SMART TROLLEY

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report titled **"SMART TROLLEY"** is the bonafide work of **"RESHWANTH.R, VINEETH KUMAR.D, DIVAKAR.R, ELANGO.M"** who carried out the project work under my supervision. Certified further that, to the best of my knowledge the work reported herein does not form part of any other project or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

Microcontroller based design, has acquired the status of most happening field in electronics. This is highly specialized field that has the power of integrating thousands of transistors on single silicon chip. Nowadays, in mall for purchasing variety of items it requires trolley. Every time customer has to pull the trolley from rack to rack for collecting items and at the same time customer has to do calculation of those items and need to compare it with his budget in pocket.

After this procedure, customer has to wait in queue for billing. So, to avoid headache like pulling trolley, waiting in billing queue, thinking about budget, we are introducing new concept that is "SMART TROLLEY IN MEGA MALL". In modern era, for automation of mall we are developing a microcontroller based TROLLEY which is totally automatic. It follows the customer while purchasing items and it maintains safe distance between customer and itself. Only customer has to hold the barcode side of the product wrapper in front of barcode scanner. Then corresponding data regarding product will be displayed on display. By using this trolley, customer can buy large number of product in very less time with less effort. At the billing counter, computer can be easily interfaced for verification and bill print out.

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1.Introduction

Nowadays, the advancement of technology has been enhancing many possibilities to explore through it. One such a unique product is ‘Smart trolley’ reveals with an effective approach. It does comprise of two modules namely an automated scanning and billing system as well as a guided human follower robot which gets incorporated as a single product. The automated scanning system encompasses a barcode code scanner which nominally scans the barcode serial ID in each product and the read information will be transferred to raspberry pi encapsulated with a product database to access through it with the help of Bluetooth module.

Wherein, the connection status will get inbuilt through a driven application exclusively in-order to maintain a hassle-free communication. Hereby, the generated program which runs on raspbian OS will compare the serial ID with the database and queues out the matched item. Finally, the information about the product which includes an individual price, quantity, and an overall pricing throughout the purchase will be displayed in a LCD display for easy visualization to customers. On further, Customer has an option to add or delete an item in their carts if they need to do so. Once the completion of the purchase, one could choose the finish button for uplifting their contended shopping. An another module which makes the trolley to follow its customer has been enhanced with it. This module has a fleet of Ultrasonic sensors connected with an Arduino to effectively control the motion of the robot. The reflected echo signals from the Ultrasonic sensors has been used to carry out a driven motion by taking the digital outputs in the pins of Arduino. These encoded bits will act as a control inputs to the DC motor driver incorporated with the module. Based on the condition of intelligence, the robot moves forward whenever it detects a human from a particular distance and moves backward whenever any object approaches it closely.

A unique algorithm has been worked out to make it interference less. Further, we have been enlisting various proposals for synchronized follow of the robot. Finally, the smart trolley will attract customers with the help of its user-friendly venture and so It gets placed in every shopping markets to reduce time consumption for its customers who were shopping in a relaxed and a busy phase.

2. Proposed Methodology

2.1 Objective

The main objective of this project is to reduce and eliminate the time taken in billing counters in super markets by designing an Intelligent Shopping Basket. It uses Barcode scanners to allow users to self-checkout and increase productivity time.

