“DESIGN AND CONSTRUCTION OF IOT BOT”

DEPARTMENT OF MECHANICAL ENGINEERING

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In partial fulfillment of the requirements for the award of the degree

of

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

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DECLARATION

We hereby, declare that the work presented in this project is the outcome of the investigation and research work performed by us under the supervision of Md. Mainol Hasan, Lecturer of Department of Mechanical Engineering, Sonargaon University (SU). We also declare that no part of this project and thereof has been or is being submitted elsewhere for the award of any degree.

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APPROVAL

This is to certify that the project on "by **Design And Construction Of IOT Bot**. Khandaker Abu Zarif Sourov-Student Id: BME 1602009022, Md, Ibrahim Miah. Student ID: BME 1602009415, Morshed Alam-Student ID: BME 1602009103, Anwar Hossain-Student ID: BME 1602009089) has been carried out under our supervisor. The project has been carried out in partial fulfillment of the requirement for the degree of Bachelor of Science (BSc) in Mechanical Engineering of the year 2020 and has been approved as to its style and contents.

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ABSTRACT

IOT Chatbots, or conversational interfaces as they are also known, present a new way for individuals to interact with computer systems. Traditionally, to get a question answered by a software program involved using a search engine, or filling out a form. A chatbot allows a user to simply ask questions in the same manner that they would address a human. The most well known chatbots currently are voice chat bot: Alexa and Siri. However, chatbots are currently being adopted at a high rate on computer chat platforms. The technology at the core of the rise of the chatbot is natural language processing ("NLP"). Recent advances in machine learning have greatly improved the accuracy and effectiveness of natural language processing, making chatbots a viable option for many organizations. This improvement in NLP is firing a great deal of additional research which should lead to continued improvement in the effectiveness of IOT chatbots in the years to come.

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CHAPTER –1
INTRODUCTION

1.1 INTRODUCTION

The Internet of Things (IOT) is not just a well-recognized phenomenon but one that is shaping the digital age. It varied range of technologies are able to interact with each other and reach common goals [1]. An essential goal of connecting various sensors, actuators and services and collecting/processing data from them is to generate situational awareness and enable machines and human users to make sense of themselves and their surrounding environments. The proliferation of IOT can be seen through adoption of Healthcare, Transportation, Building and Home Automation and Energy Management among others. A report by Gartner estimates that there will be over 20 Billion connected things in activity by 2020 with Cisco estimating the number to be over 50 Billion [2, 3]. Among them more than half of all IOT endpoints in the consumer space alone. Hence IoT is a phenomenon which is certain to play a major role in our daily interaction with the digitally connected world. A chatbot is a piece of software that conducts a conversation via auditory or textual methods.[1] Such programs are often designed to convincingly simulate how a human would behave as a conversational partner, although as of 2019, they are far short of being able to pass the Turing test.[2] Chatbots are typically used in dialog systems for various practical purposes including customer service or information acquisition. Some chatbots use sophisticated natural language processing systems, but many simpler ones scan for keywords within the input, then pull a reply with the most matching keywords, or the most similar wording pattern, from a database.

The term "ChatterBot" was originally coined by Michael Mauldin (creator of the first Verbot, Julia) in 1994 to describe these conversational programs.[3] Today, most chatbots are accessed via virtual assistants such as Google Assistant and Amazon Alexa, via messaging apps such as Facebook Messenger or WeChat, or via individual organizations' apps and websites.[4][5] Chatbots can be classified into usage categories that include conversational commerce (e-commerce via chat), education, entertainment, finance, health, news, and productivity.[6]

Beyond chatbots, Conversational AI refers to the use of messaging apps, speech-based assistants and chatbots to automate communication and create personalized customer experiences at scale.[7]

1.2 SCOPE OF THE PROJECT

The literature presents various ways to define the Internet of wide network of interconnected objects uniquely addressable, advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information While considering the broad vision of IOT, this paper focuses on the perspective of connected things and applications for those things. To do this we simply create a separation of concern between the fragmented lower Open System Interconnection (OSI) layers of IOT and the unifying adopted upper layers of IOT communication which uses the World Wide Web and its standard network protocols. The entire IOT system consists of Sensors (temperature, light, motion, etc.), Actuators (displays,

sound, motors, etc.), Computation (programs and logic), and Communication interfaces (wired or wireless). However, based on established advantages presented in the literature [5, 6, 7, 8], our scope will be limited to interaction with IOT through Web Application Programming Interfaces (API) and in particular Hypertext Transfer Protocol (HTTP) based Representational State Transfer (REST) Architectures. A popular approach of Web of Things has been illustrated in Fig 1 based on [6]. The Evans Data Corporation (EDC) Report: Internet of Things - Vertical Research Service study [9] reveals that more than half of IOT developers connect to devices primarily through the cloud. The massive growth and acceptance of these cloud based platforms such as IBM IOT Platform, AWS IOT, Microsoft Azure IOT and Cisco IOT show that the new generation of IOT applications concentrate on cloud based platforms with the lower layers (Transfer, Transport and Network). Hence, this paper also proposes the use of IOT cloud based platforms in our architectural design. This is discussed further in Section 4.

CHAPTER -2
LITERATURE REVIEW

2.1 Literature Review.

In 1950, Alan Turing's famous article "Computing Machinery and Intelligence" was published,[8] which proposed what is now called the Turing test as a criterion of intelligence. This criterion depends on the ability of a computer program to impersonate a human in a real-time written conversation with a human judge to the extent that the judge is unable to distinguish reliably—on the basis of the conversational content alone—between the program and a real human. The notoriety of Turing's proposed test stimulated great interest in Joseph Weizenbaum's program ELIZA, published in 1966, which seemed to be able to fool users into believing that they were conversing with a real human. However Weizenbaum himself did not claim that ELIZA was genuinely intelligent, and the introduction to his paper presented it more as a debunking exercise:

[In] artificial intelligence ... machines are made to behave in wondrous ways, often sufficient to dazzle even the most experienced observer. But once a particular program is unmasked, once its inner workings are explained ... its magic crumbles away; it stands revealed as a mere collection of procedures ... The observer says to himself "I could have written that". With that thought, he moves the program in question from the shelf marked "intelligent", to that reserved for curios ... The object of this paper is to cause just such a re-evaluation of the program about to be "explained". Few programs ever needed it more.[9]

ELIZA's key method of operation (copied by chatbot designers ever since) involves the recognition of clue words or phrases in the input, and the output of corresponding pre-prepared or pre-programmed responses that can move the conversation forward in an apparently meaningful way (e.g. by responding to any input that contains the word 'MOTHER' with 'TELL ME MORE ABOUT YOUR FAMILY').[10] Thus an illusion of understanding is generated, even though the processing involved has been merely superficial. ELIZA showed that such an illusion is surprisingly easy to generate because human judges are so ready to give the benefit of the doubt when conversational responses are *capable of being interpreted* as "intelligent".

