Online Voice Based Multipurpose Surveillance Robot for Defence Using Artificial Intelligence

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Abstract: This project describes the design and construction of a multifunctional field monitoring robot for the detection of landmines, the detection of smoke and temperatures as well as the surveillance of gas quality in battling areas without providing any severe manual obstacles. Prediction of metals can be performed by land cognitive sensors, deadly gas attacks can occur and the robot can be remotely controlledvia an IOS device. The robot picks up sensor information and interfaces between the control unit and the robot with a microcontroller. The robot moves and lift everywhere on the basis of the input data from Android application. In this contemporary project is characterized by the integrated approach of Android's telephone and multiple IOT cloud services. All documentation on robot sensing devices is delivered to cloud servers and expressed on all devices. This allows the robot to monitor both usages, prefer military warfare and mining areas. This is a new attempt to integrate IOT and field robots into a massive design form. Specific design enhancements were an excellent choice for use and use in dangerous spots riddled with minefields and other hazardous pieces of metal.

Keywords: IOS devices, cloud service, Surveillance, IOT server.

1. Introduction

India is a growing, wealthy and powerful coal country. Even so, the prevailing hygienic mining operations growth rates are still low, rapidly in recent years, whenever a tragedy often occurs at the mining area leading to substantial property loss and life. The safety challenges in the coal mine are gradually being resolved by the nation and the people. Due to the complex nature of the mining ecosystem and the distinct workplace environment of mining operations, catastrophes which are occurring in the coal mine ought to be surveilled. Conventional surveillance systems in mining activities prefer to be wired networks which play a crucial role in safety risk management of mining operations. As mining sites continue to evolve and the intensity of resource extraction expands, there are several pavements which become invisible, which are concealed.Furthermore, laying cables which are costly and time consuming is not convenient. We will design a safety monitoring system for coal mines based on a network of wireless sensor networks that improve production safety monitoring levels and reduce accidents in coal mines to tackle issues. There are plenty hectares of armed forces technologies and services. It encompasses weapons, weapon systems, tools and confidential data. In the event of an emergency, however, some mechanism based on modern electronics and innovative technologies is essential if military officers active in surveillance areas seem to be to inform that they can rapidly coordinate for protection to be stuck and enacted at geographical boundaries and antagonistic territories. For military applications like with the patrolling of the involved space, this mechanism is a lot of economical. In captive or in aggressive instances it'll provide inherent blessings. it would walk on virtually any surface and supply supervising over a locality. The supervising becomes a lot of economical with the assistance of contemporary live streaming, it detects extreme temps and conjointly uses water hydrant to scale back the fireplace. within the planned system, video quality is makeshift. This is often necessary in several applications like noncombatant robots and military robots.

2. Related Work

Akshay Kumar [1].This project presents a modern approach to remote and boundaries surveillance using a multi-functional robot based on current IOT. This robot continuously watches and sends live streaming to an authorized person. Here, the MJPG streamer is used to visualize the live video installed in the raspberry pi. The VNC software is installed on the local computer and connects to the raspberry pi that must be installed on the remote computer. The server transmits a duplicate of the display screen. This process includes a smart surveillance robot for military application. With the guidance of this robot, we can assess the current state of the border area in real time without depending on any human source. The surveillance robot provides us with live

streaming video in response to our commands. The goal of this project is to create an equipment circuit that allows people to control robots or other home machinery using their voices. Smart phones are becoming increasingly powerful devices with the ability to interact with other appliances via Bluetooth, wifi, and other means. Bluetooth, despite being a low-cost mode of communication, provides a strong mode of connection.

H.I.Darwish[2].This project will use Google voice recognition to analyze human speech and transfer it to text using the Google voice to text API. The converted text will be sent to the microcontroller as a code using the HC-05 Bluetooth. The HC-05 will act as a receiver (Rx) for this function, obtaining the code from the smart phone and forwarding it to the decode circuit.Via the UART protocol, a controller can communicate with the Bluetooth module. The aim of this project is to develop an equipment circuit that allows user to manage robots with their voices.The main part of the project to control the robot from any remote location is the creation of a web page. It will be necessary to construct a single platform from which we will access the robot. We can control the direction of the motor and the position of the camera from the web page, as well as monitor the video feed. It will be necessary to secure our website from anyone.