2.2 Block Diagram

Billing System

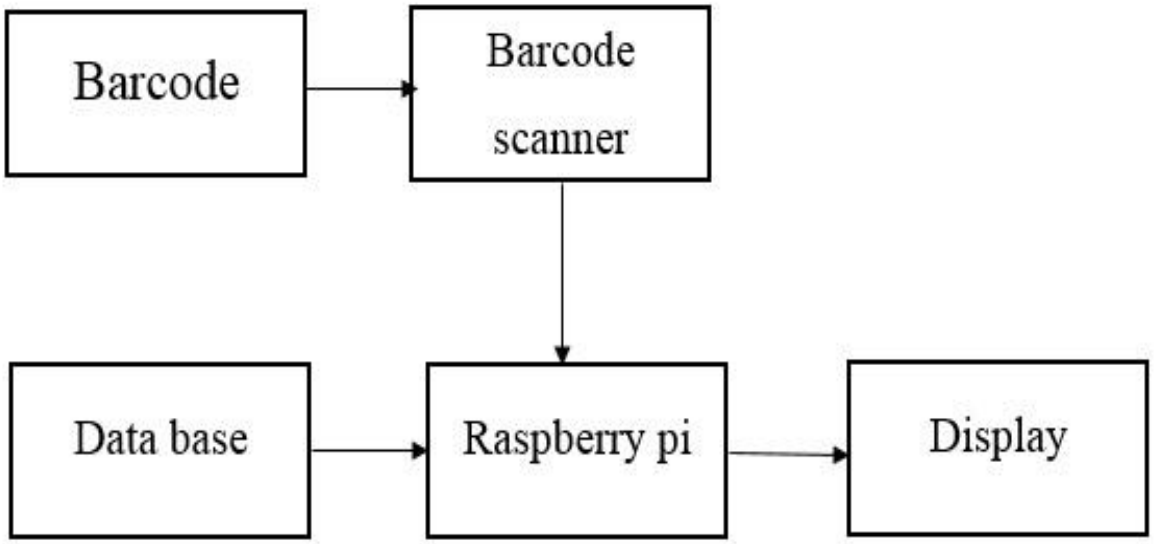

Figure 2.1 Block Diagram of Billing System

Barcode Reader Module

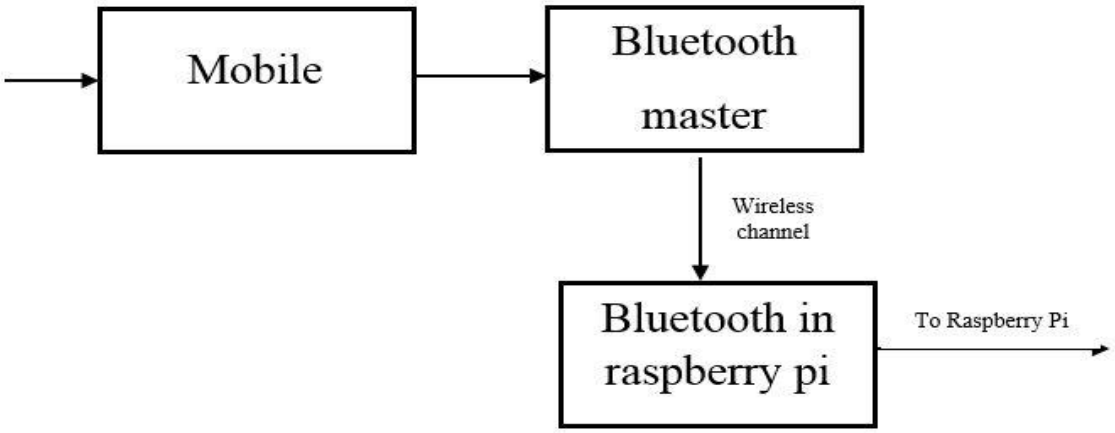

Figure 2.2 Block Diagram of Barcode Reader Module

Human Follower

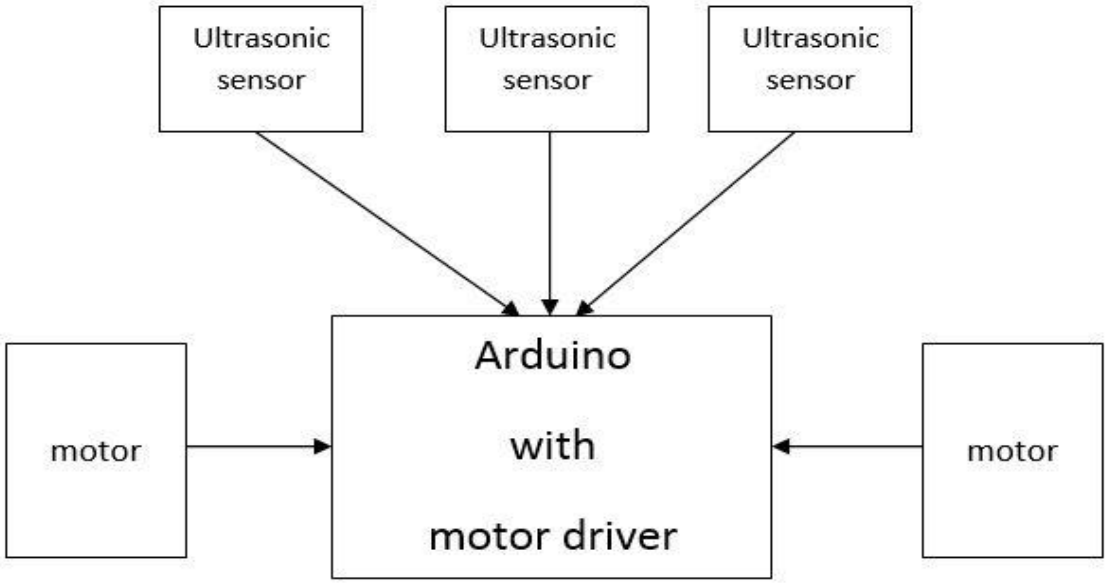

Figure 2.3 Block Diagram of Human Follower

2.3 Working principle

The Automated Shopping cart system integrates a Shopping cart (trolley) with 2 sets of barcode scanners placed at 2 different checkpoints, the entry and exit points respectively. It facilitates the user to self-scan the barcode of the purchased products which he intends to purchase. Wrongful entries can be corrected by making use of a keypad that changes the functionality of the machine from addition of products to removal of products and activates the other barcode scanner at the opposite end. A wireless smart-device makes note of all the scanned commodities of the particular trolley (with allotment number) and is linked with the Supermarket's backend database which contains details of the products such as Cost Price, Available Stock.

The scanned products are automatically billed in the wireless smart device for their purchases, thereby significantly reducing turnaround time and reducing and transmitted to the Shop's central Billing program. By this mechanism, the time consuming work of scanning and billing every single product at the cash counter can be avoided. Users can then make use of the counter to pack and pay labour time which has become a real problem in the modern era. The tray in which the two barcode scanners are embedded is fitted with a lock and keys for which are with the people at the billing section. This allows users to take out all their products and place them into carry bags during the checkout.

3.Hardware Description

3.1 Barcode Scanner

Barcode is also known as the Auto ID (Automatic Identification). It was invented in the early 1970s, the barcode was created to help large retail stores and markets process their goods. The barcode technology is quite efficient for the management and information updating in the computers. Barcode is one of the familiar business standards. It is used for scanning the items at supermarket for checkouts. The barcode reader is used to detect the tag on items and identifies the product and related information. Barcode result in a visual representation of the data which is scanned and Interpreted for information. Barcode is smaller, lighter and less expensive. The barcode must be in the direct line of sight to be read by barcode scanner. Barcode have no read/write capabilities hence they cannot contain information such as product expiry date etc.

The barcodes can be easily reproduced and forged those results in less security. If the barcode is ripped, damaged there's no way to scan the product. The barcode based data collection system can be typically comprised of any of the components like Barcode scanner; barcode based mobile computer, barcode printers, barcode label, barcode data collection software etc. The computer looks up the price in a master database subtracts it from the store inventory, and calculates the change. The software also creates reports regarding inventory levels, shows which product is the most and least popular, creates demographic reports on individual products and customers, and tracks much more.

The key to the whole system is accurate reporting of the product purchased. Cashiers are inherently fallible and slow. Barcode benefits in data accuracy, consistency and efficiency. Barcode is used in Retail Operations, Receiving & shipping Operations, asset management, manufacturing operations, Office and Customer Service Applications and Warehousing etc. Barcodes are measured by the width of the narrow bar and are recorded in mils, or 1/1000 inch. A 15 Mil bar code, for instance, has a narrow bar that is 15/1000 inches wide. Further, quiet" zones," or blank spaces to the left and right of barcode symbols, are included to insure the barcode can be read. Barcode result in a visual representation of the data which is scanned and interpreted for information.