Interface designers have come to appreciate that humans' readiness to interpret computer output as genuinely conversational—even when it is actually based on rather simple pattern-matching—can be exploited for useful purposes. Most people prefer to engage with programs that are human-like, and this gives chatbot-style techniques a potentially useful role in interactive systems that need to elicit information from users, as long as that information is relatively straightforward and falls into predictable categories. Thus, for example, online help systems can usefully employ chatbot techniques to identify the area of help that users require, potentially providing a "friendlier" interface than a more formal search or menu system. This sort of usage holds the prospect of moving chatbot technology from Weizenbaum's "shelf ... reserved for curios" to that marked "genuinely useful computational methods".

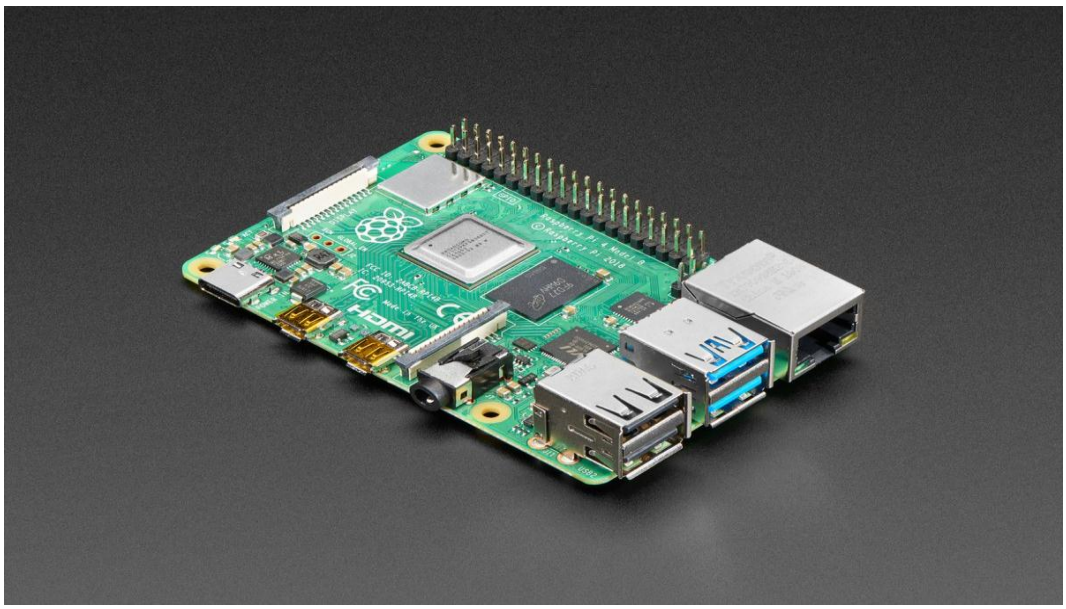
The key to the massive adoption and diffusion of IOT is the proliferation of Internet in our daily lives. We use the internet to search for information, check emails, consume media, and connect with people via social networks and so much more. With around 40% of the global population (3.4 Billion) currently using the world wide web, this number is estimated to increase

to 7.6 billion global internet users in 2020,a majority of which use mobile devices (phones, tablets, wearable's etc.) [14]. Hence the internet has played a vital role as a global backbone for information sharing, interconnection of physical objects with computing/networking capabilities for applications and services spanning numerous use cases. Internet alone, however, cannot address all issues of IOT. First, we will briefly discuss the challenges in IOT, and then mention the motivation for choosing intelligent conversational interface.

CHAPTER –3
METHODOLOGY

METHODOLOGY:

3. Raspberry pi 4



Figure(3.1): Raspberry pi 4

The Raspberry Pi 4 Model B is the latest version of the low-cost Raspberry Pi computer. The Pi isn't like your typical device; in its cheapest form it doesn't have a case, and is simply a credit-card sized electronic board -- of the type you might find inside a PC or laptop, but much smaller.

Raspberry Pi 4 Model B is the newest Raspberry Pi computer made, and the Pi Foundation knows you can always make a good thing *better*! And what could make the Pi 4 better than the 3? How about a *faster* processor, USB 3.0 ports, and updated Gigabit Ethernet chip with PoE capability? Good guess - that's exactly what they did!

The Raspberry Pi 4 is the latest product in the Raspberry Pi range, boasting an updated 64-bit quad core processor running at 1.5GHz with built-in metal heatsink, USB 3 ports, dual-band 2.4GHz and 5GHz wireless LAN, faster Gigabit Ethernet, and PoE capability via a separate PoE HAT.

This version comes with 4 GB of RAM, but we also have versions with 1 and 2 GB if you like.

You can still use all your favorite Raspbian or PIXEL software with this update. You MUST make sure to upgrade your Raspbian operating system install to the latest version so that the firmware can support the new chips! Old SD cards from previous releases will not work without a upgrade!

The dual-band wireless LAN comes with modular compliance certification, that's the metal tin in the corner of the Pi, with the logo stamped on it. This allows the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market.

Please note, the Pi 4 is a significant redesign and Raspberry Pi 1/2/3 cases and power supplies will not fit unless you have an adapter

- Official Raspberry Pi 4 case - easy snap-fit case for your Pi 4
- Official Raspberry Pi 4 power supply - can give up to 3A (15W) of current with a 1.5m long cable, and a USB C connector
- Micro HDMI cable - connect the onboard micro HDMI sockets to standard HDMI displays.
- USB C power supply or you can use USB micro B power supply with an adapter

3.2 -7”LCD Display

Figure (3.2)**:** 7”LCD Display

The MEGA 2560 is designed for more complex projects. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch it is the recommended board for 3D printers and robotics projects. This gives your projects plenty of room and opportunities.The Arduino Mega 2560 is a microcontroller board based on the AT mega 2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contain 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 Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

Arduino Mega.