B.Mert[3]. In this paper, they develop a prototype of a smart robot whose movements are controlled by voice-commands and gesture-commands. Voice-command controls include an Android OS-based smart phone. Gesture-commands can be delivered either by hand usingan accelerometer, or by tilt-getting using a smart phone's gravity sensor.Robot's body movements are controlled by the voice-commands, and its arms and claws are controlled by the gesture-commands.The robot's body will move backwards and forwards, left and right, and stop, on several things. The established robot's body movements are controlled by an Android OS-based smart-phone application called "AMR Voice."Using an online cloud server, this pre-developed Android application converts speech signal commands to text. The voice commands are processed and converted to text, which will then be sent to a Bluetooth module on board the robot through the smart phone's Bluetooth network link.The link manager protocol (LMP) is used to encrypt, exchange, and authenticate control signals sent to the robot.The need for human robot interactions has significantly increased in recent years, mainly because of increasing demand for an intelligent robot that is easily and accurately controllable. In various aspects of life, for example in homes for placing an object from one place to another, in hospital, in the industry or during a car accident smart robots developed using multiple control mechanisms can thus be of huge help. In this article we are developing a prototype of a smart, multi-modal controlled robot. The body of the robot is controlled by the use of a smartphone based on Android and by gesture controls which are available to either users the weapons and claws of the robot. In few earlier studies, attempts have been made to develop smart robots, that can be controlled using different control mechanisms.

T.L.Chien[4].This robotic is designed to operate a vehicle using a Bluetooth module and a human voice command. The robot is received commands via an Android device. The Android application (AMR – Voice) is connected to a Bluetooth Module (HC – 05), which is in turn linked to an Arduino Uno R3 directly. A Voice Control Robot is extremely useful in environments where humans are unable to enter.While this robot is so small, we can use it for monitoring or spying. The Voice Control Robot is operated by a voice command given directly to the robot by the user. An Android application which serves as a transmitter is enabled on the handset. This android module offers the commands.The Arduino is understood using a Bluetooth module by the Android application AMR Voice. The Arduino is connected to a Bluetooth module (HC-05).These robotic aids can be used in various sectors, such as production, defence etc. for the shaping, production and tooling of materials. These are in hospitals For performance purposes the robotic assistant can be used High precision surgery and surgery. In this article, we are developinga speech-operable assistant robotic Order. Robot arm, developed with 6 degrees of liberty,follow a much better accuracy and predefined trajectory Value of accuracy. A low cost robotic arm interfaced with a PC was developed which can be built into a robotic arm for use Applications for light weight lift.A low cost robotic PC-interface arm has been developed that can be integrated with a robot arm that is used to lift the light weight. There was another robotic arm developed that had special physical application People who have been challenged. A robotic arm has been developed A way that the human brain can be controlled. A Robot arm designed to perforate boreholes and Effective urban congested areas.

Wolf M.T.[5].The implementation of the wireless robot control system for monitoring purposes is defined in this paper. On the domestic sector, robots are only used to detect human activity in the area and record it in a database, while on the protection side, robots are used to detect movement and send it directly to the control room, finding the individual on the ground.This project proposes a low-cost four-wheel surveillance robot with ZigBee technology and a microcontroller. A laptop is used to guide the robot using ZigBee technology. This device is incredibly helpful for monitoring in areas in which there is no Internet access as well as during a disaster when the communication system fails.Monitoring means a situation, region or guy surveilling operation.