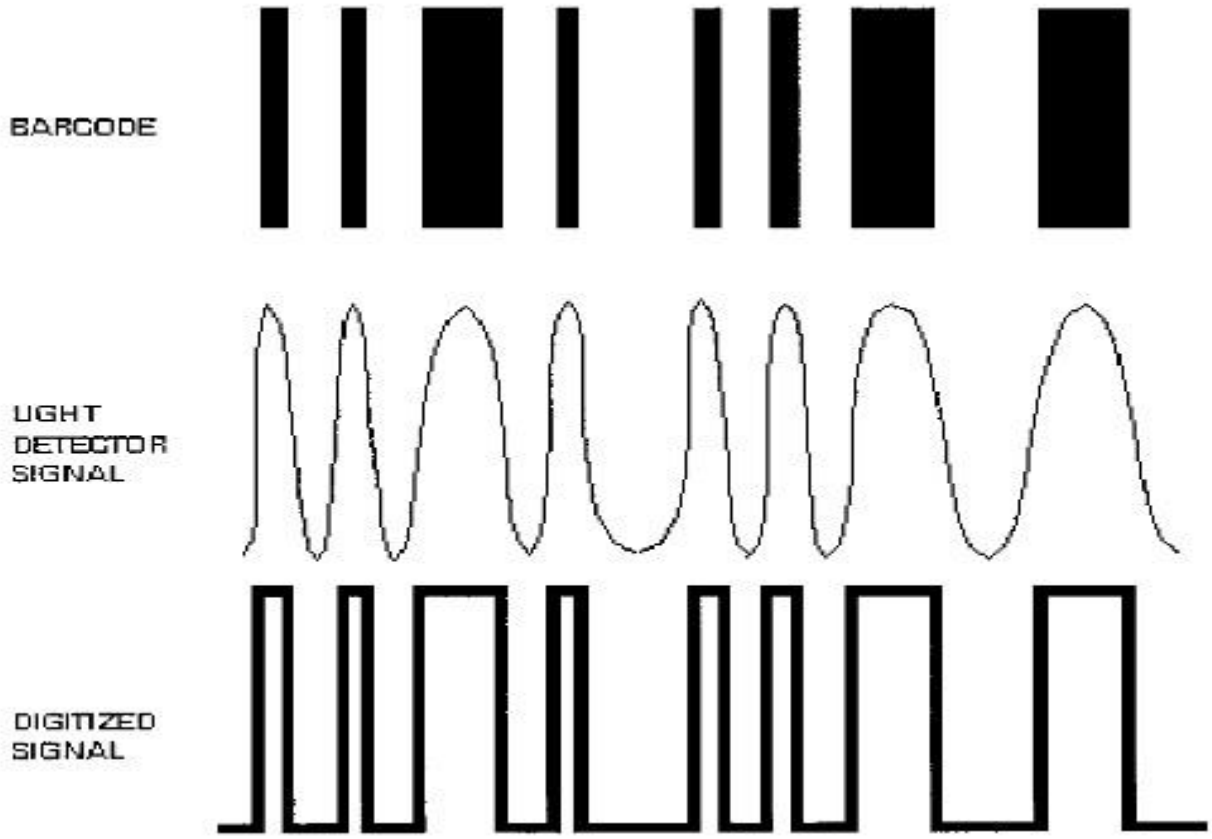

Figure 3.1 Barcode Encoding

There are many different types of barcodes that are supported by this application, in addition to the original 1-D barcode. These are commonly provided on products such as food, books, clothing, DVDs, and most other products sold commercially. When the Barcode Scanner application scans the 1-D barcode on one of these types of items, it can automatically search the web for that product. With this functionality, the application can enable the user to quickly do comparisons between the price of an item they are looking at in a store with prices from online retailers. The most common 2-D barcodes that can be read by this application are QR code and Data Matrix barcodes.

QR codes are often embedded in websites so that when users are browsing the website on their desktop or laptop and want to transfer a link, product, or application to their Android device, they can quickly point their camera at the screen and using the Barcode Scanner application, get that data from the website.

3.2 Raspberry Pi

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

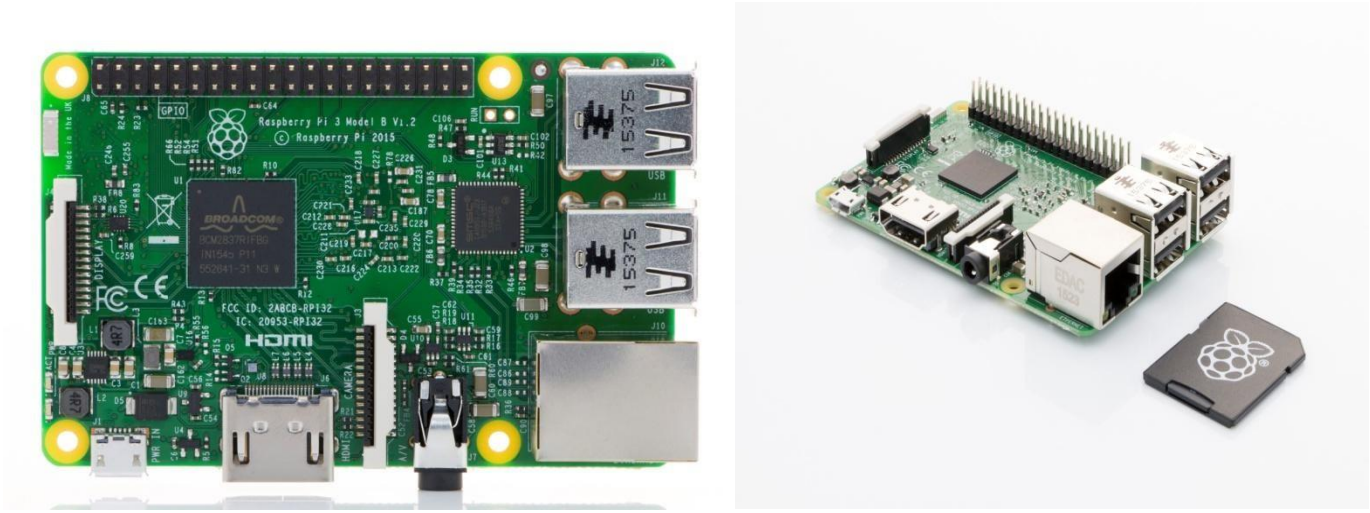

Figure 3.2 Raspberry Pi2

In Figure 5, The picture of Raspberry pi board is shown. It has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.

The Raspberry Pi is a series of credit card sized single board computers developed in England, United Kingdom by the Raspberry Pi Foundation with the intent to promote the teaching of basic computer science in schools and developing countries. The original Raspberry Pi and Raspberry Pi 2 are manufactured in several board configurations through licensed manufacturing agreements with Newark element14 (Premier Farnell), RS Components and Egoman. The hardware is the same across all manufacturers. All models feature a Broadcom system on a chip

(SOC) which include an ARM compatible CPU and an on chip graphics processing unit GPU (a VideoCore IV).

Specifications	
Chip	Broadcom BCM2836 SoC
Core architecture	Quad-core ARM Cortex-A7
CPU	900 MHz
GPU	Dual Core VideoCore IV® Multimedia Co-Processor Provides Open GL ES 2.0, hardware-accelerated OpenVG, and 1080p30 H.264 high-profile decode Capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering and DMA infrastructure
Memory	1GB LPDDR2
Operating System	Boots from Micro SD card, running a version of the Linux operating system
Dimensions	85 x 56 x 17mm
Power	Micro USB socket 5V, 2A

Table 3.1 Specification of Raspberry Pi2

CPU speed range from 700 MHz to 1.2 GHz for the Pi 3 and on board memory range from 256MB to 1GB RAM. Secure Digital SD cards are used to store the operating system and program memory in either the SDHC or MicroSDHC sizes. Most boards have between 1 and 4 USB slots, HDMI and composite video output, and a 3.5mm phono jack for audio. Lower level output is provided by a number of GPIO pins which support common protocols like I2C.

