

The Range-Less Robot with Solar Power

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Abstract: In present day every one of the general population know about robots. Robots assume a vital part in human life. Robots are a machine which lessens the human endeavors in substantial works in businesses, building and so forth and makes life simple. We are here with our future robot that is a Range-less ROBO. Truly, we call it a Range-less in light of the fact that the Transmitter and Receiver which works for this ROBO has an unending range of activity and can be worked from anyplace. In the time of universal frameworks, it is essential to have the capacity to control robots all over the place. Albeit numerous strategies to remotely control robots have been concocted, the techniques have the issues, for example, the requirement for unique gadgets or programming to control the robots. This paper proposes a strategy for robotic control utilizing the DTMF tone created when the client pushes cell phone keypad catches when associated with a remote versatile robot.

I. INTRODUCTION

A robot is a mechanical or imaginary artificial agent, generally an electro mechanical machine that is guided by a computer program using electronic circuitry. The robot is a technology which deals about the design, construction, operation, and application of robots, as well as computer systems is used to control, sensory feedback, and information processing are called robots. This technology deals with automated machines that can be placed by humans in dangerous environments, or resemble humans in appearance, behavior. Now a today's robots are inspired by nature contributing to the field of bio-inspired robotics. These robots also created a new branches of robotics and soft robotics.

Right now there are a wide range of robotic choices accessible to current militaries. Robots can be controlled by wire, keep running by remote control or directed through tele-robotics. In any case, that is only the begin as these advances will spare a huge number of lives on our Nation's Highways through Smart Car Systems and Net-Centric Automobiles without bounds. Spurred from this foundation, this undertaking will diagram self-governing "Range-less Robot" which is controlled by straightforward cell phone (with 3G bolster). Our thought process is to outline a framework which gives an answer for making mindful of the new condition, robot are utilized rather than people to make mindful of new places. Along these lines, we have proposed a DTMF based observation which can be controlled remotely by utilizing web so the portable which is mounted on robot will be controlled by means of web from another android stage or pc. Camera in the portable can be utilized to outwardly control the robot bearings from far spots so this can be utilized to make mindful of new places everywhere throughout the world gathering data

DTMF Mobile ROBOT is a machine that can be controlled with a versatile. In this paper, the robot is controlled by a cell phone that makes a call to the cell phone joined to the robot. Throughout a call, if any catch is squeezed, a tone relating to the catch squeezed is heard at the opposite end of the call. The robot sees this DTMF tone with the assistance of the telephone stacked on the robot. The control of robots involves three different phases they are perception, processing and action. Normally, the sensors are mounted on the robot. The perception and processing is done by the on-board microcontroller, and the action is performed using motors..

II. EXISTING SYSTEM

Customarily, wireless controlled robots utilize RF circuits, which have disadvantages of constrained working range and frequency range, utilization of cell phones can defeat this restriction. It gives the benefits of vigorous control, working range as expansive as the scope region of the specialist organization, no obstruction with different controllers and up to twelve controls. Using Bluetooth is an easier way in connecting between devices where most of devices has a Bluetooth technology in it so connecting the system to one of that device is easy. On the other hand, Bluetooth communication had some disadvantages compared to others wireless communication ways where the range of Bluetooth modules approximately equal to 30 feet, which is a small range when wide spaces are needed.

The customary wired catches controlled robot turns out to be exceptionally bulgy and it likewise confines the separation the robot goes. The essential thought of our undertaking is to build up a framework (Robot) which can perceive the Human Interaction with it to achieve the specific errands allocated to it. The DTMF tone produced Cell Phone Controlled when the client pushes cell phone keypad catches or when associated with a remote versatile framework. The essential mode for robot correspondence utilizes RF (radio frequency).

RF is a conspicuous decision for correspondence since it enables more data to be exchanged at fast and over long separation. Be that as it may, the utilization of RF adds to improving the effectively strange nature of robotic innovation. To execute basic correspondence, Dual-Tone Multi-Frequency (DTMF) innovation is utilized.

