DTMF Controlled Robot for SPY Detection

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Abstract- A robot car is controlled by cell phone using DTMF. The robot is controlled by a mobile phone that makes a call to the mobile phone attached to the robot. In the course of a call, if any button is pressed, a tone corresponding to the button pressed is heard at the other end of the call. This tone is called "Dual Tone Multiple-Frequency" (DTMF) tone.

The robot perceives this DTMF tone with the help of the phone stacked on the robot. The received tone is processed by the microcontroller with the help of DTMF decoder. The microcontroller then transmits the signal to the motor driver ICs to operate the motors & our robot starts moving.

Keywords/ Index Term- Arduino Uno R3, Dual Tone Multi Frequency, L293D(motor shield) driver IC.

I. INTRODUCTION

In this project, we have made a surveillance bot which can be controlled over the Internet or a personal network in an efficient and economical way. The robot uses DTMF technology that takes the input from mobile phone attached with it and streams the live footage from a camera mounted over it.DTMF (Dual Tone Multi Frequency) is the flag to the telephone organization that we create when we press a conventional phone's keys.

The robot is controlled by a cell phone that makes call to the cell phone connected to the robot and throughout the call, whenever a match of frequency occurs at the robot's side the robot performs the desired function and moves accordingly.

DTMF relegates a particular recurrence to each key that it can undoubtedly be recognized by the electronic circuit. The flag produced by the DTMF encoder is the direct logarithmic accommodation, progressively of the amplitudes of two sine(cosine) influxes of various frequencies, for instance: squeezing key5 will send a tone made by adding 1336hz and 770hz to the next end of the versatile.

The received tone is handled by the Arduino microcontroller with the assistance of DTMF decoder. The decoder deciphers the DTMF tone into its equal parallel digit and this paired number is send to the microcontroller as 4 different binary inputs, the microcontroller then converts the binary digits into the equivalent decimal number. The microcontroller is pre programmed to take a choice for any given decimal number and the signals to the L293D are issued accordingly which aid in the motion of the robot.

II. LITERATURE REVIEW

The aim of this project is to improve the machine operation in Malaysia Industry and also in medical facilities. In this project, the technology that we used is Dual-Tone Multi-Frequency (DTMF) Technology. DTMF signaling is used for telecommunication signaling over analog telephone lines in the voice frequency band between telephone handsets and other communications device and the switching center.

The underlying principle mainly relies up on the ability of DTMF (Dual-Tone Multi-Frequency) Technology to acts as a remote for controlling the land-rover to move. It will generate DTMF corresponding to a number or code in the number pad and then detect the same number or code from its corresponding DTMF (Table 2.0). In detail, a DTMF generator will generates two frequencies corresponding to a number or code in the number pad which will be transmitted through the communication networks, constituting the transmitter section which is simply equivalent to a mobile set.

For my project, the microcontroller is pre-programmed to take a decision for any given input and outputs its decision to motor drivers in order to drive the motors forward, backward motion or a turn. The Microcontroller acts as a brain of my project because the code will give the action to the motor to move it. For this project, it can be use two method with or without using microcontroller software. The second method which is without using the Microcontroller Interfacing software, the microcontroller is replace with the equivalent logic circuit that act as a decoder to convert the binary to perform the action of the land rover.

When using this second method, it will be a problem in excessive current division due to the overloaded logic. So the chosen of using the microcontroller is the best solution to avoid this entire problem from happening in constructing this project. These both methods operate in same way which is drawback the limited working range, limited range and limited control.
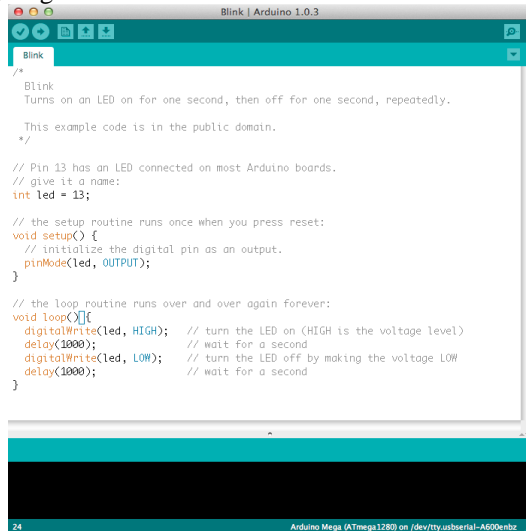
III. SOFTWARE SPECIFICATIONS

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable.

Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

The Uno is a great choice for your first Arduino. It's got everything you need to get started, and nothing you don't. It has 14 digital input/output pins (of which 6 can be used as

PWM outputs), 6 analog inputs, a USB connection, a power jack, a reset button and more. 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.