3.2.1 GPIO Pins

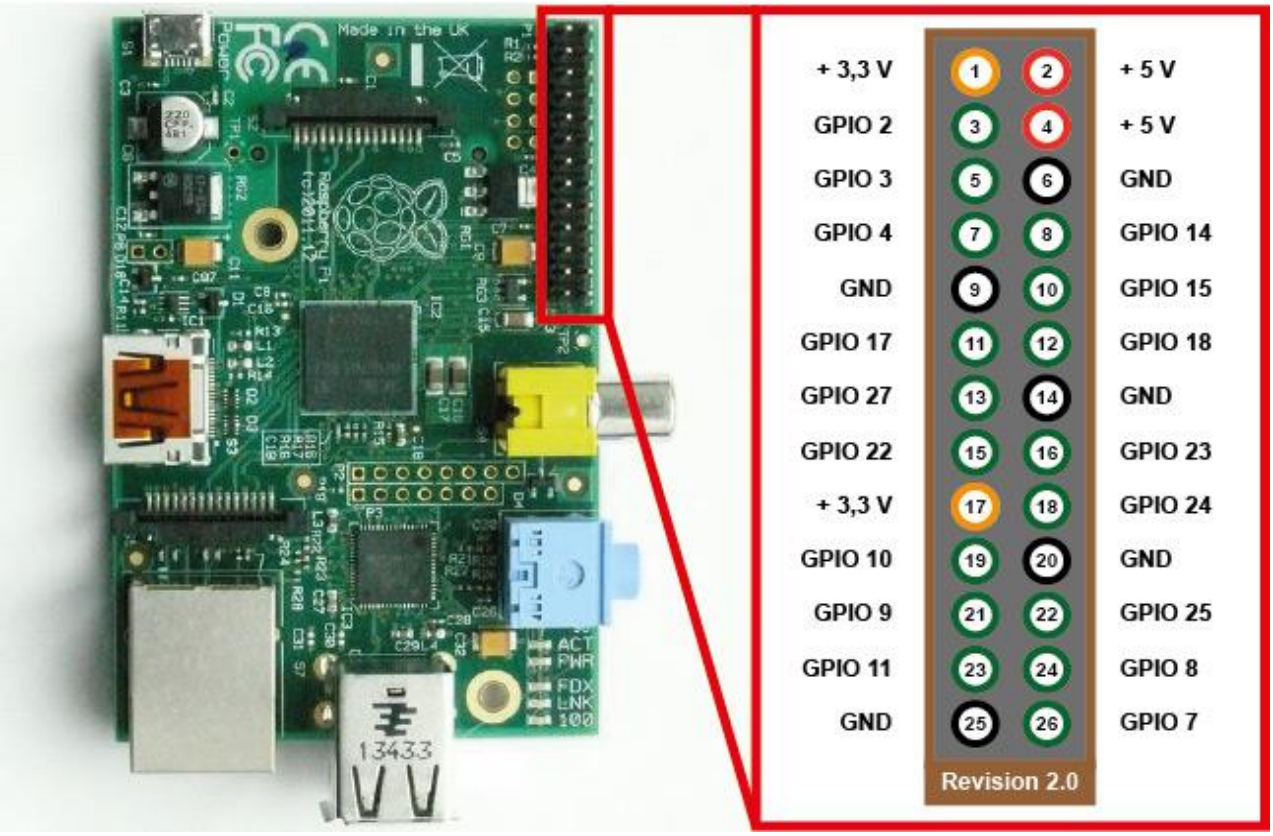

Figure 3.3 Raspberry Pi GPIO

GPIO pins can be configured as either general-purpose input, general-purpose output or as one of up to 6 special alternate settings, the functions of which are pin-dependent and shown in Figure 6.

There are 3 GPIO banks on BCM2835. Each of the 3 banks has its own VDD input pin. On Raspberry Pi, all GPIO banks are supplied from 3.3V. Connection of a GPIO to a voltage higher than 3.3V will likely destroy the GPIO block within the SoC. A selection of pins from Bank 0 is available on the P1 header on Raspberry Pi.

3.2.2 GPIO Pads

The GPIO connections on the BCM2835 package are sometimes referred to in the peripherals datasheet as "pads" - a semiconductor design term meaning "chip connection to outside world". The pads are configurable CMOS push-pull output drivers/input buffers.

Register-based control settings are available for

- Internal pull-up / pull-down enable/disable
- Output drive strength
- Input Schmitt-trigger filtering

3.2.3 Power-On States

All GPIOs revert to general-purpose inputs on power-on reset. The default pull states are also applied, which are detailed in the alternate function table in the ARM peripherals datasheet. Most GPIOs have a default pull applied.

3.2.4 Interrupts

Each GPIO pin, when configured as a general-purpose input, can be configured as an interrupt source to the ARM.

Several interrupt generation sources are configurable:

- Level-sensitive (high/low)
- Rising/falling edge
- Asynchronous rising/falling edge

Level interrupts maintain the interrupt status until the level has been cleared by system software (e.g. by servicing the attached peripheral generating the interrupt). The normal rising/falling edge detection has a small amount of synchronization built into the detection. At the system clock frequency, the pin is sampled with the criteria for generation of an interrupt being a stable transition within a 3-cycle window, i.e. a record of "1 0 0" or "0 1 1". Asynchronous detection bypasses this synchronization to enable the detection of very narrow events.

3.2.5 Alternative Functions

Almost all of the GPIO pins have alternative functions. Peripheral blocks internal to BCM2835 can be selected to appear on one or more of a set of GPIO pins, for example the I2C busses can be configured to at least 3 separate locations. Pad control, such as drive strength or Schmitt filtering, still applies when the pin is configured as an alternate function.

3.3 LCD Display

Liquid Crystal Display(LCD) is a flat display used in digital watches, cameras and many portable computers. LCD displays utilize two sheets of polarizing material with a liquid crystal solution between them. An electric current passed through the liquid causes the crystals to align so that light cannot pass through them. Each crystal, therefore, is like a shutter, either allowing light to pass through or blocking the light. LCD's consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. LCD's are used in flat screen TV's, smartphones, computer monitors, digital watches, etc. LCD 16x2 which means it can display 16 characters per line and there are 2 such lines.

All these LCD's performs the same functions such as display characters, numbers, special characters ASCII characters etc. Hence their programming is also the same since they all comes with same 14 pins (0-13) or 16 pins (0 to 15).

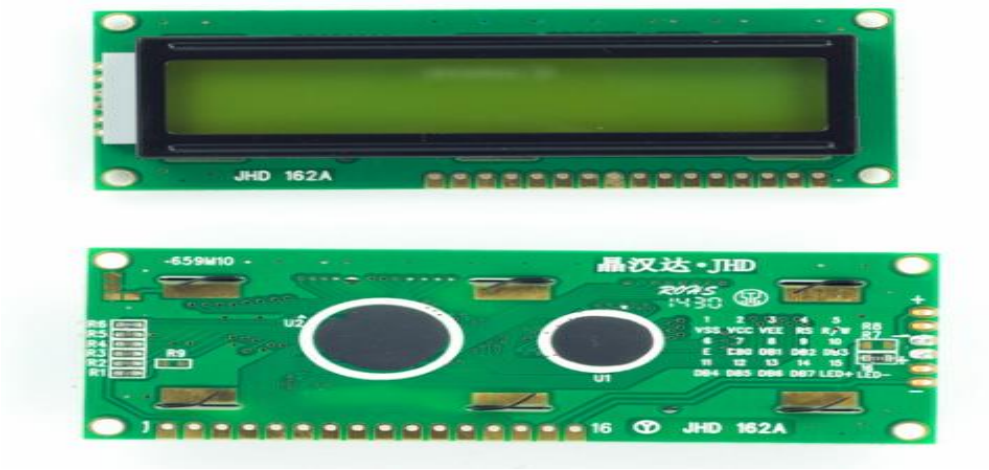

Figure 3.4 LCD Display Module

3.3.1 Pin Description of LCD

All LCDs have 14 or 16 pins. Let's see them in the following.

- **GND** or **VSS:** Ground or 0V
- **VCC** or **VDD:** Supply Voltage 5V
- **VEE:** Contrast adjustment through a variable resistor
- **RS:** Register select. Generally, every LCD has two types of registers namely **Command Register** and **Data Register**. When RS=0 or low, Command Register is selected and When RS=1 or high, Data Register is selected.
- **R/W:** Read/Write. When **RW=1**, data is read from LCD and When **RW=0**, writes the data to LCD.
- **EN:** Enable. Sends data to data pins when a high to low pulse is given.
- **Eight Data Pins (DB0 to DB7):** This 8-Data pins carries 8-bit data or command from an external unit such as micro controller.
- **Led+:** Back light of the LCD which should be connected to VCC or 5V.
- **Led-:** Back light of the LCD which should be connected to GND or 0V.