Figure (3.3): Arduino Mega

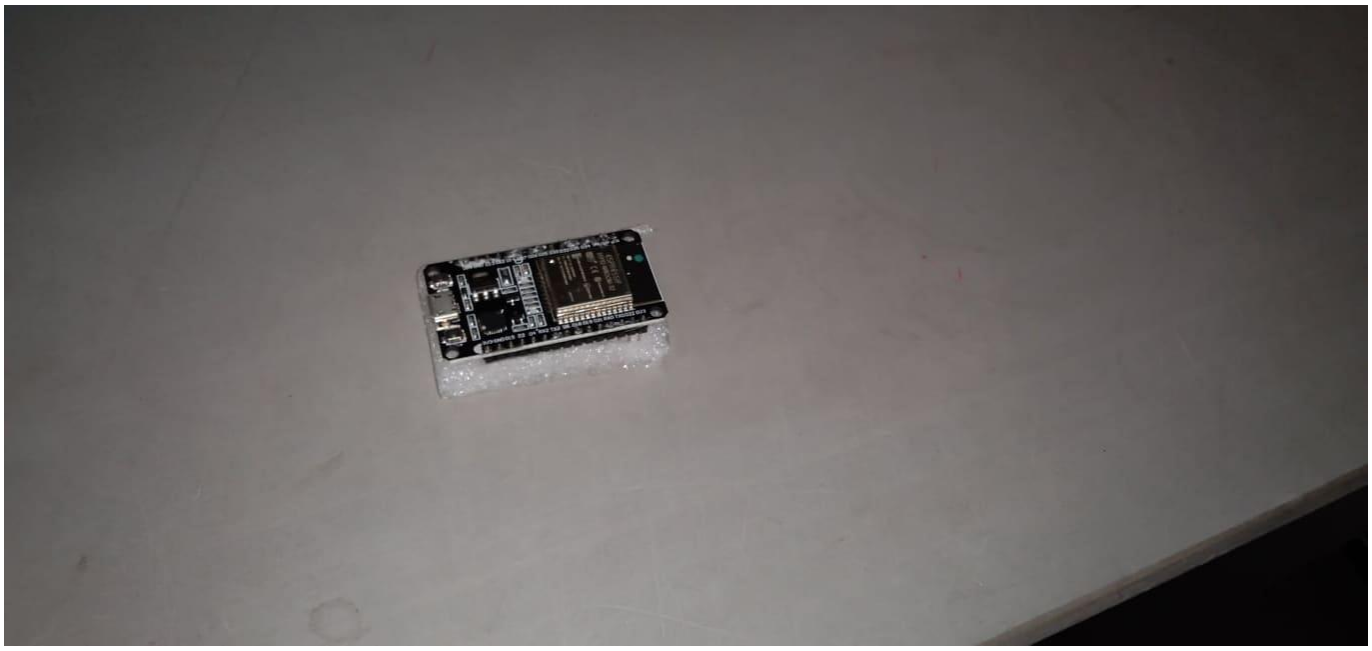
The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power

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 Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

your board, use the Arduino Software (IDE), and start tinker with coding and electronics.

- On the Software on the Arduino Forum
- On Projects on the Arduino Forum
- On the Product itself through our Customer Support

3.3 -Wifi module node mcu.



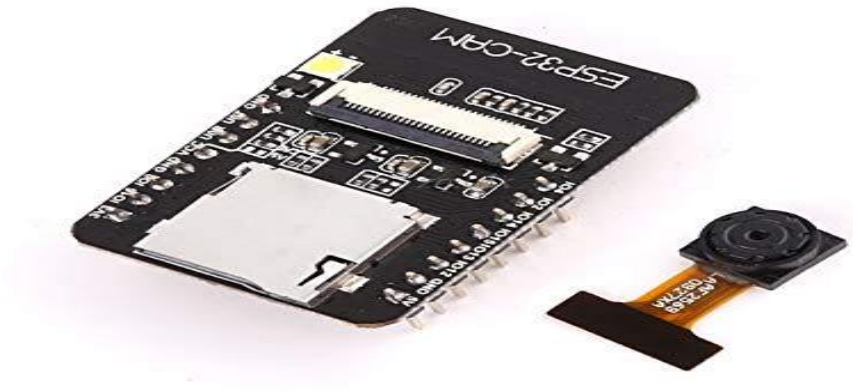
Figure(3.4): -Wifi module node mcu.

Node MCU is an open source development board and firmware based in the widely used ESP8266 -12E WiFi module. It allows you to program the ESP8266 WiFi module with the simple and powerful LUA programming language or Arduino IDE.
With just a few lines of code you can establish a WiFi connection and define input/output pins according to your needs exactly like arduino, turning your ESP8266 into a web server and a lot more. It is the WiFi equivalent of ethernet module. Now you have internet of things (iot) real tool.
With its USB-TTL , the node MCU Dev board supports directly flashing from USB port. It combines features of WIFI access point and station + microcontroller. These features make the Node MCU extremely powerful tool for Wifi networking. It can be used as access point and/or station, host a webserver or connect to internet to fetch or upload data.

Features

- Finally, programmable WiFi module.
- Arduino-like (software defined) hardware IO.
- Can be programmed with the simple and powerful Lua programming language or Arduino IDE.
- USB-TTL included, plug & play.
- 10 GPIOs D0-D10, PWM functionality, IIC and SPI communication, 1-Wire and ADC A0 etc. all in one board.
- Wifi networking (can be used as access point and/or station, host a web server), connect to internet to fetch or upload data.
- Event-driven API for network applications.
- PCB antenna.

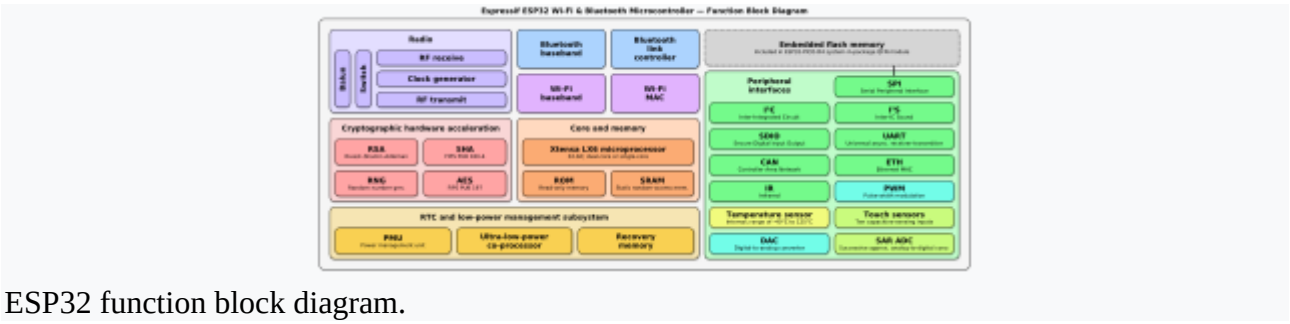
3.5-ESP 32 module camera.



Figure(3.5): ESP 32 module camera.

ESP32 is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. ESP32 is created and developed by Espressif Systems, a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process.[2] It is a successor to

the ESP8266 microcontroller.



ESP32 function block diagram.