S.RahmathNisha[6] . The IOT connects more number of people and things in real world environment. With most researches, current research is mostly on smart car parking system. An ultramodern city has number of vehicles on road, which controls most of the traffic and which could not be controllable. Introducing such smart car parking system controls traffic in major cities and could help to move the city smart. The increasing number of vehicles on the road and mishandling of available parking spaces, leads to congestion and traffic problems. This paper introduces the concept of using RFID and Cloud based technology in car parking services in cities. It provides a solution using RFID concept with Internet of Things (IoT) connected with cloudbased system. These features provides available nearest parking space for the user. In order to provide a user-friendly environment a website is being developed that gives information to the user about the availability of parking spaces.

3. Existing Methodologies

In the existing system, voice recognition is used to command the robot, which can only recognize specific voices and respond to those voices.Many dangerous tasks that soldiers cannot do are carried out by robots under the new military organization. These military robots are normally fitted with an integrated system that includes video screens, sensors, grippers, and cameras. Military robots appear in several of styles, depending on their desired use. With the help of a low-power ZigBee wireless sensor network, a new system is proposed to monitor intruders (unknown persons) and the robot will automatically take the necessary action. Thus, the proposed system, the Intelligent Unmanned Robot (IUR) using ZigBee, saves human life and reduces manual defense error.This is a special robotic system designed to save human life and protectthe country from enemies. The robot is controlled by remotes. ZigBee technology is used. Web pages are created that are used to control robots from any distant area. In Bluetooth which is used in existing systems.Existing robots are controlled with voice commands using a voice recognition algorithm.The robot is powered by radio frequency technology. It consists of a transmitter on one end and a receiver on the other end, both of which are connected to a remote circuit to be controlled. Electromagnetic waves or radio waves are used to relay the control signal from the transmitter end.Any object, such as a robotic vehicle, can be controlled using the control signal received at the receiver end.

Limitations:

- When the robot is controlled using radio frequency, the distance between the transmitter and receiver is limited in indoor conditions, and we must press more than one button at the same time for certain operations.
- Bluetooth communication has a small range, can lose connection in some circumstances, and has a low bandwidth.
- The data transmission speed of Zig Bee is slower than that of Wi-Fi, and the network stability is poor.
- The existing voice recognition technologies only recognize specific voices, which is a disadvantage in the defence sector.
- Websites are built to monitor the robot, which causes delays in comment transmission.

4. Proposed Methodologies

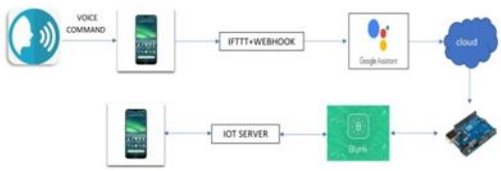
For a certain purpose or specific field of use, many conventional machines are programmed. Two different kinds of robots may be required for two different types of work. This implies both cost and increased complexity when coordinating various robots' jobs. Therefore, if a robot is designed for numerous uses that can perform several works in one console, it will be more cultural. Such a multifunctional robot can simultaneously perform several works and save time and cost. Thus, this work will focus on the design of such a multifunctional robot that can do several jobs and build a multifunctional robot. Multiple robots or multiple works of a single robot must always be coordinated. This coordination is always a difficult task, and it mainly depends on this part for the proper working of an embedded robotic system. Since there are various sensing and working modules in the multi-use robot that can work simultaneously and synchronously. This part is largely dependent upon challenges and the proper running of an integrated robotic system. Because a multifunctional robot involve various sensing packages and work modules that can work simultaneously and sync, time and cost can be saved and work is done more adequately at the same time. Embedded systems are control systems that are built in order to incorporate on-chip memory, RAMs and various peripheral capabilities, such as time and serial communication. In-chip system systems are integrated. A robot that can manoeuvre through a modeling industry or a home, locate a candle inside a room of the modeling industries and the robot has to discover the room and then extinguish the fire.