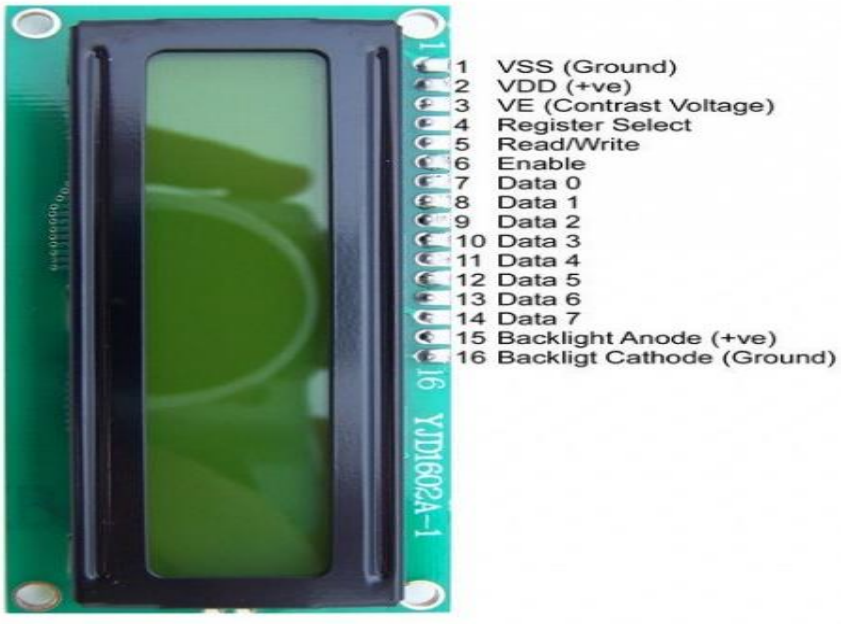

Figure 3.5 LCD Pin Diagram

3.4 HC-05 Bluetooth Module

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. Hope it will simplify your overall design/development cycle.

Figure 3.6 HC-05 Module

3.4.1 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.

3.5 Arduino UNO

The Arduino Uno is a microcontroller board based on the ATmega328. 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. The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V the voltage.

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The Atmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX).

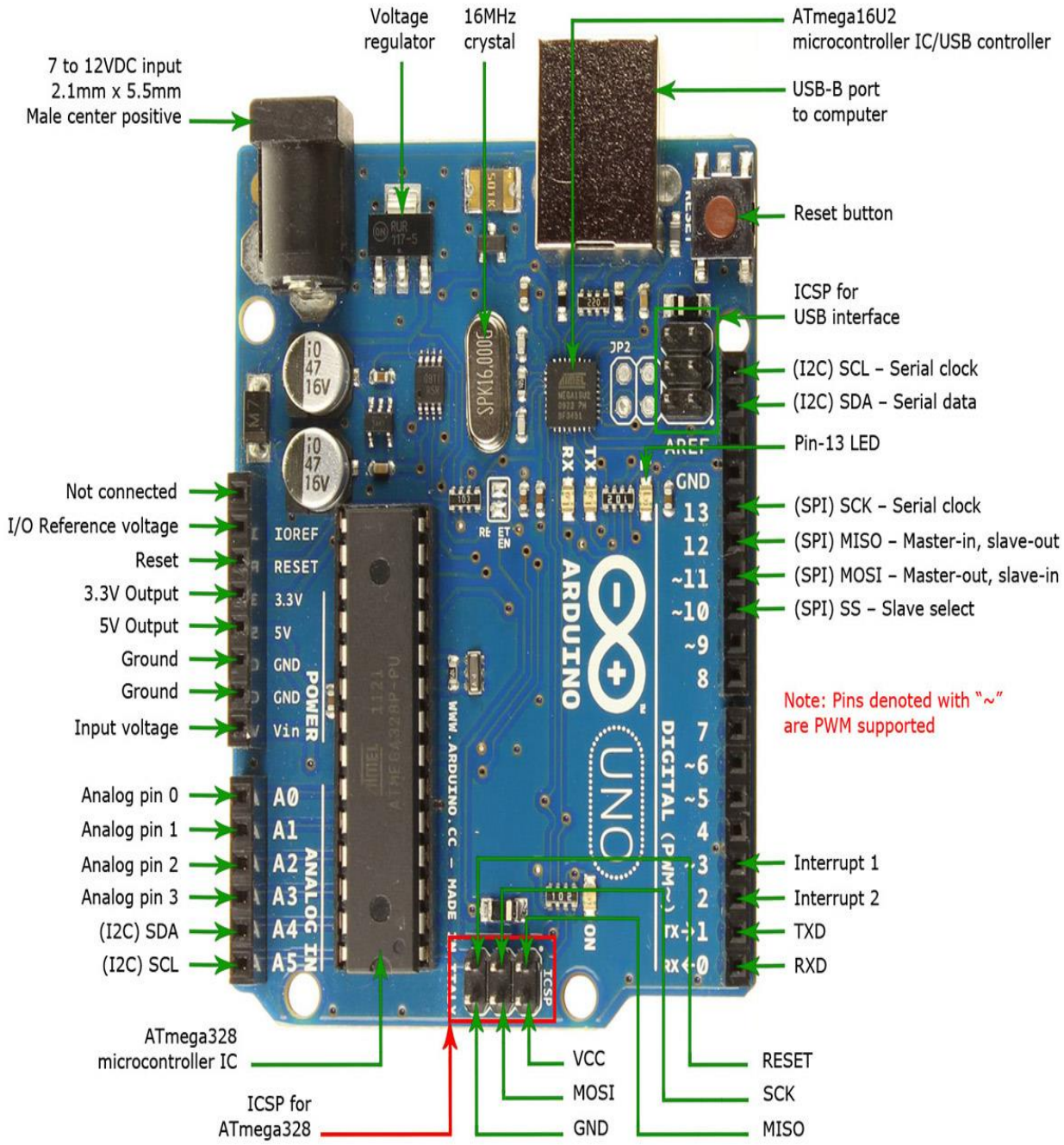

Figure 3.7 Arduino UNO

An Atmega8U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '8U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, an *.inf file is required. The

Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

Features	Arduino Uno
Flash memory	32K
RAM	2K
EEPROM	1K
UART (Serial ports)	1
Digital Pins	14
Analog Inputs	6
ADC Resolution (bits)	8
MircoSD memory card socket	0
Solar Lipo battery charger	No
RealTimeClock (RTC)	No
Bee socket (WiFi/Xbee/Cellular)	No
Processor	ATmega328P

Table 3.2 Features of Arduino UNO

The Arduino Uno has a resettable poly fuse that protects your computer's USB ports from shorts and over current. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