The robot can be operated in 3 ways: perception, action and processing. In the perception stage if the cellphone attached to the robot receives a call, then the pressing action of the key on the cellphone decodes the generated DTMF tone. Then, the decoder chip receives the audio signal from the cellphone, and then converts the DTMF tone into a binary code, which is then fed to the microcontroller. In this project, an MT88710 IC is used as a DTMF decoder. In the processing stage, the microcontroller processes the binary code which is received from the DTMF decoder. The controller is programmed in 'c' to perform this particular task according to the input bits. On the action stage, the rotation of the motors depends upon the input given by the microcontroller.

III. PROPOSED SYSTEM

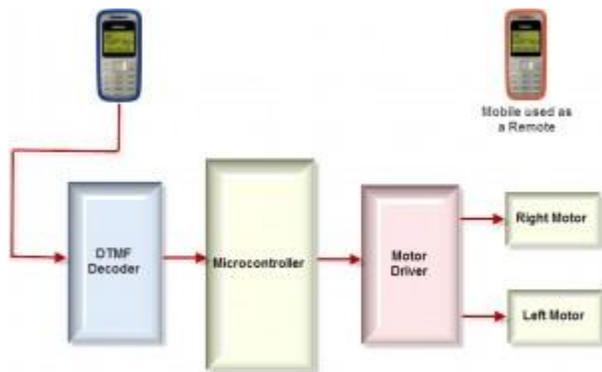


Fig.1. Block Diagram range-less Robot

The blocks of the system are microcontroller, Cellphone, DTMF Decoder and DC-Motor-driver circuit. The cellphone is the most important part of the entire system because the entire system works and is activated by the cellphone. DTMF (Dual-Tone Multi-Frequency) receives the input signal from cell phone and decodes it, and then generates 4-bit-digital output

A cell phone that makes a call to another cell phone joined to the robot. Over the span of a call, if any catch is squeezed, a tone comparing to the catch squeezed is heard at the opposite end of the call as shown in Fig.1. The robot sees this DTMF tone with the assistance of the telephone stacked on the robot. The got tone is handled by the microcontroller with the assistance of a decoder IC. The microcontroller at that point transmits the flag to the engine driver ICs.

IV. HARDWARE DESCRIPTION

A. Mobile Phone

The cell phone (likewise called a wireless telephone or PDA) is a convenient electronic gadget utilized for portable voice or information correspondence over a system of particular base stations known as cell locales., for example, SMS for content informing, email, parcel changing for access to the Internet, gaming, Bluetooth, infrared, camera with video recorder and MMS for sending and getting photographs and recordings. Nowadays cell phones associate with a cell system of base stations (cell locales), which is thusly interconnected to general society exchanged phone organize (PSTN). At the point when the cell phone or information device is turned on, it enlists with the cell phone trade, or switch, with its remarkable identifiers, and would then be able to be cautioned by the portable switch when there is an approaching phone call. The handset always tunes in for the most grounded flag being gotten from the encompassing base stations and can switch seamlessly between locales. As the client moves around the system, the "handoffs" are performed to enable the device to switch locales without introducing on the call.

B. ARDUINO UNO with ATmega328P Microcontroller:

Arduino Uno is a microcontroller board urbanized by Arduino.cc which is an open-source electronics platform mainly based on AVR microcontroller Atmega328. It allows the designers to control and sense the peripheral electronic devices in the real world.

