DESIGN & IMPLEMENTATION OF A MICROCONTROLLER BASED LOW COST DTMF CONTROLLED ACOUSTIC & VISUAL DETECTING ROBOT TO MONITOR CHILD & AGED PERSON

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Abstract:

Technology provides us to control area. Nowadays, anyone can control a machine from all over the world. It is sometimes quite difficult to take care of a child or aged person of the house beside a job. A number of peoples effort human maid to monitor their child or old parents. In this paper, a Dual Tone Multi-Frequency (DTMF) controlled robot is designed to monitor child or aged person. In which, a child or aged person can be monitored directly by a robot. The robot can be controlled by a phone call and a camera will send live streaming of audio and video to the robot-controlled anywhere in the world. Atmega2560 used as the processor with L293D motor driver, DTMF decoder, a pair of the monitor, a pair of the phone for both receiving an sending end a smart phone with an internet connection to transmit audio-video. A computer or smart phone is also needed in the receiving end to receive the live audio-video transmission. Arduino IDE used as the programming software. An android app named 'IP Webcam' is used for video-streaming. This research will mitigate the difficulties of monitoring child or old person. And for this project we are adding flame sensor to detect fire accidents.

Index Terms – DTMF, Arduino, Atmega2560, L293D, Robot, IP Webcam.

I. Introduction

A robot is electro-physical machine which is coordinated by computer, Mobile phone or programming, and is thus able to do process on its own. The Robot Institute of America define "A robot isa reprogrammable multifunctional manipulator designed to move material parts, tools or specialized device through variable programmed motions for the performance of a different of works. Formally, wireless robots use radio frequency circuits, that have issues of limited working range & frequency range, use of cell phonescan overcome this limitation. It provides the advantages of robust control, working range as more as the coverage area of the service provider, no intervention with all other controllers and up to twelve controls. Dual Tone Multi Frequency Mobile controlled ROBOT is a machine that can be operated with a cell phone. In this project, the machine is controlled by a cell phone that makes a call to the mobile phone attached to the robot. When called, if any button is pressed, a tone interrelated to the button pressed is heard at the other part of the call. This tone is called Dual Tone Multiple-Frequency tone. The robotinterprets

this Dual Tone Multi Frequency tone with the help of the phone connected with the robot. The input tone is processed by the Arduino microcontroller with the help of Dual Tone Multi Frequency decoder MT8870 IC the decoder decodes the Dual Tone Multi Frequency tone is to its interrelated binary digit and this binary number is passed to the microcontroller, the microcontroller is pre- programmed to take decision for any provided input and output its decision to motor drivers in demand to drive the motors for forward or backward movement or a turn.

II. RESEARCH METHODOLOGY

A. Structure of the proposed system

This project mainly consists of 2 sections, one is mobile unit and the other one is robot unit. The GSM modem which is fixed at the robot receives the DTMF tones sent by the mobile and gives the instructions to the Arduino to control the robot directions. In this project, we interface ARDUINO with GSM SIM 800L. The protocol used for the communication between controller and GSM modem is UART (Universal Asynchronous Receiver-Transmitter). This system continuously checks for DTMF tones to take the decision for controlling the robot.

DTMF (dual tone multi frequency) is the signal to the phone company that you generate when you press an ordinary telephone's touch keys.

With DTMF, each key you press on your phone generates two tones of specific frequencies. So that a voice cannot imitate the tones, one tone is generated from a high-frequency group of tones and the other from a low frequency group. Along this we can see live streaming with using mobile camera or IP camera.
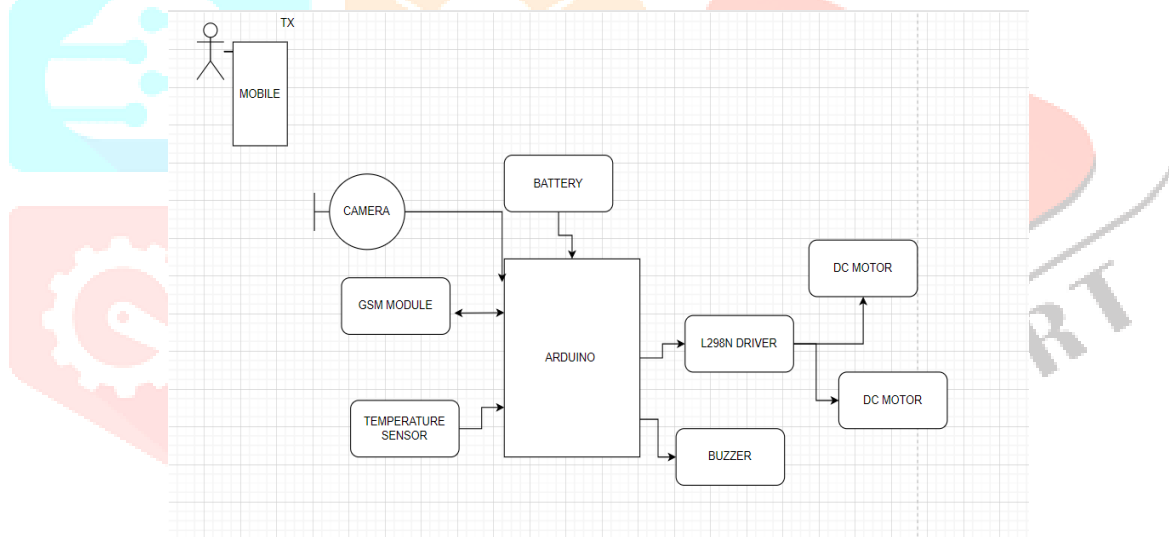
B. DTMF

(DTMF)Dual Tone Multi Frequency is used to operate robot. DTMF technology can be useful in day to day life. DTNF technology is peerless to the present generation. DTMF technology is derived on the theory of Digital Signal Processing. Beforehand Radio Frequencycircuit is used for wireless controlling but it has the big deprivation that is range. Owing to which it limits the control and has unfavorable effect on the performance of the car. Whereas the DTMF converts this deprivation of Radio Frequency circuit into dominance. It provides increased range of working and also provides better results. This system is controlled and managed using phone in microcontroller. The wireless communication is the remote handling operation of robot using Dual Tone Multi Frequency.