3.5.1 ATMEGA328P

Pin Diagram of ATmega328P

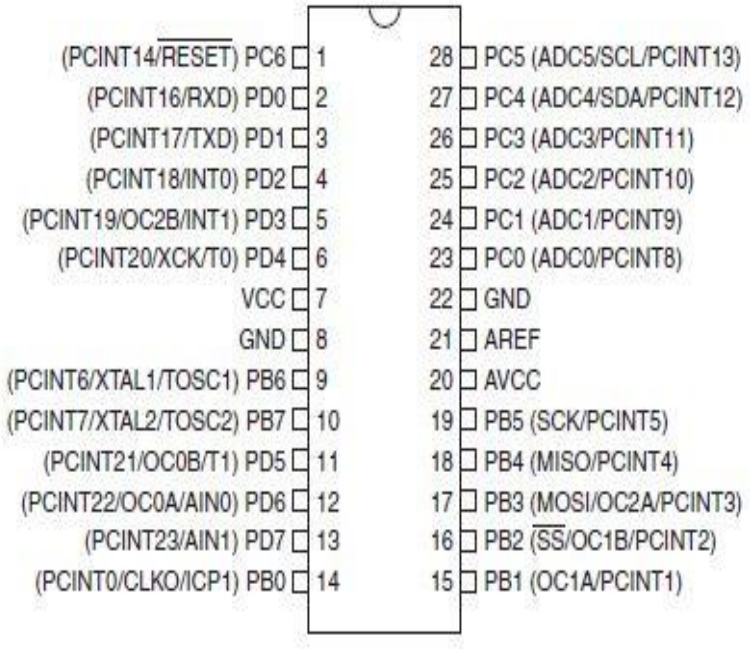

Figure 3.8 ATmega 320P

Basic Functions of Arduino Technology

1. Digital read pin reads the digital value of the given pin.
2. Digital write pin is used to write the digital value of the given pin.
3. Pin mode pin is used to set the pin to I/O mode.
4. Analog read pin reads and returns the value.
5. Analog write pin writes the value of the pin.
6. Serial. Begins pin sets the beginning of serial communication by setting the rate of a bit.

Advantages of Arduino Technology

1.It comes with an open supply hardware feature that permits users to develop their own kit
2.The software of the Arduino is well-suited with all kinds of in operation systems like Linux, Windows, and Macintosh, etc.
3.It also comes with open supply software system feature that permits tough software system developers to use the Arduino code to merge with the prevailing programming language libraries and may be extended and changed.
4. For beginners, it is very simple to use.

3.6 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. DC motors were the first type widely used, since 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 motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills.

The advent of power electronics has made replacement of DC motors with AC motors possible in many applications. At high power levels, DC motors are almost always cooled using forced air. A different number of stator and armature fields as well as how they are connected provide different inherent speed/torque regulation characteristics. The speed of a DC motor can be controlled by changing the voltage applied to the armature.

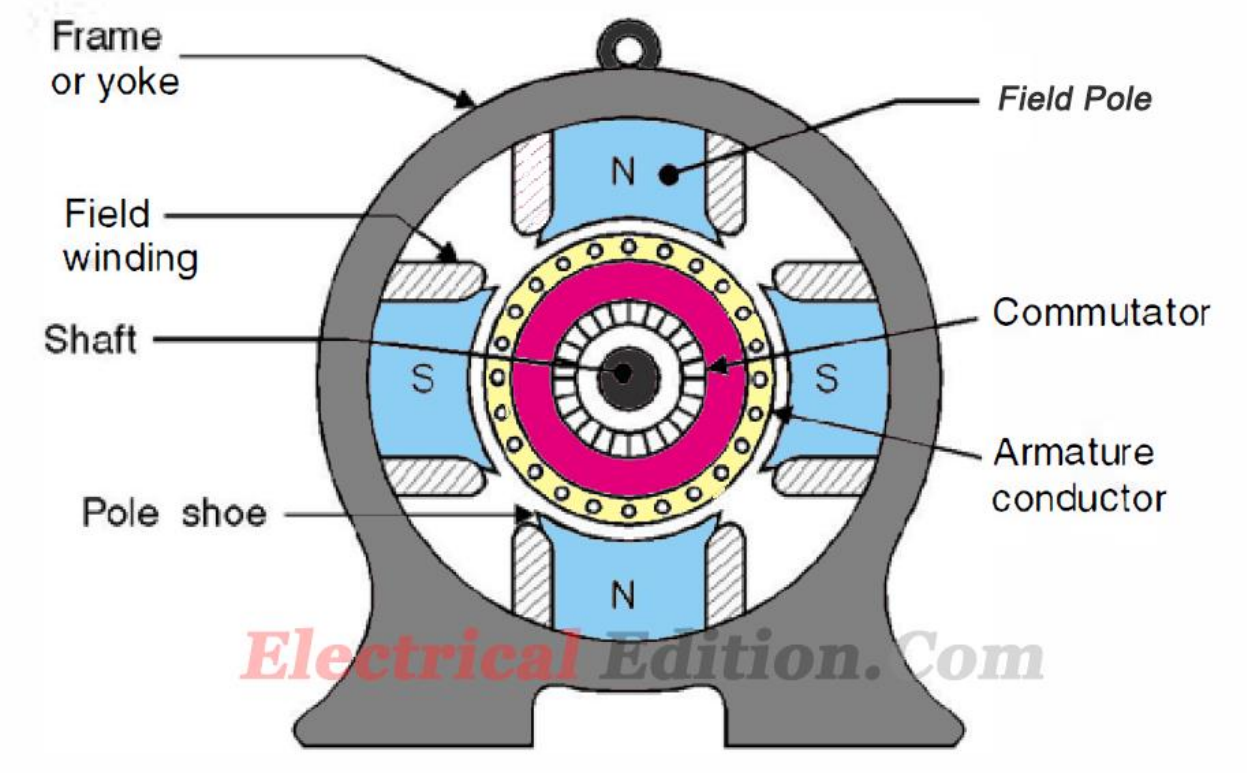

Figure 3.9 DC Motor

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3.7 L239D Motor Driver

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). A motor driver is a little current amplifier; the function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

3.7.1 Pin Diagram

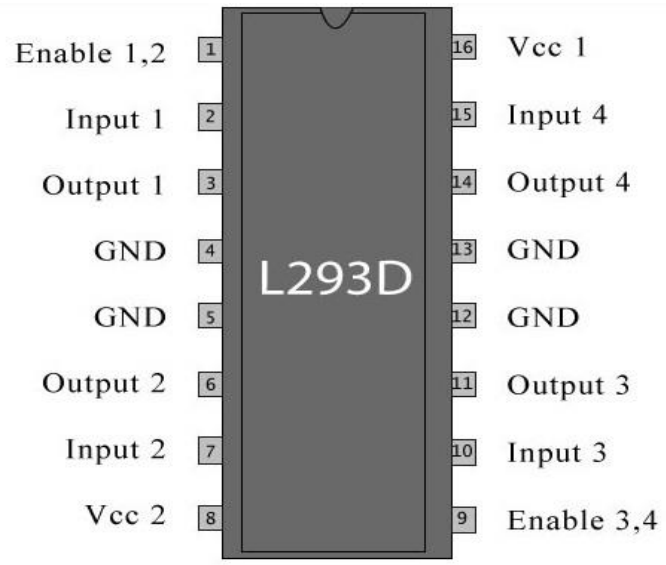

Figure 3.10 LM293D

3.7.2 H-Bridge Concept

1. It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor.
2. In a single l293d chip there two H-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller.