5. Architectural Diagram

In this architecture of voice-based defense robot voice-based means mobile-controlled robot, so in this paper, smart phone plays an important role. The voice commands are given to the robot uses a smart mobile phone based on an Android OS based platform. When it comes to technology, IFTTT is a platform that allows users to connect all your different apps and devices.When you sign up for a free account, you can enable your apps and devices to work together to do things they would never be able to do otherwise. It also contains two different approaches. The first is that Google Support is not an app that you can use to download from the Android OS.It is used to

provide input from the user and to transmit it to the cloud. The inputs are converted to binary bits such as 1s and 0s using JSON code; the converted data can be transferred from the control unit using the mqtt protocol.Another is a web hook used for security purposes. Web hooks are automated messages sent from applications. When something happens to you. In this paper use Blink is a server for IOT. Blink is a new platform that allows you to quickly build interfaces to control and monitor your hardware projects from your iOs and Android device. After downloading the Blink app, you can create a project dashboard and arrange buttons, sliders, graphs,and other on-screen widgets. Usingthe widgets, you can turn pins on and off or view data from sensors. Blink is perfect for interfaces with IOT-based projects such as monitoring of temperature level, smoke level and also air quality level or Switch the robot on and off remotely. All these things are integrated in the mcu node. The controller is equipped with temperature sensors, smoke sensor, PIR sensor, metal sensor, air quality sensor, ESP32 cam module, wifi module.

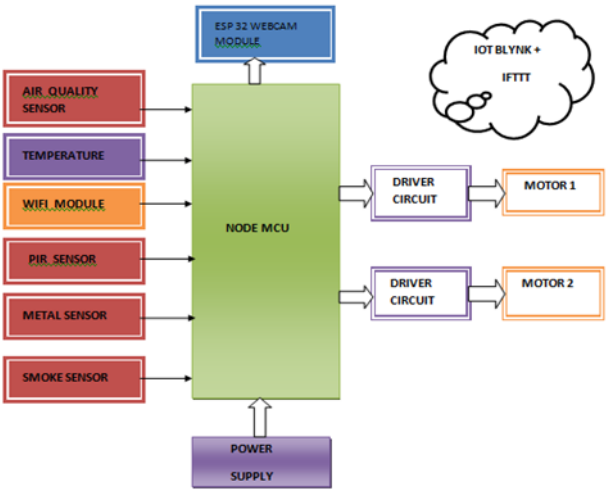
Fig: System Diagram



5.1. BLOCKDIAGRAM

The system consists of various sensors such as a smoke sensor, atemperature sensor, an air quality sensor, a PIR sensor, a metal sensor equipped to the Node MCU (Microcontroller) and an ESP-32 web cammodule used for live streaming.Robot has successfully recovered information regarding the impact under patrolling for human detection and explosives detection and restored information to the Android Phone. This enables the system to pinpoint metals, toxic gases and to monitor the field temperature by means of sensors placed on the conveyor system. To approach followed in the detection and monitoring process, the user performs fine tuning of the sensor meter to make the system more precise and much more affordable. The turmoil of the vehicle and the microcontrollers are regulated for the desired working range.

Fig: Block Diagram



The robot has become an innovative construction framework in the world of contemporary IOT robots. An information system is a combination of computer hardware and software, either knowledgeable of being updated or programmable, looking for a specific function, or for certain functions in a complex network.

Smoke sensor- A smoke detector is a computerized fire prevention detection system that senses, as a key indication of fire, the appearance of smoke and warns building occupants. As part of the wider fire suppression system in a structure, residential and retail smoke detectors receive a notification on a fire alarm podium.

Temperature sensor- A temperature sensor is a device that quantifies the atmospheric pressure and incorporates the input data for recording, monitoring or signal temperature changes.

Air Quality sensor-"Air quality" refers to the air condition in our ecosystem. The effectiveness of air circulation depends, among other things, on the extent to which the air is clean, clear, and free of toxic substances including smoke, dust and smog. Natural or man-made forms can diminish air quality.

PIR sensor- They are most widely used in PIR mobility detectors. Users could even absolutely recognize infrared (radiant heat) radiation, emitted or displayed by artifacts'.

Metal sensor- Metal detectors detect iron, copper, aluminum, tin, nickel, brass and lead, and can detect these.However, these detectors can also find bronze, silver and gold in particular! We can only set our devices to transmit a particular electromotive force for the estimation of target metals.

