is called the Fly back Diode. The purpose of the diode is to protect the switch from high voltage spike that can produced by the relay coil. As shown one end of the load can be connected to the Common pin and the other end is either connected to NO or NC. If connected to NO, the load remains disconnected before trigger and if connected to NC the load remains connected before trigger.

❖ Features of 5-Pin 5V Relay

- Trigger Voltage (Voltage across coil): 5V DC
- Trigger Current (Nominal current): 70mA
- Maximum AC load current: 10A @ 250/125V AC
- Maximum DC load current: 10A @ 30/28V DC
- Compact 5-pin configuration with plastic molding
- Operating time: 10msec Release time: 5msec
- Maximum switching: 300 operating/minute

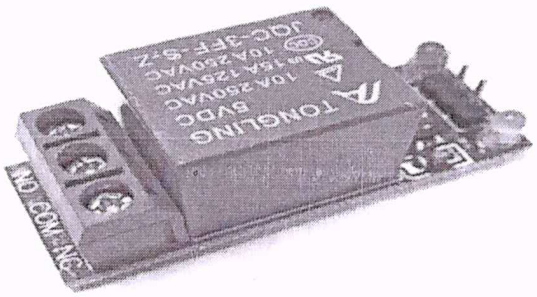

Figure 18 5V Relay

CHAPTER 4EXPERIMENTAL RESULTS & ANALYSIS

4.1 ARDUINO UNO BOARD SPECIFICATIONS

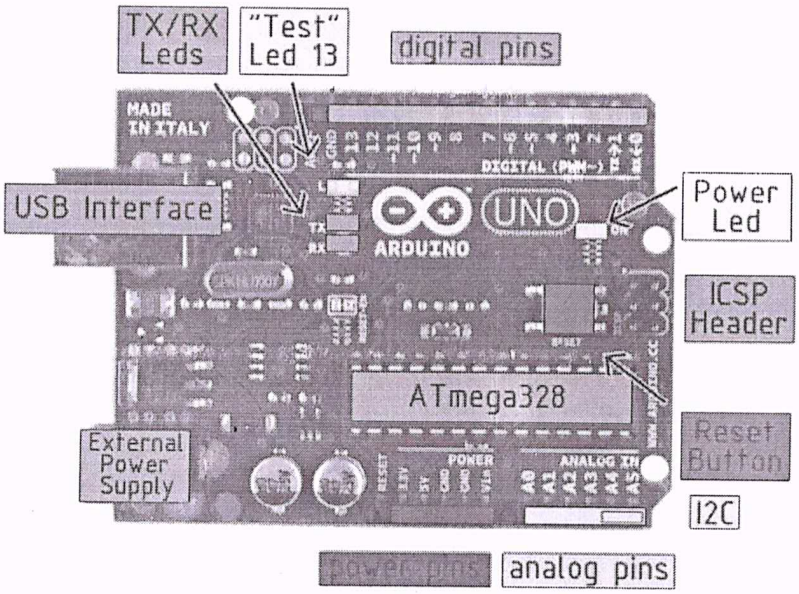

Figure 19 Arduino UNO Board

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz

4.2 L293D SPECIFICATIONS (MOTOR DRIVER IC)

The Device is a monolithic integrated high voltage, high current four channel driver designed tostandard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors.

PIN CONNECTIONS (Top view)