Features of the ESP32 include the following:[3]

- Processors:
  - CPU: Xtensa dual-core (or single-core) 32-bit LX6 microprocessor, operating at 160 or 240 MHz and performing at up to 600 DMIPS
  - Ultra low power (ULP) co-processor
- Memory: 520 KiB SRAM
- Wireless connectivity:
  - Wi-Fi: 802.11 b/g/n
  - Bluetooth: v4.2 BR/EDR and BLE
- Peripheral interfaces:
  - 12-bit SAR ADC up to 18 channels
  - 2 × 8-bit DACs
  - 10 × touch sensors (capacitive sensing GPIOs)
  - 4 × SPI
  - 2 × I²S interfaces
  - 2 × I²C interfaces
  - 3 × UART
  - SD/SDIO/CE-ATA/MMC/eMMC host controller
  - SDIO/SPI slave controller
  - Ethernet MAC interface with dedicated DMA and IEEE 1588 Precision Time Protocol support
  - CAN bus 2.0
  - Infrared remote controller (TX/RX, up to 8 channels)
  - Motor PWM
  - LED PWM (up to 16 channels)
  - Hall effect sensor
  - Ultra low power analog pre-amplifier
- Security:

- IEEE 802.11 standard security features all supported, including WFA, WPA/WPA2 and WAPI
- Secure boot
- Flash encryption
- 1024-bit OTP, up to 768-bit for customers
- Cryptographic hardware acceleration: AES, SHA-2, RSA, elliptic curve cryptography (ECC), random number generator (RNG)

- Power management:
  - Internal low-dropout regulator
  - Individual power domain for RTC
  - 5μA deep sleep current
  - Wake up from GPIO interrupt, timer, ADC measurements, capacitive touch sensor interrupt

Module

The ESP32-PICO-D4 system in package module combines an ESP32 silicon chip, crystal oscillator, flash memory chip, filter capacitors, and RF matching links into a single 7 mm × 7 mm sized QFN package.

Identifier	**Processor cores**	**Embedded flash memory (MiB)**	**Package size**	**Description**
ESP32-PICO-D4	2	4	7 mm×7 mm	Includes ESP32 chip, crystal oscillator, flash memory, filter capacitors, and RF matching links.[4]

3.6- Power Adapter .

Figure(3.6): Power Adapter Pi 4.

'm trying to decide what is the best option for powering a Pi4. The specs mention for a *minimum* of 3A. Let's consider we would also like to connect a 2.5" drive to the Pi4. Could someone more experienced with power supplies help me with the following?

- How far can we go with a good 2.4A USB charger?
- The official power supply is rated 5.1V/3A. Does this mean that this may turn out to be inadequate?

- Some 3rd party chargers (e.g. the one discussed here) are rated for 3A in Quick Charge mode. Will the QC mode be activated with RPi4? Or the charger will operate as a regular 2.4A charger?
- How can we tell apart 3rd party chargers that would work with RPi4? Are there any of them? I've seen a couple of models mentioning 5V/4.4A output. But I'm afraid this is only the aggregate amperage (they were multi-port USB chargers).

3.7-Motor

Figure(3.7): Motor.

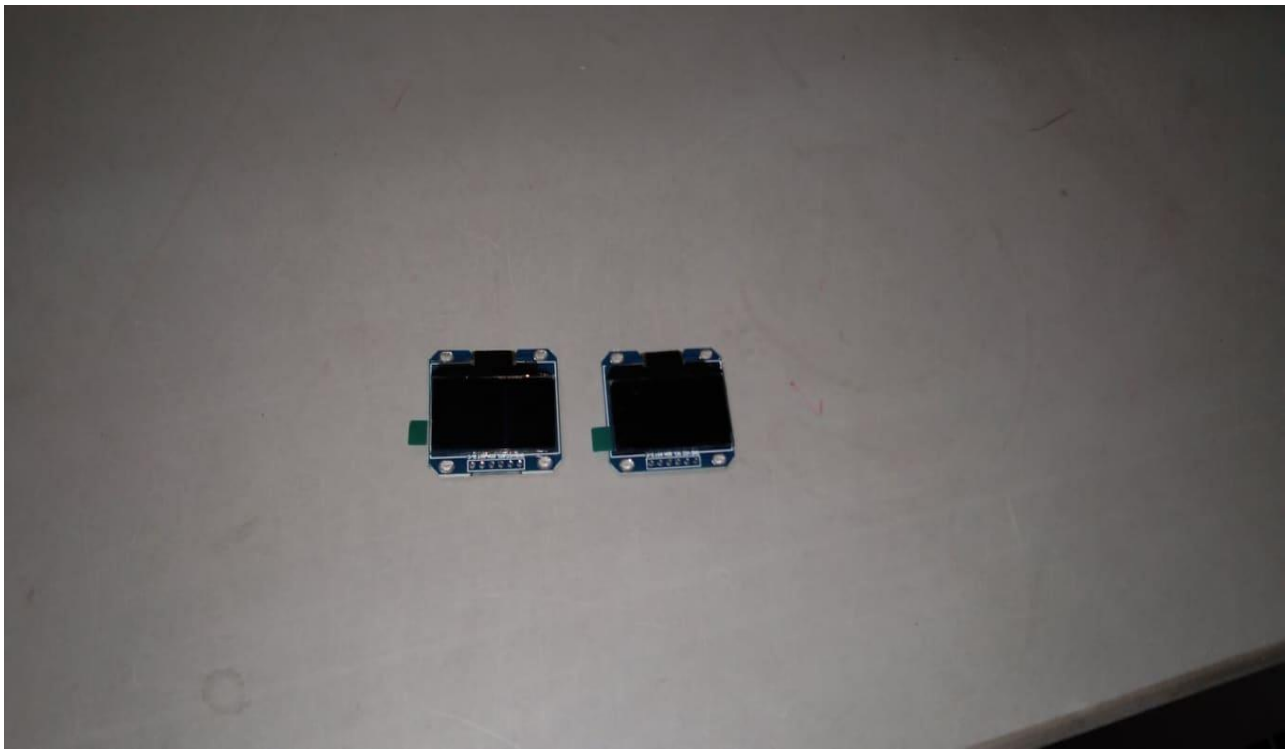
An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of rotation of a shaft. Electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, converting mechanical energy into electrical energy.

Electric motors may be classified by considerations such as power source type, internal construction, application and type of motion output. In addition to AC versus DC types, motors may be brushed or brushless, may be of various phase (see single-phase, two-phase, or three-phase), and may be either air-cooled or liquid-cooled. General-purpose motors with standard dimensions and characteristics provide convenient mechanical power for industrial use. The largest electric motors are used for ship propulsion, pipeline compression and pumped-storage applications with ratings reaching 100 megawatts. Electric motors are found in industrial fans, blowers and pumps, machine tools, household appliances, power tools and disk drives. Small motors may be found in electric watches.

In certain applications, such as in regenerative braking with traction motors, electric motors can be used in reverse as generators to recover energy that might otherwise be lost as heat and friction.

Electric motors produce linear or rotary force (torque) intended to propel some external mechanism, such as a fan or an elevator. An electric motor is generally designed for continuous rotation, or for linear movement over a significant distance compared to its size. Magnetic solenoids produce significant mechanical force, but over an operating distance comparable to their size. Transducers such as loudspeakers and microphones convert between electrical current and mechanical force to reproduce signals such as speech. When compared with common internal combustion engines (ICEs), electric motors are lightweight, physically smaller, provide more power output, are mechanically simpler and cheaper to build, while providing instant and consistent torque at any speed, with more responsiveness, higher overall efficiency and lower heat generation. However, electric motors are not as convenient or common as ICEs in mobile applications (i.e. cars and buses) as they require a large and expensive battery, while ICEs require a relatively small fuel tank.