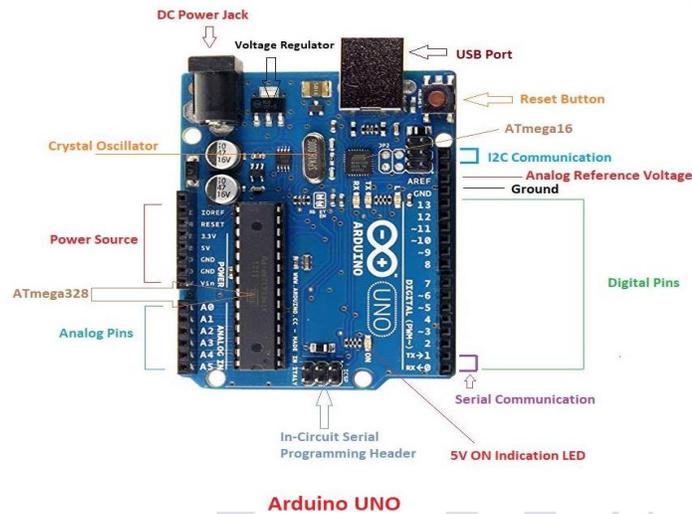


Fig2: Arduino UNO details

Arduino Uno consists of USB interface, 14 I/O digital ports that are used to connect with external electronic circuits. Out of 14 I/O ports, 6 pins can be used for PWM output, 6 analog pins marked as A0 to A5, and Atmega328 microcontroller. It also supports serial communication using Transmission and Reception pins. The software used for Arduino is IDE (Integrated Development Environment) which is free to use and required some basic skills to learn it. It can be programmed using C and C++ language. The Atmel ATmega328P is a 32K 8-bit microcontroller in view of the AVR design. That microcontroller is placed on the board that comes with a number of features like timers, counters, interrupts, PWM, CPU, I/O pins are based on a 16MHz clock that helps in producing added frequency and number of instructions. 13KB of flash memory is used to store instructions in the form of code.

Features include:

- High Performance, Low Power Design
- 8-Bit Microcontroller Atmel® AVR® advanced RISC architecture
- 131 Instructions are present, most of which are executed in a single clock cycle
- Up to 20 MIPS throughput can be obtained at 20 MHz
- 32 x 8 working registers
- cycle multiplier
- 32 x 8-bit Timers/Counters each with independent prescaler and compare modes
- A 16-bit Timer/Counter with an independent prescaler, compare and capture modes
- Real times counter with independent oscillator
- 10 bit, 6 channel analog to digital Converter is present
- 6 pulse width modulation channels
- Internal temperature sensor
- Serial USART (Programmable)
- Programmable watchdog timer with independent internal oscillator
- Internal analog comparator
- Interrupt and wake up on pin change

Memory Includes:

- 32KB of programmable FLASH
- 1KB of EEPROM
- 2KB SRAM
- Data preservation for 20 years at 85°C and 100 years at 25°C
- Optional boot loader with lock bits
- Programming lock available for software security

C. DTMF

The DTMF remains for 'Dual Tone Multi-frequency' which is one of the systems for changing over the simple flag to digital utilizing DTMF decoder. The DTMF decoder circuit for the most part utilized as a part of portable interchanges framework which perceives the succession of DTMF tones from the standard keypad of the cell phone. DTMF is a sort of a flagging framework, used to send the data through the telephone lines. The dual tone multi frequency is the flag of a telephone organization, it produces when you press a customary phone touch keys. In the United States or in different spots, it is known as a touch tone telephone dialing. Generally this innovation is utilized as a part of the cell phones with the correct methods and decoded DTMF flag is utilized as a part of the robotic microcontrollers to expand the robot execution to a specific activity as shown In figure:3

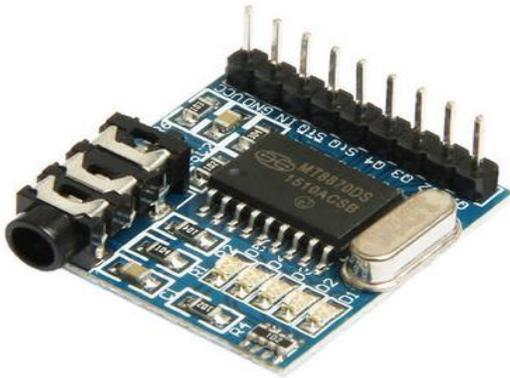


Fig3: DTMF Module

In the dual tone multi-frequency (DTMF), in the event that we press any key on your telephone, at that point it creates two tones of particular frequencies, the principal particular frequency is a high frequency of pitch and the second one is a low frequency of the tone. When a valid DTMF tone is received as input the position led flashes and the corresponding 4 bit binary value is latched to the output pins D0, D1, D2 & D3 and then a status led blink. The module is capable of providing 16 different outputs if the tones are fade thru a tone generation circuit or through PC based software (the inputs being from 0-9 * # and A B C D). However when operated through cellular phone device it can provide only 12 diff outputs because of 0-9 keyboard along with * and #.