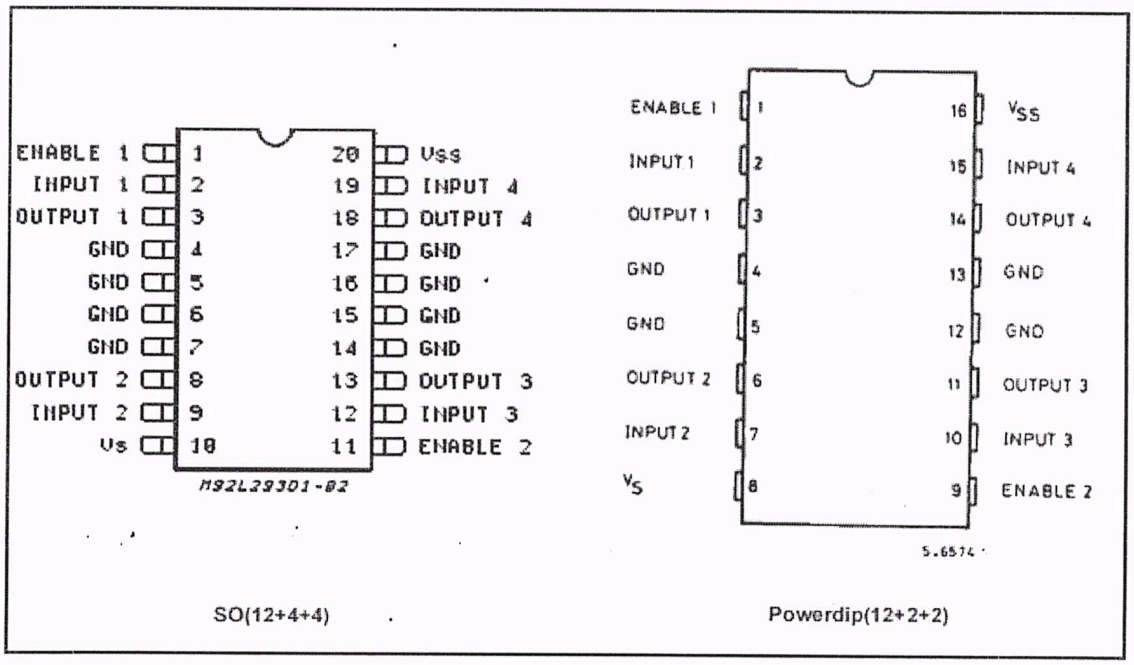

Figure 20 Pin Out

To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included. This device is suitable for use in switching applications at frequencies up to 5 kHz. The L293D is assembled in a 16-lead plastic package which has 4 center pins connected together and used for heatsinking The L293DD is assembled in a 20 lead surface mount which has 8 center pins connected and used for heatsinking.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	36	V
V_{SS}	Logic Supply Voltage	36	V
V_i	Input Voltage	7	V
V_{en}	Enable Voltage	7	V
I_o	Peak Output Current (100 µs non repetitive)	1.2	A
P_{tot}	Total Power Dissipation at T_{pins} = 90 °C	4	W
T_{stg}, T_j	Storage and Junction Temperature	- 40 to 150	°C

Figure 21 Maximum Rating

ELECTRICAL CHARACTERISTICS (for each channel, V_S = 24 V, V_{SS} = 5 V, T_{amb} = 25 °C, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_S	Supply Voltage (pin 10)		V_{SS}		36	V
V_{SS}	Logic Supply Voltage (pin 20)		4.5		36	V
I_S	Total Quiescent Supply Current (pin 10)	V_i = L ; I_O = 0 ; V_{en} = H		2	6	mA
		V_i = H ; I_O = 0 ; V_{en} = H		16	24	mA
		V_{en} = L			4	mA
I_{SS}	Total Quiescent Logic Supply Current (pin 20)	V_i = L ; I_O = 0 ; V_{en} = H		44	60	mA
		V_i = H ; I_O = 0 ; V_{en} = H		16	22	mA
		V_{en} = L		16	24	mA
V_{IL}	Input Low Voltage (pin 2, 9, 12, 19)		– 0.3		1.5	V
V_{IH}	Input High Voltage (pin 2, 9, 12, 19)	$V_{SS} \leq 7$ V	2.3		V_{SS}	V
		$V_{SS} > 7$ V	2.3		7	V
I_{IL}	Low Voltage Input Current (pin 2, 9, 12, 19)	V_{IL} = 1.5 V			– 10	µA
I_{IH}	High Voltage Input Current (pin 2, 9, 12, 19)	$2.3 \text{ V} \leq V_{IH} \leq V_{SS} - 0.6$ V		30	100	µA
$V_{en\,L}$	Enable Low Voltage (pin 1, 11)		– 0.3		1.5	V
$V_{en\,H}$	Enable High Voltage (pin 1, 11)	$V_{SS} \leq 7$ V	2.3		V_{SS}	V
		$V_{SS} > 7$ V	2.3		7	V
$I_{en\,L}$	Low Voltage Enable Current (pin 1, 11)	$V_{en\,L}$ = 1.5 V		– 30	– 100	µA
$I_{en\,H}$	High Voltage Enable Current (pin 1, 11)	$2.3 \text{ V} \leq V_{en\,H} \leq V_{SS} - 0.6$ V			± 10	µA
$V_{CE(sat)H}$	Source Output Saturation Voltage (pins 3, 8, 13, 18)	I_O = – 0.6 A		1.4	1.8	V
$V_{CE(sat)L}$	Sink Output Saturation Voltage (pins 3, 8, 13, 18)	I_O = + 0.6 A		1.2	1.8	V
V_F	Clamp Diode Forward Voltage	I_O = 600nA		1.3		V
t_r	Rise Time (*)	0.1 to 0.9 V_O		250		ns
t_f	Fall Time (*)	0.9 to 0.1 V_O		250		ns
t_{on}	Turn-on Delay (*)	0.5 V_i to 0.5 V_O		750		ns
t_{off}	Turn-off Delay (*)	0.5 V_i to 0.5 V_O		200		ns