IV. HARDWARE SPECIFICATIONS

Functioning of Arduino

1. Power (USB / Barrel Jack) (1)
2. **Pins (5V, 3.3V, GND, Analog, Digital, PWM, AREF)** (3,6,7,8,9)
3. Reset Button (10)
4. Power LED Indicator (11)
5. TX RX LEDs(12)
6. Main IC (13)
7. Voltage Regulator (14)
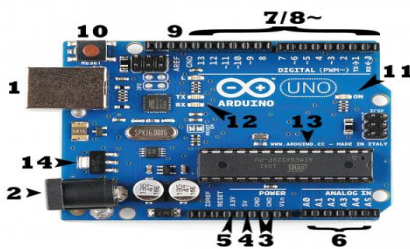
A. Features of Ardunio Uno Board

It is an easy USB interface. This allows interface with USB as this is like a serial device. The chip on the board plugs straight into your USB port and supports on your computer as a virtual serial port. The benefit of this setup is that serial communication is an extremely easy protocol which is time-tested and USB makes connection with modern computers and makes it comfortable.

It is easy to find microcontroller brain which is the ATmega328 chip. It has more number of hardware features like timers, external and internal interrupts, PWM pins and multiple sleep modes.

It is an open source design and there is an advantage of being open source is that it has a large community of people using and troubleshooting it. This makes it easy to help in debugging projects.

It is a 16 MHz clock which is fast enough for most applications and does not speeds up the microcontroller.

It is very convenient to manage power inside it and it had a feature of built-in voltage regulation.

This can also be powered directly off a USB port without any external power. You can connect an external power source of upto 12v and this regulates it to both 5v and 3.3v. 13 digital pins and 6 analog pins.

This sort of pins allows you to connect hardware to your Arduino Uno board externally. These pins are used as a key for extending the computing capability of the Arduino Uno into the real world.
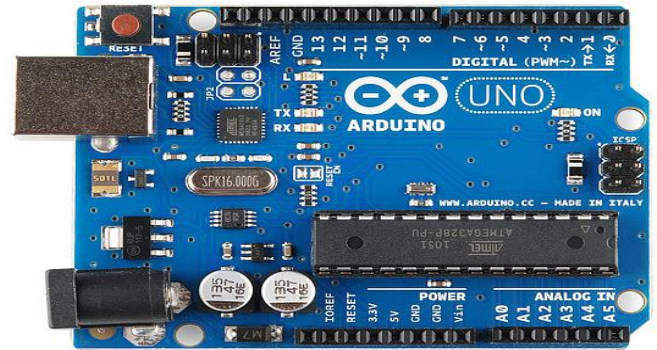

V. DTMF MODULE(MINI GSM)

DTMF stands for Dual tone multi frequency. This is the signal that you generate when you press the buttons of your phone. With DTMF, each key you press on your phone generates two tones of specific frequencies. So that a voice can't imitate the tones, one tone is generated from a high-frequency group of tones and the other from a low frequency group.

This module lets you receive and decode DTMF signal and decode them by generating a 4-bit output. You can connect this module to a mobile phone and receive DTMF signal from another mobile phone far away.

Thus you can send DTMF signal from one mobile phone and receive that with another phone connected to module. The Module Receive the signal via mobile phone and generate 4bit output

Now, if you connect 4 different loads with the output pins, you can switch on and off those loads by sending DTMF codes from your mobile phone matter where you are.
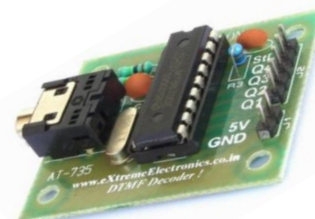
A. DTMF Module(Frequency Chart):

Digit	Low Frequency	High Frequency
1	697 Hz	1209 Hz
2	697 Hz	1336Hz
3	697 Hz	1477Hz
4	770 Hz	1209 Hz
5	770 Hz	1336 Hz
6	770 Hz	1477 Hz
7	852 Hz	1209 Hz
8	852 Hz	1336 Hz
9	852 Hz	1477 Hz
0	941 Hz	1336 Hz
*	941 Hz	1209 Hz
#	941 Hz	1477Hz

VI. ARDUINO MOTOR SHIELD

The Arduino Motor Shield is based on the L298 which is a dual full-bridge driver designed to drive inductive loads such as relays, solenoids, DC and stepping motors. It lets you drive two DC motors with your kit.

Arduino board, controlling the speed and direction of each one independently. You can also measure the motor current absorption of each motor, among other features. The shield is TinkerKit compatible, which means you can quickly create projects by plugging TinkerKit modules to the board. These shield is mainly use to drive the motor or any external devices which satisfy the code burn in respective Arduino Uno Board.
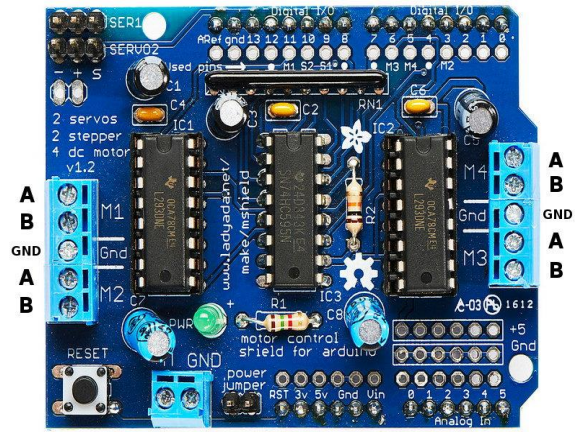
VII. IMPLEMENTATION

Step 1: At first connect the module with a mobile phone like this. Make sure that the mobile has a valid sim inside and the DC jack is supported by the mobile.