Special Features of DTMF Module :-

- Decodes DTMF as 4 bit binary
- It requires Low power of 5V DC operation & Operating Current 100 mA
- LED indication of outputs
- Simple to use
- Based on excellent HT92B70 IC

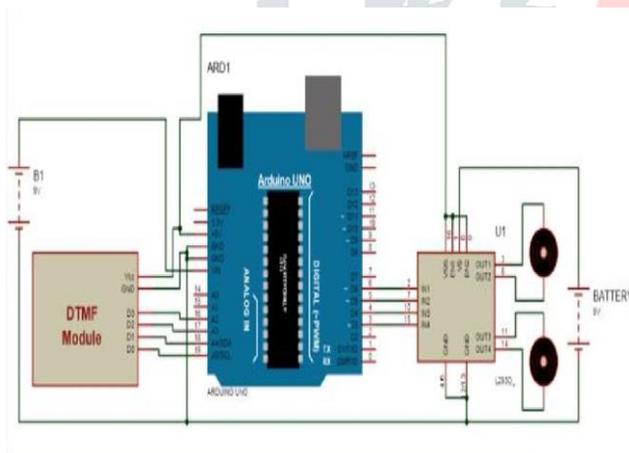


Fig.4. Connection of DTMF with Arduino UNO

The DTMF signal from the user (Sender) mobile phone is picked up by the system (Receiver) mobile phone. Then the connection is recognized between the two phones, whatever phone key is pressed at the Sender mobile phone, the corresponding DTMF tone is heard in the ear piece of the receiver phone. Received DTMF tone is fed to the DTMF decoder as shown in Fig.4. The DTMF decoder will give the equivalent BCD value of the tone. This Output is connected to D3, D2, D1, D0 pin of MT8870 Decoder IC and this output is fed to ATmega328P Microcontroller pin 4,5,6,7 respectively. Based on the corresponding binary digit of the DTMF tone received by the Atmega328P Microcontroller, a decision is made for Pins 8,9,10 and 11 regarding which pins should be high or low. These pins are feed to the L293D IC as input. Based on the Controller conclusion the Pins are either high or low which triggers the motors and moves the vehicle.

D. Audio Jack

A phone connector which is also known as phone jack, acoustic jack, headphone jack , is a family of electrical connectors typically used for analog audio signals .It is **Compact and convenient to carry and to listen the numbers.** as shown in Fig.4.



Fig.5. Audio jack.

E. DC Gear Motors

A DC motor is an electrical motor that runs on direct current power. The speed of motor is counted in terms of RPM. The DC motor works over a reasonable range of voltage. The electric motor operation depends upon simple electromagnetism. A current carrying conductor generates a magnetic field, when it is placed in an external magnetic field, it will encounter a force proportional to the current in the conductor and to the strength of the external magnetic field. It works on the fact that a current carrying conductor placed in a magnetic field experiences a force which causes it to rotate with respect to its original position. Practical DC Motor consists of core windings to provide the magnetic flux and armature which acts as the conductor.



Fig.6. DC Gear Motor.

