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IoT Based Voice Controlled Autonomous Robotic Vehicle Through Google Assistant

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Abstract — **Internet of Things (IOT) which aims to describe the execution of a voice-controlled automated vehicle utilizing Arduino IDE. The thought is to at first arrangement the Equipment of the Robot Car and a while later code the entire working using our previous data on programming. The code will by then be reenacted on programming (IDE) and later be interfaced with the gear. The client provides explicit voice orders to the mechanical vehicle through google right hand present on the cell phone. At the receiving side data will be received through Thing Speak (cloud computing) to the ESP32 micro-controller that will execute the orders and forward them to the Arduino on the mechanical vehicle. ESP32 controls the developments of the mechanical vehicle as per got orders. The voice-controlled robot (VCR) moves advances, in reverse, left and right, and quits as indicated by the voice orders forward, in reverse, left, right and stop, respectively. We picked this as our endeavor as mechanical innovation has become a huge piece of our conventional lifestyle and moreover has a wide degree in the planning field. It's anything but's an essential occupation in the improvement of new advancement**.

Keywords: IOT, Embedded C, IFTTT, IDE, VCR.

I. INTRODUCTION

As of late, Internet of Things (IoT) gadgets utilizing different natural sensors are being utilized for Activity of everyday living (ADL) assortment and analysis. It's anything but a model for evaluating the show limit of step by step life by seeing diverse development events occurring, in fact. In this research paper, we propose an IoT Device Platform for ADL capacity estimation New innovation consistently will in general present items that assist with facilitating our day by day schedule. In vehicles nowadays, producers put identical highlight on dealing with in-vehicle incorporates as well. Robots are a heap of systems which join mechanical, electrical, handling and computerization fields of advancement which can be used to perform various tasks in current and local use [1]. Additionally, with growing enhancements in this field robots would now have the option to be controlled with lesser direct human intervention to achieve a more ordinary association with machines. A way to deal with accomplish such is to control a robot through voice orders. Some fundamental employments of robots utilizing voice affirmation are to assist people with inadequacy, executing preset orders, etc. to manage the voice orders a direct and useful system is to use a cell [2]. Phones are astounding devices prepared for playing out various limits like a PC. With their own free working system and web accessibility they are continuously being utilized in various applications. Associating a vehicle's theater setup to the proprietor's PDA for different intentions, is one of mainstream society in the present situation. In any case, to utilize most frameworks, a driver may have to redirect its concentration from heading to track down a separate catch for a component. That can make the driver lose his sight from the street. Completely modified systems come in top brands and at exorbitant expense. Be that as it may, practically all mid-range vehicles do not have these frameworks, because of its significant expense of execution. Its adaptability and convenience make it an optimal interface for mechanical application. These android related systems are useful for making applications all through the world. This paper will utilize an in-vehicle framework which uses google right hand empowered cell phone and voice acknowledgment for controlling essential capacities without the requirement for the client to press any catch. This system will be down to earth and uses present day normal progressions. It tends to be utilized all in all framework for new vehicles, too as can be utilized as an update alternative for existing vehicles.

II. BACKGROUND DETAILS

The existing VCR utilizes a wide scope of strategies for highlight extraction. Any of the methods can be utilized to foster the framework. The methods are as per the following:

A. ROBOT CONTROLLED VIA VOICE USING ANDROID MOBILE BLUETOOTH

VCR is a compact robot whose developments can be obliged by the customer by giving unequivocal voice orders [3]. The

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talk affirmation programming running on an android portable is good for perceiving the particular voice orders 'Forward', 'Stop', 'Left', 'Right' and 'Back, etc. given by a customer [4].

B. Voice Command Recognition

Discourse signals are time variables really. We normally measure discourse signals in an exceptionally brief time frame, for example, in 20ms, a brief time frame, the sign can be viewed as constant, and this is the fundamental purpose of handling discourse signals *[5]*. The interaction of our discourse acknowledgment is to remove include from an acoustic flag and afterward remember it. Feature extraction steps incorporate Mel Frequency Campestral Coefficients (MFCC) and the straight gauge coefficients (LPCC) [7,8]. The MFCC limit achieves the most raised affirmation exactness when differentiated and LPCC. The affirmation stage can be cultivated by various cycles like Dynamic time Warping (DTW) which relies upon design correlation, Hidden Markov Modeling (HMM) which relies upon bits of knowledge model, Neural Networks (NN) which relies upon neural association [9]. In some little language application, the talk affirmation that relies upon configuration organizing is more profitable and capable than various estimations. The clearer control orders are, the sharper a robot should be [10]. Basic detached words discourse acknowledgment strategy can give the most elevated exactness of acknowledgment brings about more limited time requiring less incredible equipment.