Step 2: Give Power supply to the board. Here we have used USB breakout board for 5V power supply from a computer's USB port. You can you any 5V power supply. Press the white switch and the Red LED will gets power.

Step 3: Connect the Output pins

Step 4: Now call the connected mobile number 017xxxxxxxx from another mobile.

Step 5: Receive the call

Step 6: Press digits 1, 2, phone.

Step 7: See the changes in LEDs example, if you send '1' only the signals as you wish and match the results with chart 2, 3, 4------ etc. as you wish in the second mobile

See the changes in LEDs corresponding to your sent signal. For example, if you send '1' only the LED connected to Q1 will glow. Send signals as you wish and match the results with chart 2.

8.Block Diagram
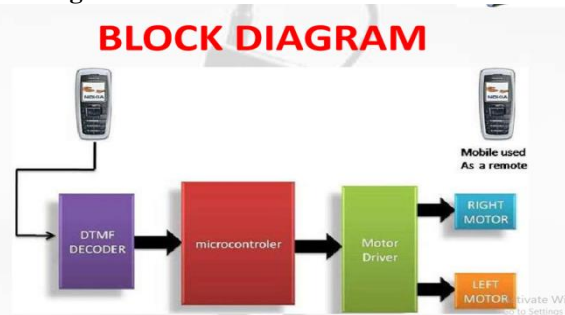
9.Circuit Diagram
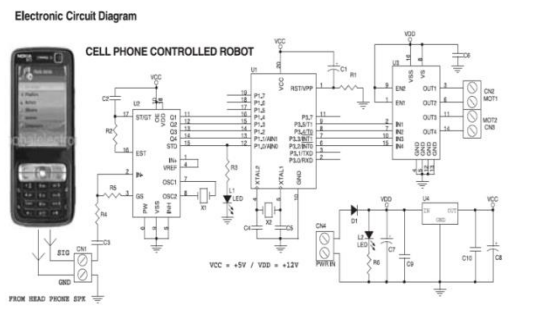
VIII. APPLICATIONS

1)Scientific Remote control vehicles have various scientific uses including hazardous environments, working in the deep ocean , and space exploration. The majority of the probes to the other planets in our solar system have been remote control vehicles, although some of the more recent ones were partially autonomous. The sophistication of these devices has fueled greater debate on the need for manned space flight and exploration.

2)Military and Law Enforcement Military usage of remotely controlled military vehicles dates back to the first half of 20th century. Soviet Red Army used remotely controlled Tele tanks during 1930s in the Winter War and early stage of World War II.

3)Search and Rescue UAVs will likely play an increased role in search and rescue in the United States. This was demonstrated by the successful use of UAVs during the 2008 hurricanes that struck Louisiana and Texas.

4)Recreation and Hobby See Radio-controlled model. Small scale remote control vehicles have long been popular among hobbyists. These remote controlled vehicles span a wide range in terms of price and sophistication. There are many types of radio controlled vehicles. These include on-road cars, off-road trucks, boats, airplanes, and even helicopters.

5) The "robots" now popular in television shows such as Robot Wars, are a recent extension of this hobby (these vehicles do not meet the classical definition of a robot they are remotely controlled by a human)

A. Limitaions and Future scope:

1.IRSensors:

IR sensors can be used to automatically detect & avoid obstacles if the robot goes beyond line of sight. This avoids damage to the vehicle if we are maneuvering it from a distant place.

2. Password Protection:

Project can be modified in order to password protect the robot so that it can be operated only if correct password is entered. Either cell phones Should be password protected or necessary modification should be made in the assembly language code. This introduces conditioned access & increases security to a great extent.

3.AddingaCamera:

If the current project is interfaced with a camera (e.g. a Webcam) robot can be driven beyond line-of-sight & range becomes practically unlimited as GSM networks have a very large range.

IX. CONCLUSIONS

Through the implementation of the proposed project it can be seen that this is a very efficient method of Automation and surveillance. The major advantage is that the Surveillance vehicle can be controlled from literally anywhere in the world. Since GSM connectivity is present worldwide, it is a very useful system. Our work focuses on the security aspect of the existing facilities and points out its flaws. It shows how the concept of security and meaning of the word "intruder" has changed in modern homes. The project points out the shortcomings of existing security systems in identifying and preventing sophisticated intruders in any environment. It is also very simple, and the strings used to spy on the allies can be suitable modified according to the needs of the user. These DTMF based Surveillance systems are inexpensive, and their ease and flexibility of usage is unparalleled

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XI. REFERENCES

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