ESP32 web cam module- It supports the design of video streaming IP camera projects with various resolutions. In PCB antenna, ESP32-CAM was built. The ESP FL connector can be connected to an external antenna.

Node MCU- the Micro Controller is a hardware & software advancement external events on an affordable system - on - chip (SOC) called an Arduino mega open source software ecosystem.

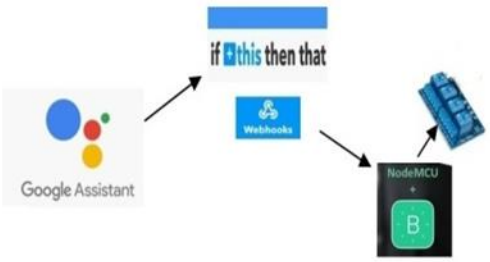
Wifi module- The Esp8266 Wifi module is a SOC with a TCP/IP constructed protocol that allows access to your Wi-Fi network for any microcontroller. The ESP8266 can host an app or download any Wi-Fi networking functionality from some other application processor.

6. Methodologies

6.1. IFTTT

IFTTT is named after a "if so, then so." The company provides a software platform that connects applications, devices and services from various developers to trigger one or more automations involving these apps, devices and services. The robot is supplied by Google support in IFTTT via voice.

Fig:6.1. APPLICATION DIAGRAM



6.2.CLOUD STORAGE

Cloud storage allows us to store data and files remotely, which we can access via the internet or private network. For data transfer of storage outside the site, a third-party cloud provider is responsible. The provider hosts, secures, manages and supports the servers and associated infrastructure and maintains data access where needed. Voice is processed in the cloud with JSON code and converted to binary bits.

6.3.BLYNK

Blynk's an IOT server. Blynk is a new platform that enables you to rapidly create interfaces from your IOS and Android device to monitor and control your hardware projects. You can then create the dashboard of a project, slide buttons, graphs and other widgets on the screen after downloading the Blynk app. You can turn on and off pins with widgets or display sensor data. Blynk is ideal for connection to IOT projects such as a temperature level monitoring, a smoke level monitoring and an air quality level or a remote turning of the robot.

7. Implementation

The robot is vocally monitored via smartphone and IFTTT, connecting device and providing support and Web hook for Google. Google support, for example right, left, reverse and forward, is needed to assess the robot. An ESP-32 webcam is being used for surveillance. Varying sensors are used to monitor momentum, temperature, air,metal and smoke quality. The Blynk Platform enables rapid interfaces to be developed in an Android device

to manage and monitor hardware. Using artificial information, interactions between user and robot are created. The user receives voice answers from the robot. For example, if the robot goes ahead, the robot reacts.

Table 1: MOMENTS

Voice commands	**Moments**
Left	Robot's body moves left
Right	Robot's body moves right
Forward	Robot's body moves forward
Reverse	Robot's body moves reverse