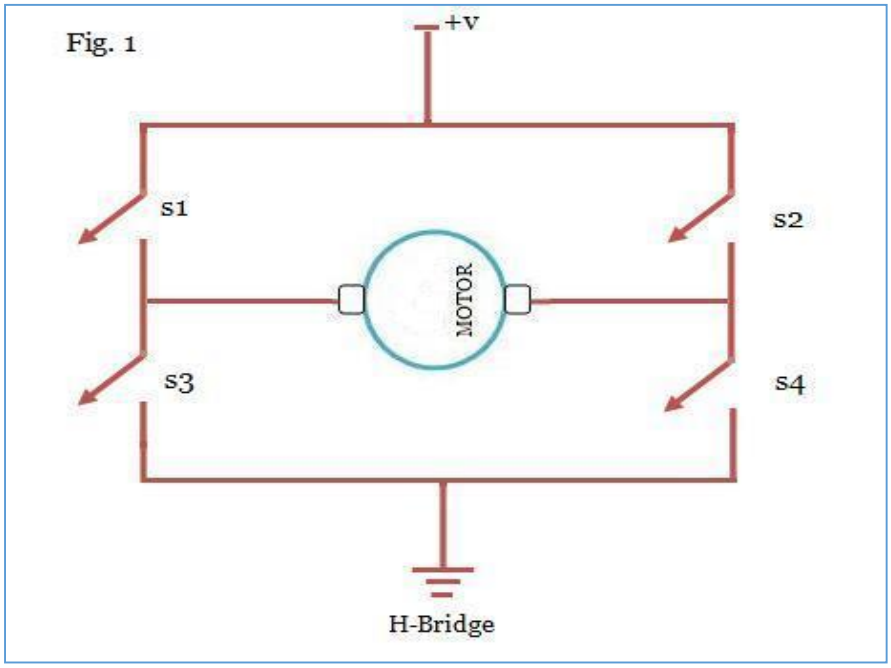

Figure 3.11 H-Bridge

3. There are two Enable pins on l293d. Pin 1 and pin 9, for being able to drive the motor, the pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low, then the motor in the corresponding section will suspend working. It's like a switch.

3.8 Ultrasonic Sensor

Ultrasonic transducers are divided into three broad categories: transmitters, receivers, and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound. In a similar way to radar and sonar, ultrasonic transducers are used in systems which evaluate targets by interpreting the reflected signals.

For example, by measuring the time between sending a signal and receiving an echo the distance of an object can be calculated. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions. Ultrasonic probes and ultrasonic baths apply ultrasonic energy to agitate particles in a wide range of materials.

3.8.1 Pin Description

Figure 3.12 Ultrasonic Sensor

1. The module includes the ultrasonic transmitter, receiver and control circuit.
2. Its stable performance and high ranging accuracy make it a popular module in Robotics.
3. There are 5 pins out of the module, VCC, Trig, Echo, OUT and GND.
4. The name of 4th pin "OUT "is misguiding. As such no output is available at this pin. This is a Mode Select pin. Generally, it is left unused.
5. It performs best in 30 degrees' angle.
6. Open source Arduino library is readily available to use.
7. It operates at 5V DC and consumes 15mA current. A range of sensing is from 3cm up to 400cm with a resolution of 1cm.
8. Trigger pulse width is 10us.

3.8.2 Working

Ultrasonic transducers convert AC into ultrasound, as well as the reverse. Ultrasonic, typically refers to piezoelectric transducers or capacitive transducers. Piezoelectric crystals change size and shape when a voltage is applied; AC voltage makes them oscillate at the same frequency and produce ultrasonic sound. Capacitive transducers use electrostatic fields between a conductive diaphragm and a backing plate. The beam pattern of a transducer can be determined by the active transducer area and shape, the ultrasound wavelength, and the sound velocity of the propagation medium. The diagrams show the sound fields of an unfocused and a focusing ultrasonic transducer in water, plainly at differing energy levels.

Since piezoelectric materials generate a voltage when force is applied to them, they can also work as ultrasonic detectors. Some systems use separate transmitters and receivers, while others combine both functions into a single piezoelectric transceiver. Ultrasound transmitters can also use non-piezoelectric principles. Materials with this property change size slightly when exposed to a magnetic field, and make practical transducers.

A capacitor microphone has a thin diaphragm that responds to ultrasound waves. Changes in the electric field between the diaphragm and a closely spaced backing plate convert sound signals to electric currents, which can be amplified. The diaphragm principle is also used in the

relatively new micro-machined ultrasonic transducers. These devices are fabricated using silicon micro-machining technology, which is particularly useful for the fabrication of transducer arrays. The vibration of the diaphragm may be measured or induced electronically using the capacitance between the diaphragm and a closely spaced backing plate, or by adding a thin layer of piezo-electric material on diaphragm.

3.8.3 Applications and performance

Ultrasound can be used for measuring wind speed and direction (anemometer), tank or channel fluid level, and speed through air or water. For measuring speed or direction, a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure tank or channel level, the sensor measures the distance to the surface of the fluid.

Further applications include humidifiers, sonar, medical ultrasonography, burglar alarms, non-destructive testing and wireless charging. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 18 kHz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed. The technology is limited by the shapes of surfaces and the density or consistency of the material. Foam, in particular, can distort surface level readings.

This technology, as well, can detect approaching objects and track their positions.

3.8.4 Interfacing with Arduino

1. From Arduino generate a short 10uS pulse to the Trigger input to start the ranging. The Ultrasonic Module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo line high.

2. It then listens for an echo, and as soon as it detects one it lowers the echo line again. The echo line is, therefore, a pulse whose width is proportional to the distance to the object.

3. By timing the pulse, it is possible to calculate the range in inches/centimetres. If nothing is detected, then the module will lower its echo line anyway after about 30mS.

4. The module provides an echo pulse proportional to distance. If the width of the pulse is measured in uS, then dividing by 58 will give you the distance in cm, or dividing by 148 will give the distance in inches.

5. The module can be triggered as fast as every 50ms, or 20 times each second. You should wait 50ms before the next trigger, even if the SRF05 detects a close object and the echo pulse is shorter.

6. This is to ensure the ultrasonic "beep" has faded away and will not cause a false echo on the next ranging. The sensor can detect objects within 3cm to 3m range.

4.Software Descriptions

4.1 Python

Python is a widely used high-level, general-purpose, interpreted, dynamic programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than would be possible in languages such as C++ or Java. The language provides constructs intended to enable clear programs on both a small and large scale. Python supports multiple programming paradigms, including object-oriented, imperative and functional programming or procedural styles. It features a dynamic type system and automatic memory management and has a large and comprehensive standard library.

Python interpreters are available for installation on many operating systems, allowing Python code execution on a wide variety of systems. Using third-party tools, such as Py2exe or Pyinstaller, Python code can be packaged into stand-alone executable programs for some of the most popular operating systems, allowing the distribution of Python-based software for use on those environments without requiring the installation of a Python interpreter.

C Python, the reference implementation of Python, is free and open-source software and has a community-based development model, as do nearly all of its alternative implementations. Python is managed by the non-profit Python Software Foundation.

Python is a widely used high-level programming language used for general-purpose programming, created by Guido van Rossum and first released in 1991. An interpreted language, Python has a design philosophy which emphasizes code readability (notably using whitespace indentation to delimit code blocks rather than curly braces or keywords), and a syntax which allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java. The language provides constructs intended to enable writing clear programs on both a small and large scale. Python features a dynamic type system and automatic memory management and supports multiple programming paradigms, including object-oriented, imperative, functional programming, and procedural styles. It has a large and comprehensive standard library.

4.2 Raspbian

Raspbian is a Debian-based computer operating system for Raspberry Pi. It is now officially provided by the Raspberry Pi Foundation, as the primary operating system for the family of Raspberry Pi single-board computers. Raspbian was created by Mike Thompson and Peter Green as an independent project. The initial build was completed in June 2012. The operating system is still under active development. Raspbian is highly optimized for the Raspberry Pi line's low-performance ARM CPUs.