3.8-1.5” Led Display.



Figure(3.8): 1.5” LED Display

This article is about Light-emitting diode (LED) based video displays. For LED-backlighted

displays, see LED-backlit LCD. For matrixed text displays, see Dot-matrix display.
Not to be confused with Vacuum fluorescent display.
For segment displays, see Seven-segment display, Nine-segment display, Fourteen-segment display, and Sixteen-segment display.

Detail view of a LED display with a matrix of red, green and blue diodes

The 1,500-foot (460 m) long LED display on the Fremont Street Experience in Downtown Las Vegas, Nevada is currently the largest in the world.

A LED display is a flat panel display that uses an array of light-emitting diodes as pixels for a video display. Their brightness allows them to be used outdoors where they are visible in the sun for store signs and billboards. In recent years, they have also become commonly used in destination signs on public transport vehicles, as well as variable-message signs on highways. LED displays are capable of providing general illumination in addition to visual display, as when used for stage lighting or other decorative (as opposed to informational) purposes. LED displays can offer higher contrast ratios than a projector and are thus an alternative to traditional projection screens, and they can be used for large, uninterrupted (without a visible grid arising from the bezels of individual displays) video walls

Light-emitting diodes (LEDs) came into existence in 1962 and were primarily red in color for the first decade. The first practical LED was invented by Nick Holonyak in 1962 while he was at General Electric.[1]

The first practical LED display was developed at Hewlett-Packard (HP) and introduced in 1968.[2] Its development was led by Howard C. Borden, Gerald P. Pighini, and Egyptian engineer Mohamed M. Atalla, at HP Associates and HP Labs, who had engaged in research and development (R&D) on practical LEDs between 1962 and 1968. In February 1969, they introduced the HP Model 5082-7000 Numeric Indicator.[3] It was the first LED device to use integrated circuit (integrated LED circuit) technology,[3] and the first intelligent LED display, making it a revolution in digital display technology, replacing the Nixie tube and becoming the basis for later LED displays.[4]

Early models were monochromatic by design. The efficient Blue LED completing the color triad did not commercially arrive until the late 1980s.

In the late 1980s, Aluminium Indium Gallium Phosphide LEDs arrived. They provided an efficient source of red and amber and were used in information displays. However, it was still impossible to achieve full colour. The available "green" was hardly green at all – mostly yellow, and an early blue needed a power station to run it. It was only when Shuji Nakumura, then at Nichia Chemical, announced the development of the blue (and later green) LED based on Indium Gallium Nitride, that possibilities opened for big LED video displays.

The entire idea of what could be done with LED was given an early shake up by Mark Fisher's design for U2's "Popmart" tour of 1997. He realized that with long viewing distances, wide pixel spacing could be used to achieve very large images, especially if viewed at night. The system had to be suitable for touring so an open mesh arrangement that could be rolled up for transport was used. The whole display was 52m (170ft) wide and 17m (56ft) high. It had a total of 150,000 pixels. The company that supplied the LED pixels and their driving system, SACO Technologies of

Montreal, had never engineered a video system before, previously building mimic panels for power station control rooms.

Today, large displays use high-brightness diodes to generate a wide spectrum of colors. It took three decades and organic light-emitting diodes for Sony to introduce an OLED TV, the Sony XEL-1 OLED screen which was marketed in 2009. Later, at CES 2012, Sony presented Crystal LED, a TV with a true LED-display, in which LEDs are used to produce actual images rather than acting as backlighting for other types of display, as in LED-backlit LCDs which are commonly marketed as LED TVs.

3.9 -Jumper wire.

Figure(3.9): Jumper Wire.

A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.[1]

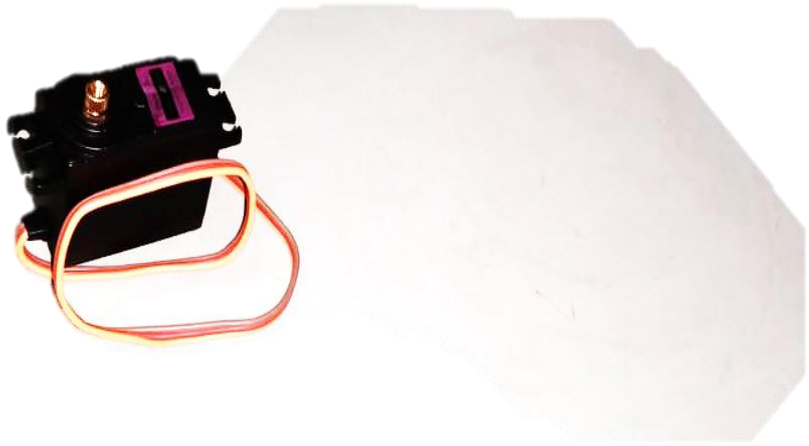
Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

Types

There are different types of jumper wires. Some have the same type of electrical connector at both ends, while others have different connectors. Some common connectors are:

- Solid tips – are used to connect on/with a breadboard or female header connector. The arrangement of the elements and ease of insertion on a breadboard allows increasing the mounting density of both components and jump wires without fear of short-circuits. The jump wires vary in size and colour to distinguish the different working signals.
- Crocodile clips – are used, among other applications, to temporarily bridge sensors, buttons and other elements of prototypes with components or equipment that have arbitrary connectors, wires, screw terminals, etc.
- Banana connectors – are commonly used on test equipment for DC and low-frequency AC signals.
- Registered jack (RJnn) – are commonly used in telephone (RJ11) and computer networking (RJ45).
- RCA connectors – are often used for audio, low-resolution composite video signals, or other low-frequency applications requiring a shielded cable.
- RF connectors – are used to carry radio frequency signals between circuits, test equipment, and antennas.
- RF jumper cables - Jumper cables is a smaller and more bendable corrugated cable which is used to connect antennas and other components to network cabling. Jumpers are also used in base stations to connect antennas to radio units. Usually the most bendable jumper cable diameter is 1/2".

3.10-Servo Motor.



Figure(3.10): Servo motor.

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.[1] 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.

Mechanism

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 position 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.

3.11-Speaker.

Figure(3.11**):** Speaker.

Speakers are one of the most common output devices used with computer systems. Some speakers are designed to work specifically with computers, while others can be hooked up to any type of sound system. Regardless of their design, the purpose of speakers is to produce audio output that can be heard by the listener.
Speakers are transducers that convert electromagnetic waves into sound waves. The speakers receive audio input from a device such as a computer or an audio receiver. This input may be either in analog or digital form. Analog speakers simply amplify the analog electromagnetic waves into sound waves. Since sound waves are produced in analog form, digital speakers must first convert the digital input to an analog signal, then generate the sound waves.