C. Control Robot Using PlayStation Controller

The Play Stations game port uses a fairly refined show dependent on top of an incredibly essential and typical consecutive interface: SPI [4]. This organized successive interface uses four lines: a clock (sent by the Arduino), a data input (called MISO), a data yield (MOSI) and a select (once in a while called SS or ATT) [5,6]. This interface is byte arranged and a fundamental move containing an exchange of eight pieces [11]. There are a few boundaries that should be settled upon before an effective connection can be set up (speed, information request, clock extremity and dynamic clock edge). Nonetheless, you don't have to stress over these a lot as the library sets up the Arduino to coordinate the design utilized by the play station.

III. PROPOSED SYSTEM ARCHITECTURE

The proposed system contains the following components:

- ESP 32: The brain of the proposed system which makes all the decisions.
- Android Phone: It controls the movements of the vehicle through voice using google assistant.
- Cloud: It is used to control the vehicle remotely.

The system circuit design and hardware integration with its components is done in such a way that it can communicate with the server and the other devices, and be able to control them, as shown in Fig. 1. Implementation of the proposed device is done in Embedded C (language) in Arduino IDE, that code will provide instruction to do various tasks. The whole device is assembled as one working module. Once the product is passed through the preliminary testing phase, we can handover the product for User Acceptance Testing (UAT) to you if UAT is required. Upon receiving UAT sign off from you and based on your feedback, we will make the necessary changes to the product.

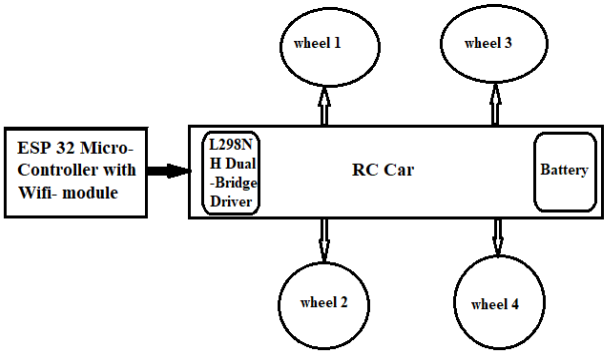

Fig. 1 Block Diagram of the device

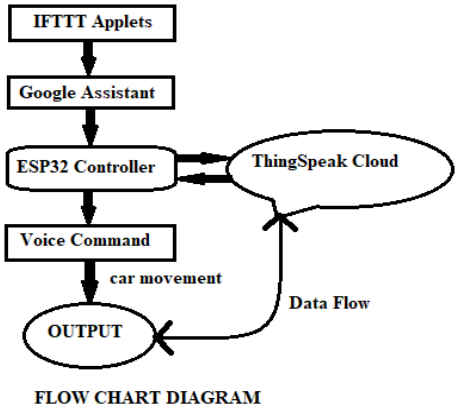

Fig. 2 Flow Chart Diagram of the device

A. HARDWARE USED

a. ESP32 Micro-Controller:

ESP32 is exceptionally incorporated within-constructed receiving wire switches, RF balun, power intensifier, low-upheaval get enhancer, channels, and power the board modules. It adds valuable helpfulness and versatility to your applications with immaterial Printed Circuit Board (PCB) necessities, as shown in Fig. 3. Cross breed Wi-Fi and Bluetooth Chip *[13]*.

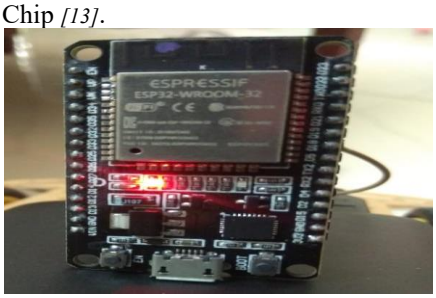

Fig. 3 ESP32 Micro-Controller with Wi-Fi Module

b. L298N Dual H-Bridge Motor Controller:

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The L298N H-associate module can be used with motors that have a voltage of some place in the scope of 5 and 35V DC, as displayed in Fig. 4. With the module used in this educational exercise, there is also an introduced 5V regulator, so if your stock voltage is up to 12V you can in like manner source 5V from the board [12].

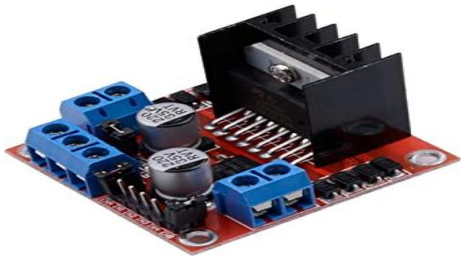

Fig. 4 L298N Dual H Bridge Controller Driver

3.2 SOFTWARE USED

a. Google Assistant

Google Assistant has been used to provide voice commands to the robotic vehicle from the registered Gmail which is linked to the car.

b. Embedded C

Embedded C is a conventional term given to a programming language written in C, which is related with a specific equipment engineering. Embedded C is an augmentation to the C language with some extra header records. These header files may change from controller to controller *[10]*.