Raspbian uses PIXEL, Pi Improved Xwindows Environment, Lightweight as its main desktop environment as of the latest update. It is composed of a modified LXDE desktop environment and the Openbox stacking window manager with a new theme and few other changes. The distribution is shipped with a free copy of computer algebra program Mathematica. It also includes a version of Minecraft called Minecraft Pi and includes a Pi-enhanced version of Chromium as of the latest version.

4.3 App Inverter

App Inventor for Android is an open-source web application originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT). It allows newcomers to computer programming to create software applications for the Android operating system (OS). It uses a graphical interface, very similar to Scratch and the Star Logo TNG user interface, which allows users to drag-and-drop visual objects. To create an application that, can run on Android devices. In creating App Inventor, Google drew upon significant prior research in educational computing, as well as work done within Google on online development environments.

App Inventor and the projects on which it is based are informed by constructionist learning theories, which emphasizes that programming can be a vehicle for engaging powerful ideas through active learning. As such, it is part of an ongoing movement in computers and education that began with the work of Seymou Papert and the MIT Logo Group in the 1960s and has also manifested itself with Mitchel Resnick’s work on Lego Mindstroms and StarLogo.

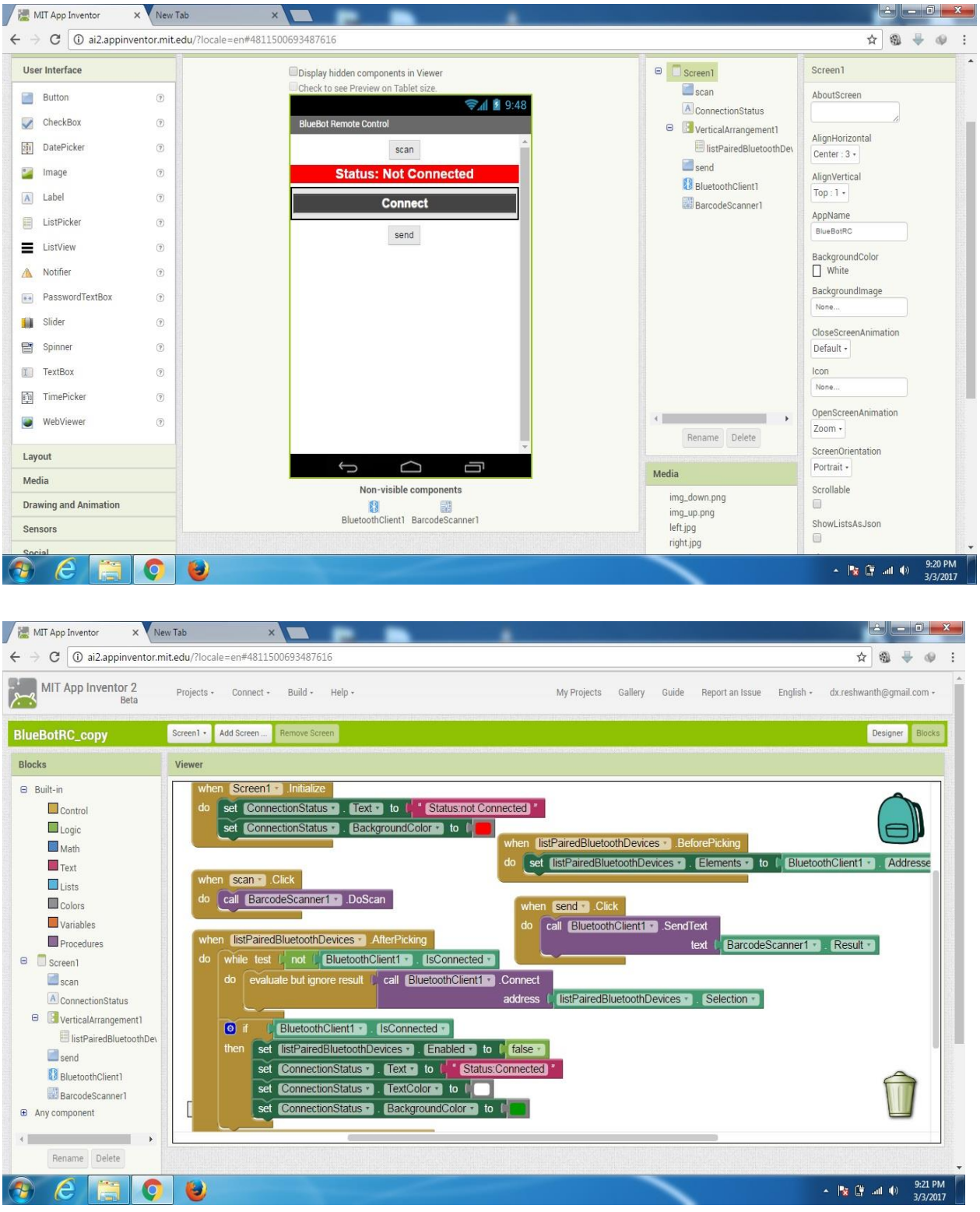

Figure 4.1 MIT App Inventor

4.4 AVRDUDE

AVRDUDE - AVR Downloader Uploader - is a program for downloading and uploading the on-chip memories of Atmel's AVR microcontrollers. It can program the Flash and EEPROM, and where supported by the serial programming protocol, it can program fuse and lock bits. AVRDUDE also supplies a direct instruction mode allowing one to issue any programming instruction to the AVR chip regardless of whether AVRDUDE implements that specific feature of a particular chip.

AVRDUDE can be used effectively via the command line to read or write all chip memory types (EEPROM, flash, fuse bits, lock bits, signature bytes) or via an interactive (terminal) mode. Using AVRDUDE from the command line works well for programming the entire memory of the chip from the contents of a file, while interactive mode is useful for exploring memory contents, modifying individual bytes of EEPROM, programming fuse/lock bits, etc.

4.5 Arduino IDE

The Arduino IDE is a cross-platform Java application that serves as a code editor and compiler and is also capable of transferring firmware serially to the board. The development environment is based on Processing, an IDE designed to introduce programming to artists unfamiliar with software development. The programming language is derived from Wiring, a C-like language that provides similar functionality for a more tightly restricted board design, whose IDE is also based on Processing.

5.Conclusion and Future Scope

5.1 Conclusion

Taking into account the changing trend in retail shopping, it is concluded that the Intelligent Shopping Basket is most certainly a definite necessity for the Retail marketing industry to step up their portfolios, cope up with the advancement in technology and save time and manpower.

5.2 Future Scope

The payment of bill by standing in long queue is a tedious factor when people want to purchase products from marts. Though people can pay instantly using electronic money facility, they have to wait in the queue for longer time. The idea which is proposed using Barcode Scanner technology will overcome the problem and it gets the task easier. The combined effects of easy and flexible implementation, secure transmission of account information, and reduced disputes offer the following benefits for all. It will save time, energy and manpower of Customer, Owner and supplier. There are many technologies which are currently being used for billing systems in supermarkets. The selection of the technology depends upon the performance, efficiency and Quality of Service of the technology regarding to particular task and environment.

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