The sound produced by speakers is defined by frequency and amplitude. The frequency determines how high or low the pitch of the sound is. For example, a soprano singer's voice produces high frequency sound waves, while a bass guitar or kick drum generates sounds in the low frequency range. A speaker system's ability to accurately reproduce sound frequencies is a good indicator of how clear the audio will be. Many speakers include multiple speaker cones for different frequency ranges, which helps produce more accurate sounds for each range. Two-way speakers typically have a tweeter and a mid-range speaker, while three-way speakers have a tweeter, mid-range speaker, and subwoofer.

Amplitude, or loudness, is determined by the change in air pressure created by the speakers' sound waves. Therefore, when you crank up your speakers, you are actually increasing the air pressure of the sound waves they produce. Since the signal produced by some audio sources is not very high (like a computer's sound card), it may need to be amplified by the speakers. Therefore, most external computer speakers are amplified, meaning they use electricity to amplify the signal. Speakers that can amplify the sound input are often called active speakers. You can usually tell if a speaker is active if it has a volume control or can be plugged into an electrical outlet. Speakers that don't have any internal amplification are called passive speakers. Since these speakers don't amplify the audio signal, they require a high level of audio input, which may be produced by an audio amplifier.

3.12 Web Camera.

Figure(3.12): Web Camera (Logitech).

A webcam is a video camera that feeds or streams an image or video in real time to or through a computer to a computer network, such as the Internet. Webcams are typically small cameras that sit on a desk, attach to a user's monitor, or are built into the hardware. Webcams can be used during a video chat session involving two or more people, with conversations that include live audio and video. For example, Apple's iSight camera, which is built into Apple laptops, iMacs and a number of iPhones, can be used for video chat sessions, using the iChat instant messaging program (now called Messages). Webcam software enables users to record a video or stream the video on the Internet. As video streaming over the Internet requires a lot of bandwidth, such streams usually use compressed formats. The maximum resolution of a webcam is also lower than most handheld

video cameras, as higher resolutions would be reduced during transmission. The lower resolution enables webcams to be relatively inexpensive compared to most video cameras, but the effect is adequate for video chat sessions.[1]

The term "webcam" (a clipped compound) may also be used in its original sense of a video camera connected to the Web continuously for an indefinite time, rather than for a particular session, generally supplying a view for anyone who visits its web page over the Internet. Some of them, for example, those used as online traffic cameras, are expensive, rugged professional video cameras.

Characteristics.

Webcams are known for their low manufacturing cost and their high flexibility,[2] making them the lowest-cost form of videotelephony. As webcams evolved simultaneously with display technologies, USB interface speeds and broadband internet speeds, the resolution went up from gradually 320×240, to 640×480, and some even offering 1280×720 (aka 720p) or 1920×1080 (aka 1080p) resolution.[3][4][5]

Despite the low cost, the resolution offered as of 2019 is impressive, with now the low-end webcams offering resolutions of 720p, mid-range webcams offering 1080p resolution, and high-end webcams offering 4K resolution at 60 fps.

Webcams have become a source of security and privacy issues, as some built-in webcams can be remotely activated by spyware. To address this concern, many webcams come with a physical lens cover.

3.13Bluetooth Keyboard.

Figure(3.13): Bluetooth Keyboard with Mouse.

A keyboard Bluetooth is a computer keyboard that allows the user to communicate with computers, tablets, or laptops with the help of radio frequency (RF), infrared (IR) or Bluetooth technology. It is common for wireless keyboards available these days to be accompanied by a wireless mouse.

Wireless keyboards based on infrared technology use light waves to transmit signals to other infrared-enabled devices. But, in case of radio frequency technology, a wireless keyboard communicates using signals which range from 27 MHz to up to 2.4 GHz. Most wireless keyboards today work on 2.4 GHz radio frequency. Bluetooth is another technology that is being widely used by wireless keyboards. These devices connect and communicate to their parent device via the bluetooth protocol.

A wireless keyboard can be connected using RF technology with the help of two parts, a transmitter and a receiver. The radio transmitter is inside the wireless keyboard. The radio receiver plugs into a keyboard port or USB port. Once the receiver and transmitter are plugged in, the computer recognizes the keyboard and mouse as if they were connected via a cable.

3.14 END STOP SWITCH:

Figure(3.14): End stop switch

To stop the movements of axis when datum position is reached the end stops are used. These switches basically act as a protection to save the machine from striking by cutting off the power when the axis reaches at the end point. The end stops are needed at every axis end & they provide the range and zero position to machine.

3.15 HDMI to Micro HDMI

Figure(3.15): Hdmi To Micro Hdmi.

HDMI (High-Definition Multimedia Interface) is a proprietary audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from an HDMI-compliant source device, such as a display controller, to a compatible computer monitor, video projector, digital television, or digital audio device.[4] HDMI is a digital replacement for analog video standards.

HDMI implements the EIA/CEA-861 standards, which define video formats and waveforms, transport of compressed and uncompressed LPCM audio, auxiliary data, and implementations of the VESA EDID.[5][6](p. III) CEA-861 signals carried by HDMI are electrically compatible with the CEA-861 signals used by the Digital Visual Interface (DVI). No signal conversion is necessary, nor is there a loss of video quality when a DVI-to-HDMI adapter is used.[6](§C) The CEC (Consumer Electronics Control) capability allows HDMI devices to control each other when necessary and allows the user to operate multiple devices with one handheld remote control device.[6](§6.3)

Several versions of HDMI have been developed and deployed since the initial release of the technology, but all use the same cable and connector. Other than improved audio and video capacity, performance, resolution and color spaces, newer versions have optional advanced features such as 3D, Ethernet data connection, and CEC (Consumer Electronics Control) extensions.

Production of consumer HDMI products started in late 2003.[7] In Europe, either DVI-HDCP or HDMI is included in the HD ready in-store labeling specification for TV sets for HDTV, formulated by EICTA with SES Astra in 2005. HDMI began to appear on consumer HDTVs in

2004 and camcorders and digital still cameras in 2006.[8][9] As of January 6, 2015 (twelve years after the release of the first HDMI specification), over 4 billion HDMI devices have been sold.[10]

3.16 Memory Card 32 GB.

Figure(3.16): Memory Card 32GB.

Secure Digital, officially abbreviated as SD, is a proprietary non-volatile memory card format developed by the SD Card Association (SDA) for use in portable devices.