IV. SYSTEM ANALYSIS

A. FEASIBILITY STUDY

Feasibility study is a main consideration that adds to the examination of the system. The choice of the System Analyst, where to plan a specific framework or not relies upon its practicality study. The plausibility concentrate on this framework is isolated in the accompanying three regions [1]. All gadgets are attainable given limitless assets and endless time. It is both important and judicious to assess the plausibility of the gadget at the soonest conceivable time. According to various perspectives practicality and hazard investigation are associated. In the event that gadget hazard is incredible, the achievability recorded underneath are similarly significant [4].

- *Economic Feasibility:*

This is worried about the expense caused for advancement and execution of the framework, the support of the framework and the advantages got from it [12]. The equipment and programming needed for the framework is as of now accessible. In this we look at the expense of fostering the framework with respect to what the association can bear. The lone expense included is for coding, execution and keeping up with of the framework. Consequently, the framework is monetarily feasible [13].

- *Technical Feasibility:*

The firm needs to buy a machine with a Pentium processor or higher. The PC should be running windows 8 or some other higher variant of windows. As the equipment and the product of fostering the framework is as of now accessible, the framework is actually plausible. The worry may be in which framework the product is being created and in which it will be implemented. The project is useful just in the event that it's anything but a fruitful and precise admittance to the users [1].

- *Operational Feasibility:*

There are two viewpoints to functional plausibility. One perspective is specialized data and the other is acknowledgment. Specialized data decides whether a framework can give right outcomes and acknowledgment includes client's acknowledgment to the PC framework. Realizing that the framework can give simple and precise admittance to an automated vehicle, clients won't stop for a second to utilize the framework for genuine circumstances in their day by day routine [4,12]. The current framework likewise gives alternatives to discourse acknowledgment strategies to control the bot however is less open and has a less inclusion region. In this manner the framework that will be created will be profoundly exact and can handle the voice signals at a lot quicker rate. With better calculations the product is guaranteed to give better outcomes without compromising in the class of value on accessibility [5].

B. REQUIREMENT ANALYSIS

a) Google Assistant:

Google Assistant is a straightforward and proficient UI enough to set up the client's voice. Aside from this, the UI need not be utilized as the application runs in the background [2].

b) Hardware interface:

Any advanced cells chipping away at android having google partner support should be there. Processor over 500 MHz and 512 MB of RAM inner memory with something like 100 MB free stockpiling.

c) Performance requirements:

The most extreme acceptable chance to react to the voice and access the bot ought to be not exactly a second. Reaction time can be estimated from the time the client addresses the telephone to the time the vehicle takes to begin its second. It is the client's emotional stand by time [5].

d) Security requirement:

It must be guaranteed that the saved data on the cloud isn't altered by another program, programming or infection purposefully or inadvertently.

V. RESULT

This section contains the output obtained by our proposed system along with visual representation of cloud computing and data transfer.

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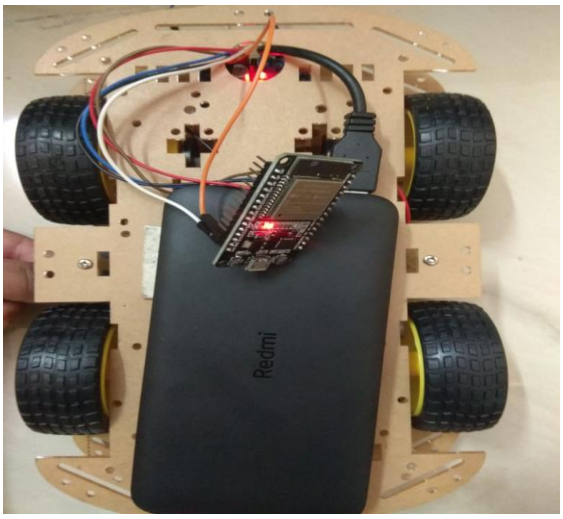