F. Connecting DC Motor with Arduino UNO:

Arduino can't drive the engines straight forwardly. Along with these lines, we require some sort of drivers to control the speed of engines. L293D is the one of the motor driver. L293D contains two inbuilt H-bridge driver circuits. In its common mode of action, two DC motors can be driven simultaneously, both in forward and reverse direction. The operations of two motors can be controlled by input at pins 2 & 7 and 10 & 15. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start working. When an enable input is high, the linked driver gets enabled. As a result, the outputs become lively and work in phase with their inputs. Likewise, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

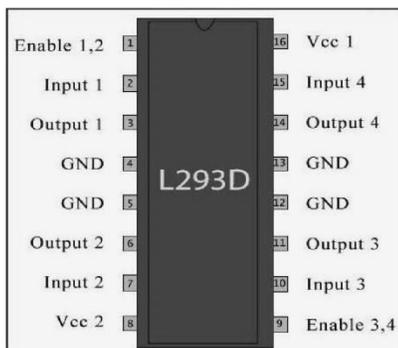
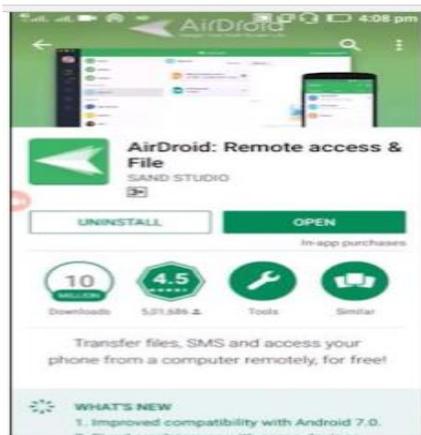


Fig.6.DC motor interfaced with L293D microcontroller.

AIRDRIOD (APP) APPLICATION:**Fig7: AirDriod App**

It is used to view the location of the robot. It must be installed both in mobile phone and laptop with same account details. We can operate the mobile phone using laptop. To access the camera, we must pay the premium of \$1.99 per month.

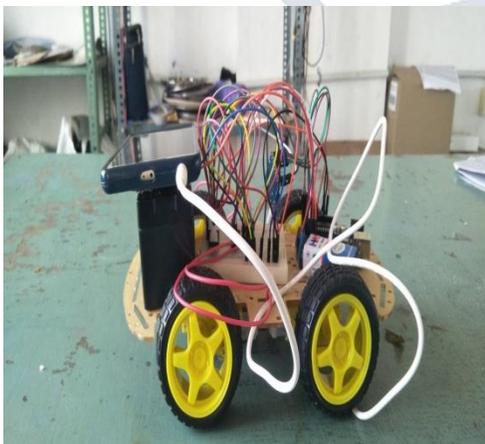
V. ALGORITHM STEPS

The working of the project is explained in the following steps:

- Step 1: first power supply is given to the DTMF robot.
- Step 2: Make a call to mobile which is placed on the robot.
- Step 3: Call is answered automatically as auto answer mode is turned on in the mobile phone.
- Step 4: Directions can be given by the operator using mobile phone.
- Step 5: When key 2 is pressed, robot moves forward
- Step 6: When key 8 is pressed, robot moves backward
- Step 7: When key 4 is pressed, robot moves to left.
- Step 8: When key 6 is pressed, robot moves to right.
- Step 9: When key 5 is pressed, robot moves to stop.
- Step 10: Observation can be done through camera present in smart phone connected to DTMF robot.
- Step 11: Video streaming from the laptop can be done by AIRDROID application.

VI. RESULTS

- When key 2 is pressed robot moves in FORWARD direction.
- When key 4 is pressed robot moves in LEFT direction.
- When key 6 is pressed robot moves in RIGHT direction.
- When key 8 is pressed robot moves in BACKWARD direction.
- When key 5 is pressed robot get STOPS.

**Fig.8.Range less robot using DTMF.**

VII. CONCLUSION

The task has been successfully composed and tried. It has been mainly intended to make mindful of new place utilizing robotics through web. Current frameworks have talked about the robots and have proposed numerous for decreasing these endeavors. Keeping in mind the end goal to overcome the trouble, rather than controlling the robots physically utilizing RF, GSM, Bluetooth advances our task prevailing with regards to moving the robot utilizing DTMF module. As per the instructions given by the individual sitting at one place, the motors run according to the instructions.

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