The standard was introduced in August 1999 by joint efforts between SanDisk, Panasonic (Matsushita Electric) and Toshiba as an improvement over MultiMediaCards (MMC),[1] and has become the industry standard. The three companies formed SD-3C, LLC, a company that licenses and enforces intellectual property rights associated with SD memory cards and SD host and ancillary products.[2]

The companies also formed the SD Association (SDA), a non-profit organization, in January 2000 to promote and create SD Card standards.[3] SDA today has about 1,000 member companies. The SDA uses several trademarked logos owned and licensed by SD-3C to enforce compliance with its specifications and assure users of compatibility.[4]

3.17 ZIP TIE:

Figure(3.18): Zip tie

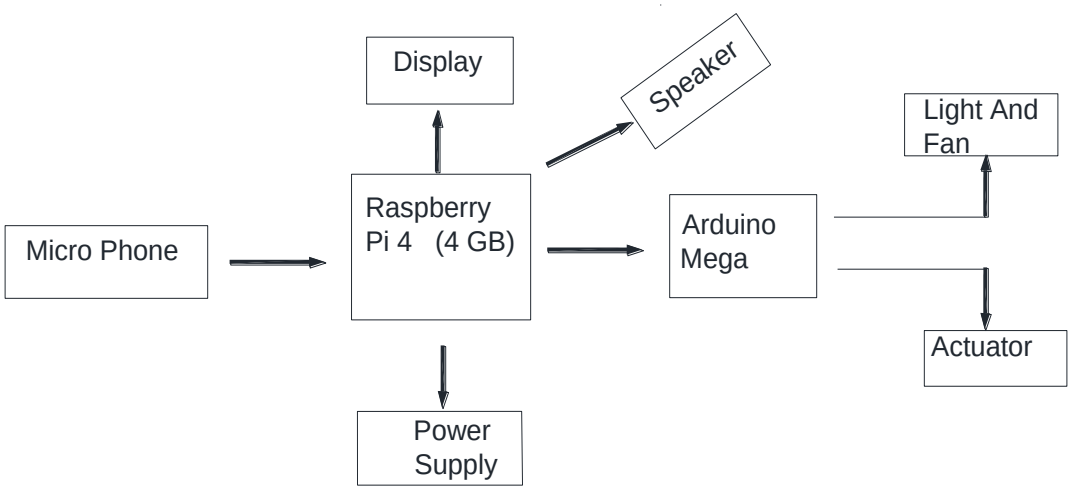
we have used zip tie to fix motor with the plywood as role of screw.

3.18 Power Bank 10000 mAh.

Figure(3.19): power supply 12 Volt 20 amp

The ATX-12V system is used to supply power to the different parts of the machine. ATX is an advanced technology extended having the motherboard configuration which is manufactured by Intel in 1995. Its specifications basically used to identify its dimensions and it consists of mounting points, input/output panel, power and different connector interfaces between computer and case, a motherboard and a power supply.

3.19 WORKING PRINCIPLE OF IOT BOT.



Figure(3.21): Flow Process Diagram.

There are two types of processors we use here.We have Used the Raspberry Pi 4 processor for voice control, and we have used the Arduino mega processor to control the lights and fan . We first made the legs to fit all the components. Then we connected all the components according to the circuit. Then we have connected the 7 "display with the Raspberry Pi 4 and Arduino mega(2560).We have used two power Bank of (10000mAh)for power supply .We have use two servo motors to move the hands. We also have use IP Camera to monitor the area remotely .We used the software IP V380 for controlling IP Camera. There is a built in IOT system that is used for controlling home appliance.(We are used a logitec 570 to capture the voice.)We used the software python 2.7 for IOT And Chatting system. There are three features in the robot.1. Home security system,2. IOT System, 3.Chat bot .We have use the wifi module to connect Raspberry pi 4 of the internet .A 32 GB Memory card is used for storing the operating system.

1.set up the port and set Display.
2.Then set up the Raspberry Pi 4 Arduino Mega.
3.Then set up the maximum and minimum speed of servomotor
4.Then set up the IP Camera.
5.Then setup the wifi module of internet.
6.Connect the power Bank for power supply.

3.20 FINAL PRODUCTS:

The figure 1,2,3,4 below shows some of the samples of Connection system of the components.. The IOT Chat Bot can control the light ,fan by receive the voice and chat each other.However we can change the support if required. These specimens shown below are further used to study the mechanical & physical properties of the filament used however they results are not discussed here.