Fig. 5 Proposed Voice controlled Robotic Device

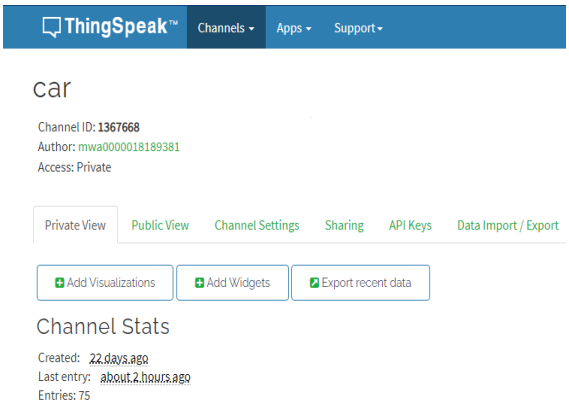

Fig. 6 Thing Speak Channel to store the car status

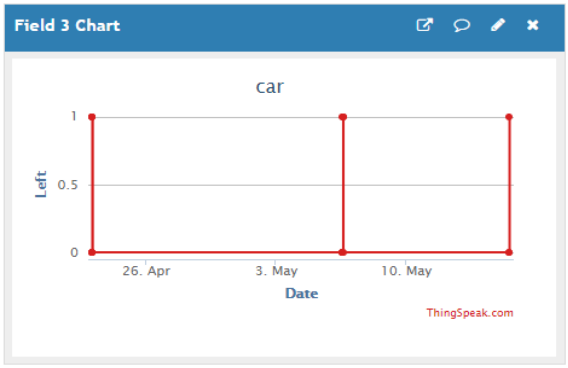

Fig. 7 Visualization of left command by the car

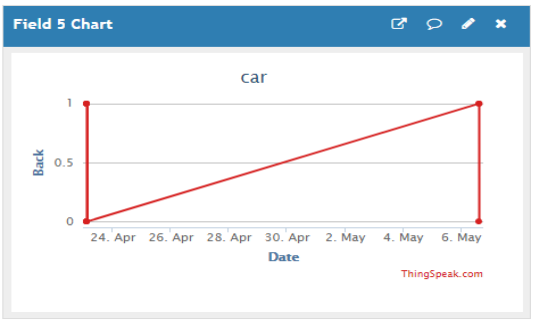

Fig. 8 Visualization of back command by the car

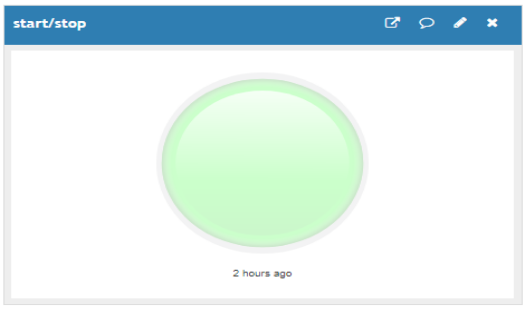

Fig. 9 Start/ Stop button visualization of the car

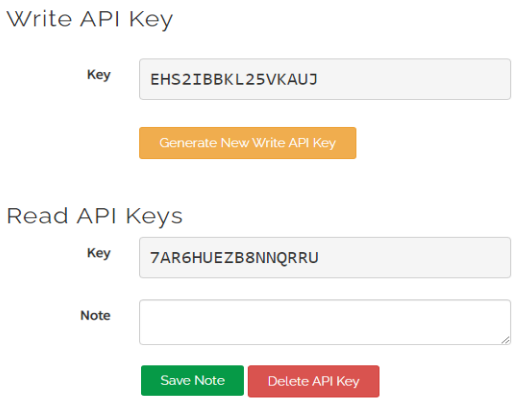

Fig. 10 API Keys used to receive data from the car channel

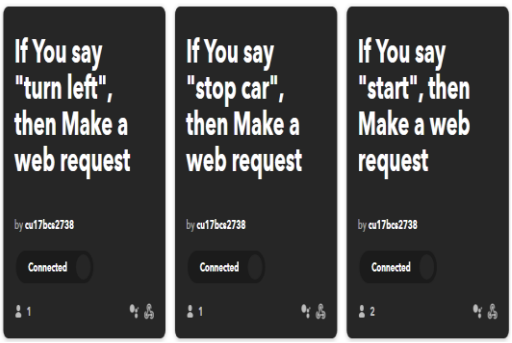

Fig 11 IFTTT Applets used to make web request from the user

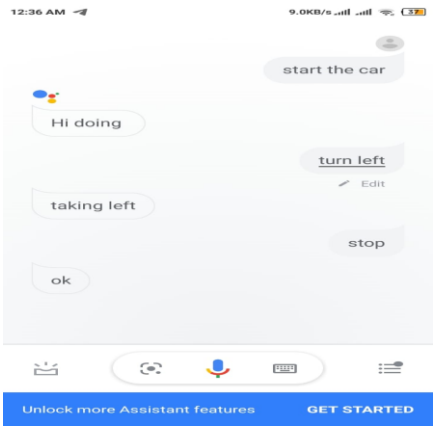

Fig. 12 Commands given by user on google assistant to control the car

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VI. CONCLUSION

More or less we can reason that VCR can unquestionably be a future market for some, modern and homegrown purposes identified with mechanizing every day assignments. This research paper presents an IOT based system for VCR vehicles using google assistant using smartphone. This invention is focused on how much a vehicle can be controlled from a remote location without any extra application, No use of extra sensors, Reduce manual functionality, and it will be a part of next gen technology.

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