Figure 22 Electrical Rating

CHAPTER 5CONCLUSION & FUTURE SCOPE

5.1 CONCLUSION

The presence of each component has been reasoned out and placed very carefully, thus contributing to the best and efficient working of the unit. Secondly using very highly advanced IC's with the help of up growing technology, the project has been successfully developed and implemented. This project provides an efficient method that help to all the people, especially dumb/illiterate people to communicate easily and it is user friendly device. This is our proposed system which reduces the cost of running the restaurants as it does not require any waiters. This project also helps in transforming the whole catering industry in the world. This system will help in reducing the waiting time of customer in the restaurant. It will also reduce the manual service given by waiters and serving staff and eliminating the mistakes.

Hence the idea of automating the process of intelligent parking system will enhance better parking process. The mechanism works on a simple principle and there is not much complexity needed in the circuit and works on low cost. The accuracy of this project may be improved by adding some features. The system was helpful over reduce the wasting time of searching parking lot and improving the parking lot estimation. This is the basic idea of developing a system to handle parking related issues in bigger Malls/ shopping complex. For a bigger parking system, detailed engineering must be done considering safety and other issues. By introducing Radio frequency identification tags on vehicles, automated billing system can be developed based on the duration of stay in the parking slot.

5.2 FUTURESCOPE

Thus the "Automated Irrigation system based on soil moisture using Arduino" has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. In this is showing pin diagram of project. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Thus, the Arduino Based

Automatic Plant Watering System has been designed and tested successfully. The system has been tested to function
automatically. The moisture sensors measure the moisture level (water content) of the different plants. If the moisture level is goes to be below the desired and limited level, the moisture sensor sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to respective plant using the Rotating Platform/Sprinkler. When the desired moisture level is reached, the system halts on its own and the water Pump is turned OFF.

This project can further be improved using tabs and help in development of more efficient food ordering system.