Figure: 1.Part-1

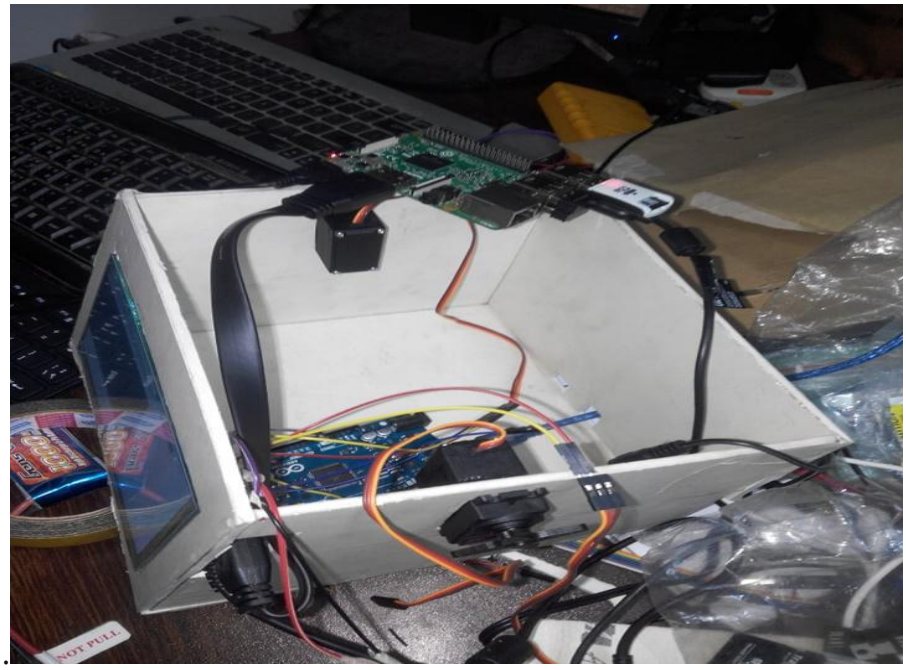


Figure: 2.Part-2

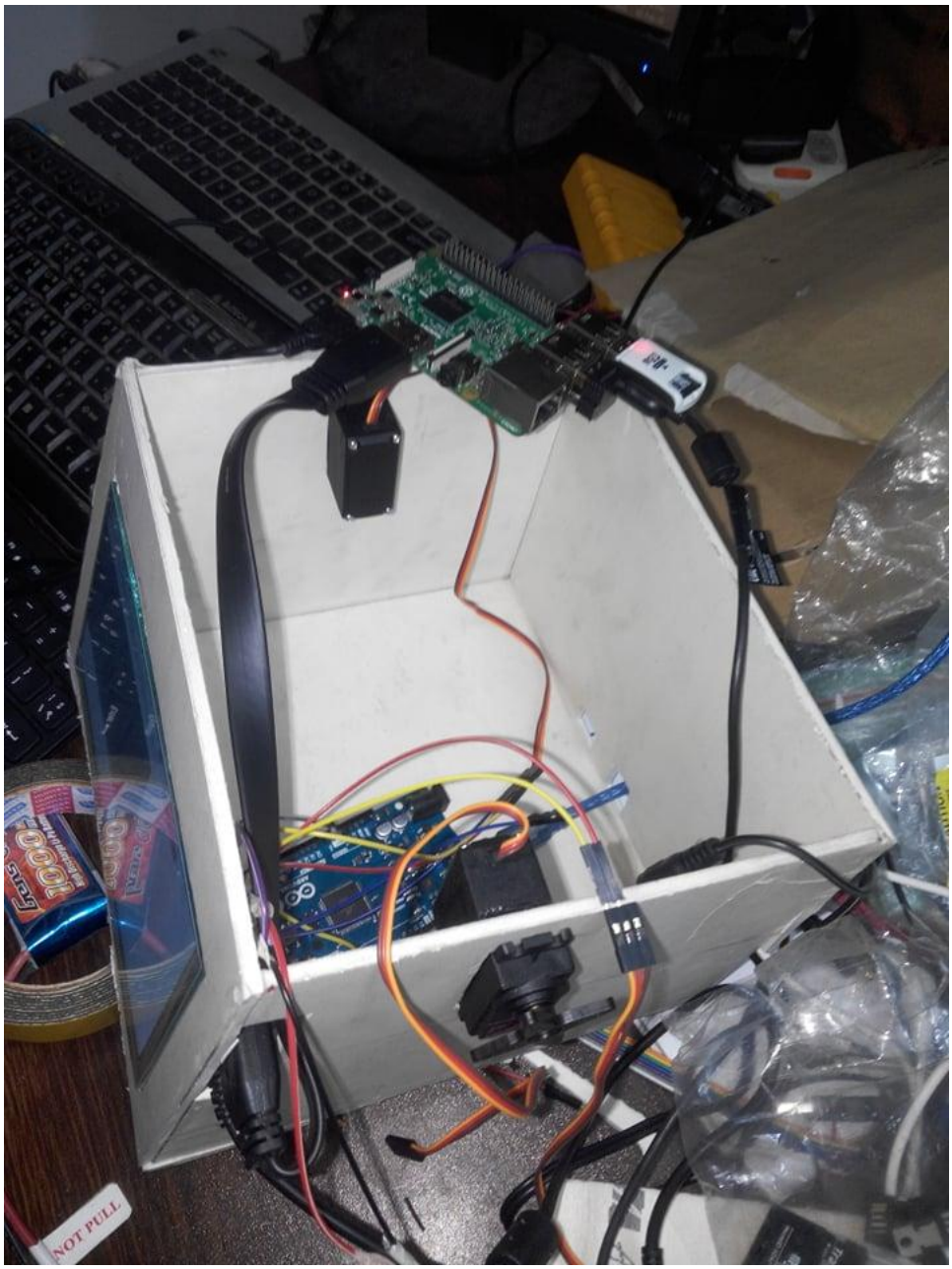


Fig**:**3. Part-3.

CHAPTER-4

Result And Discussion

4.1 ADVANTAGE OF IOT Chat Bot.

Today, construction chatbot use cases are pretty much endless. For instance, if the machine draws up the conclusion that some activity can be improved with the implementation of different equipment like for instance better quality scaffolding, it can send a notification to project manager who then has a final say in the whole matter.

Let's take a quick look at some of the similar activities contemporary bots are capable of performing.

- Generating reports — If project managers notice some persisting problems, they can ask the AI to browse the databases, find similar notifications, and look for the patterns. This way, the circumstances that led to the said issue can be easily identified.
- Real-time feedback — AI chatbots are capable to access the info about any part of machinery (assumed the tools are IOT capable) and even about team performance (based on the efficiency) and provide instantaneous feedback.
- Visual communication — The way the bots are interacting with their user doesn't need to be exclusively text-based — the information can be passed in the form of photos and video footage as well. In terms of the construction industry, this simple fact helps construction managers to get a much better grasp at the current state of construction progress.
- Access to location-related information — The AI bots can also interact with the construction modeling interface and share relevant location-related information through easily accessible UI.
- Notifications for urgent needs — Construction bots can perform a lot of duties on their initiative as well. One of the most common examples of this practice is the monitoring of available resources and sending notifications in the case of depleting resources.
- Communication made easy — Finally, the AI bots are not only incredibly useful for quick feedback harvesting. They also represent a tool that logs all interaction with different related parties (engineers, contractors, suppliers, etc.) and provides them a unified UI for mutual communication.

- A better understanding of the interaction
- Personalized experience based on the user group

- Tighter integration in the construction workflow
- Higher decision-making autonomy

So, to conclude the conversation — the construction industry has historically proved to be quite impenetrable to the results of the IT revolution. Now, when the dam has been breached, the incoming tide is threatening to reshape the very core of the industry.

That is a good thing. Although human ingenuity and input will never be replaced by some kind of AI, being punctual and calculation-driven as it is, the construction industry can only benefit from the software solutions such as AI Chatbots.

4.2 DISADVANTAGE OF IOT Bot.

Privacy & security

In today's tech-driven world, each and every device that an individual uses is connected via the internet. This increases the risk of any leakage of data that might be important. This is a major drawback of sharing information, as confidential information might not be safe & could be hacked by third parties easily.

Complexity

A diverse network that connects various devices is what we call IoT. A single loophole can affect the entire system. This is by far the most complicated aspect of the internet of things that can have a tremendous effect.

Lesser jobs

With every task being automated, the need for human labour will reduce drastically. This will have a direct impact on employability. As we head into the future of IoT, there will be a visible decline in the hiring process of professionals.

Dependability

We may not notice it, but we are witnessing a major shift in technology and its implementation in everyday lives. There is no doubt that technology is dominating our lifestyle, reflecting a human's dependability on technology. In case of a bug in the system, there are high chances of every related device getting corrupted.

IoT is a big part of our lives and will only become a more important part of it every day that goes by. We hope you now understand what IoT (Internet of things) is, what is the significance of IoT is and what the limitations of IoT are. If we missed out on something, let us know in the comments below

CHAPTER-5
CONCLUSION

5.1 CONCLUSION:

Overall, the implementation of the Design constraction of IOT Chat bot system is a success. This senior design project has been a valuable learning experience over the past year, providing insight into design philosophies and the Internet of Things. Information learned from this project will be useful moving forward into a post-grad setting, and will lead to better engineering in the future. The term IoT is mainly used for devices that wouldn't usually be generally expected to have an internet connection, and that can communicate with the network independently of human action. For this reason, a PC isn't generally considered an IoT device and neither is a smartphone -- even though the latter is crammed with sensors. A smartwatch or a fitness band or other wearable device might be counted as an IoT device, however.

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