Fig:7.1.Top view of the robotic body

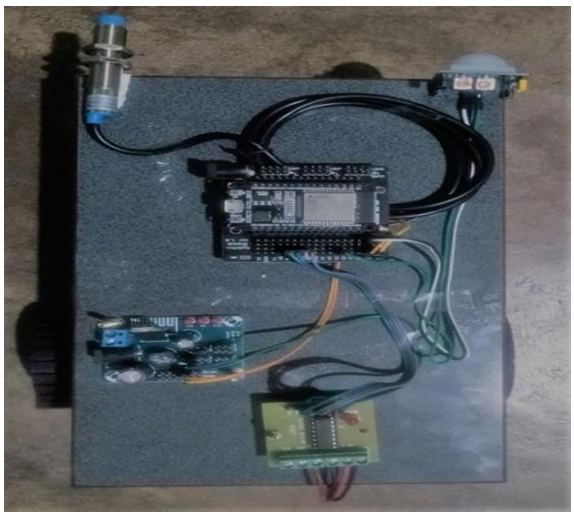


Fig:7.2. Side view of the robotic body

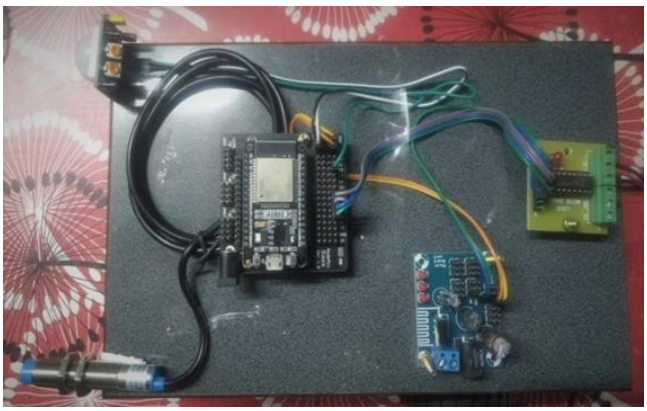


Fig:7.3. Blynk application

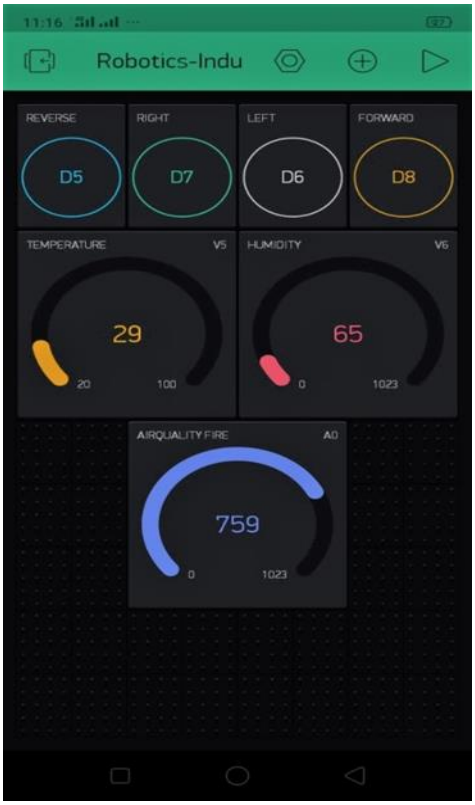


Fig:7.4. Blynk monitoring

Fig:7.5. Human detection in Blynk

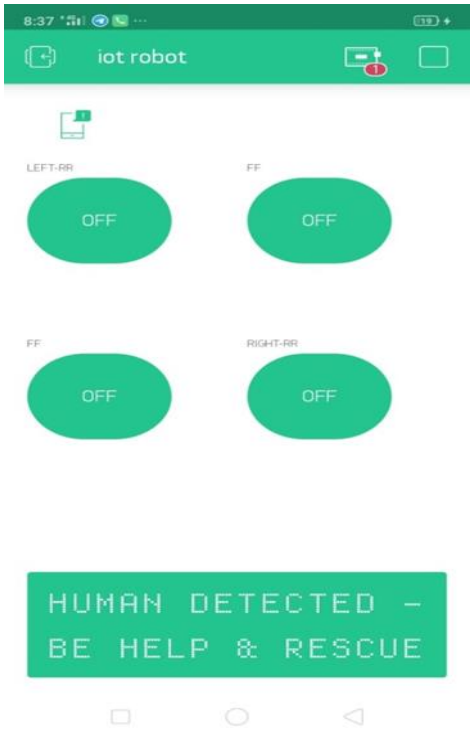


Fig: 7.6[1]. IFTTT Applet

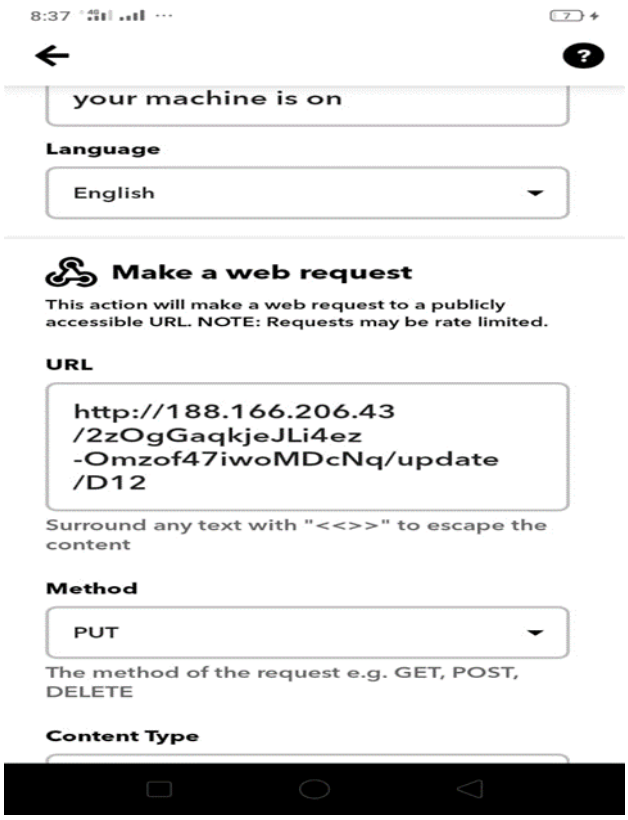
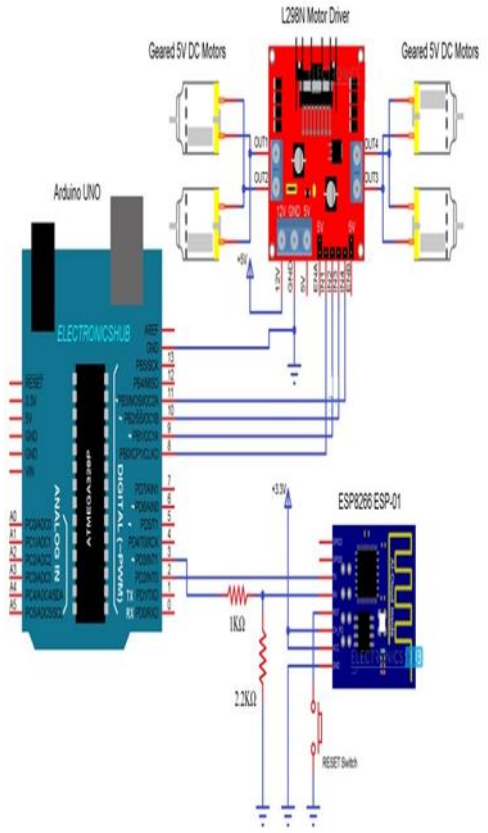


Fig: 7.6[2]. IFTTT Applet

Fig: 7.7.Circuit diagram of node MCU



8. Application and Advantages

- Besides military forces monitoring, here the robot can be used.
- The robot can be used wherever the connecting service provider's tower is installed on the robot.
- The robot is small so that it can be spied.
- Remote rural areas easy to use.
- Low consumption of power
- Robot controlled by smart phone may be used at the territory for disposal of hidden mines.

9. Future Scope

The above-noted project can be further enhanced through the inclusion of different types of sensors, like pressure sensors, fire sensing, light sensors, humidity sensors as well as by the incorporation of GSM units in order to provide notification on personal computer or mobile system in case of a risk. Path and tracking system robot using IOT will be properly implemented in immediate future ARTIFICIAL INTELLIGENCE-based path selection.

10. Conclusion

The project aims to provide the rescue team with human security in dangerous environments including coal mining and military monitoring. This is a prototype that can be implemented with better range and efficiency in real time. The robot enters into hazardous environments and provides data such as the content of gases after the occurrence of the explosive and also the temperature that the rescue team is being sent to ensure that no damage is caused by the rescue team.Use higher transceivers in the future to travel more distances and use them in various environments, based on the transmission range. The number of sensors included in the robot can also be developed. Several other sensors, such as the O2 sensor and the moisture sensor, can be used to provide a much better picture of the environments. A robot arm can assist the robot in taking samples or removing little waste from its path.

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