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APPENDICES

PROGRAM CODE

1. Ordering System Code

```
#include <LiquidCrystal.h>
LiquidCrystallcd(2, 3, 4, 5, 6, 7);
int in1 = 8;
int in2 = 9;
int in3 = 10;
int in4 = 11;
int button1 = 12;
int button2 = 13;
int buttonstate1 = 0;
int buttonstate2 = 0;
void setup() {
  // set up the LCD's number of columns and rows:
lcd.begin(16, 2);
  // Print a message to the LCD.
Serial.begin(9600);
Serial.print("order dish choice ,table wise");
delay(1000);
pinMode(A0, OUTPUT);
pinMode(in1, OUTPUT);
pinMode(in2, OUTPUT);
pinMode(in3, OUTPUT);
pinMode(in4, OUTPUT);
pinMode(button1, INPUT);
pinMode(button2, INPUT);
}
```

```
String order;
void loop() {
  if (Serial.available() > 0) {
    order = Serial.readString();
Serial.print("order is not ready");
Serial.print(order);
  }
lcd.setCursor(3, 0);
lcd.print("Table order");
lcd.setCursor(0, 1);
lcd.print(order);

delay(100);
  buttonstate1 = digitalRead(button1);
  buttonstate2 = digitalRead(button2); delay(50);
  if ((buttonstate1 == HIGH) && (buttonstate2 == LOW)) {
forward();
delay(5000);
ruk();
Serial.print("table1");
  }
  else if ((buttonstate1 == LOW) && (buttonstate2 == HIGH)) {
forward();
delay(10000);
ruk();
Serial.print("table2");
  }
  else if ((buttonstate1 == LOW) || (buttonstate2 == LOW)) {
ruk();
  }
}
```

```
void forward() {
digitalWrite(in1, 1);
digitalWrite(in2, 0);
digitalWrite(in3, 1);
digitalWrite(in4, 0);
}
void ruk() {
digitalWrite(in1, 0);
digitalWrite(in2, 0);
digitalWrite(in3, 0);
digitalWrite(in4, 0);
}
```

2. Parking System Code

```
#include<LiquidCrystal.h>
LiquidCrystallcd(2, 3, 4, 5, 6, 7); // (rs,e,d4,d5,d6,d7)

#define IR2 8
#define IR3 9
#define del 500
#define buzzer 13

int count = 0;

void setup() {
pinMode(IR2, INPUT);
pinMode(IR3, INPUT);
pinMode(buzzer, OUTPUT);
lcd.begin(16, 2);
Serial.begin(9600);
```

```
 }
 void loop() {
   int bs2 = digitalRead(IR2);
   int bs3 = digitalRead(IR3);

   if (bs2 == HIGH) {
     count++;
 lcd.clear();
 lcd.setCursor(0, 0);
 lcd.print("Person:");
 lcd.print(count);
 Serial.println(count);
 buzz();
    delay(del);
  }
  else if (bs3 == HIGH) {
    count--;
 lcd.clear();
 lcd.setCursor(0, 0);
 lcd.print("Person:");
 lcd.print(count);
 Serial.println(count);
 buzz();
    delay(del);
  }
}

void buzz() {
digitalWrite(buzzer, HIGH);
delay(200);
digitalWrite(buzzer, LOW);
```

```
delay(50);
}
```

3. *Energy Saving And Irrigation System Code*

```
// soil moisture
#define moisture 20
#define motor 13
int sensor_pin = A0;
int output_value = 0;

//  automation
int a = 2, b = 3, c = 4, d = 5;

void setup() {
Serial.begin(9600);
  for (int i = 2 ;i<= 5 ; i++) {
pinMode(i, OUTPUT);
  }
Serial.println("Reading From the Sensor ...");
delay(1000);
}
void loop()
{
 //  automation
 char st = Serial.read();
 switch (st) {
   //case 'A': high(a); break;
   case 'B': high(b); break;
   case 'C': high(c); break;
   case 'D': high(d); break;
```

```
    //case 'a': low(a); break;
    case 'b': low(b); break;
    case 'c': low(c); break;
    case 'd': low(d); break;
  }
// soil moisture
output_value = analogRead(sensor_pin); delay(200);
  //output_value = map(output_value, inputLow, inputHigh, outputLow, outputHigh);
output_value = map(output_value, 0, 1023 , 10, 550);
output_value = map(output_value, 550, 10, 0, 100);

Serial.print("Mositure : ");
Serial.print(output_value);
Serial.println("%");

  if (output_value< moisture) {
digitalWrite(a, HIGH);
delay(500);
  }
  else if (output_value> moisture) {
digitalWrite(a, LOW);
delay(500);
  }
delay(1000);
}
void high(int x) {
Serial.print(" HIGH :");
Serial.println(x);
digitalWrite(x, HIGH);
delay(200);
}
```

```
void low(int y) {
Serial.print(" LOW :");
Serial.println(y);
digitalWrite(y, LOW);
delay(200);
}
```