C. Arduino

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a microcontroller) and ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.
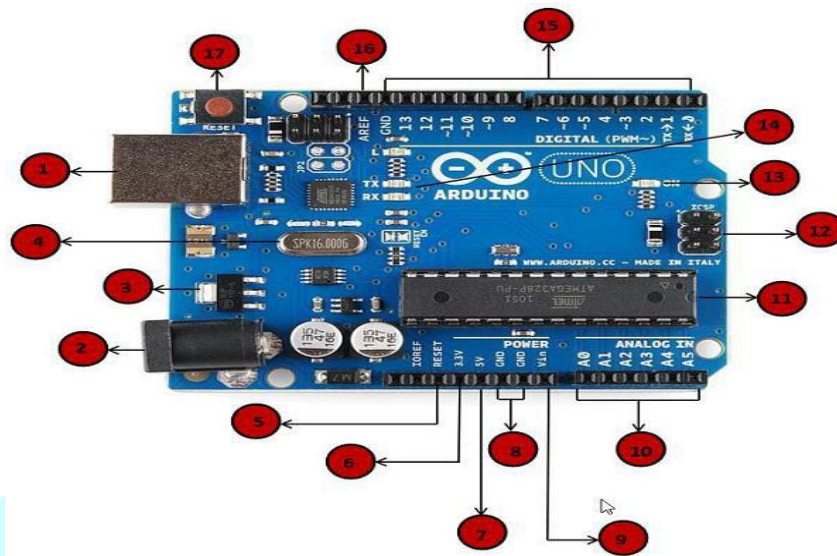

Figure 1:Arduino board

D. Flame Sensor

A flame-sensor is one kind of detector which is mainly designed for detecting as well as responding to the occurrence of a fire or flame. The flame detection response can depend on its fitting. It includesan alarm system, a natural gas line, propane & a fire suppression system. This sensor is used in industrial boilers. The main function of this is to give authentication whether the boiler is properly working ornot. The response of these sensors is faster as well as more accurate compare with a heat/smoke detector because of its mechanism while detecting the flame.
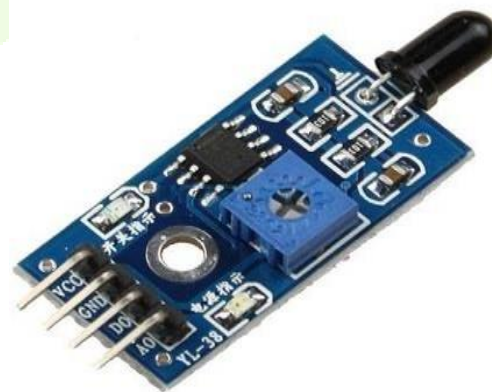

Figure 2: Flame Sensor

E. GSM Module

Whether you want to listen to what happens in your house that's miles away from you or activate sprinkler system in your garden just with a silent call; Then SIM800L GSM/GPRS module serves as a solid launching point for you to get you started with IoT!

SIM800L GSM/GPRS module is a miniature GSM modem, whichcan be integrated into a great number of IoT projects. You can usethis module to accomplish almost anything a normal cell phone can; SMS text messages, Make or receive phone calls, connecting to internet through GPRS, TCP/IP, and more! To top it off, the module supports quad-band GSM/GPRS network, meaning it works pretty much anywhere in the world.
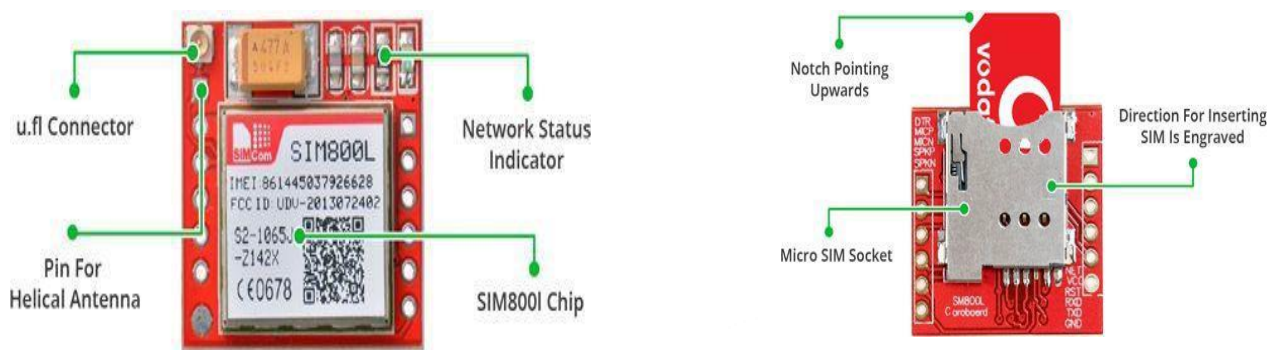

Figure 3: GSM Module

F. IP Camera

An Internet Protocol Camera, commonly referred to as an IP camera, is a digital video camera much like a webcam, which transmits and receives data over a network or the internet. Unlike an ordinary webcam it is a standalone unit with its own IP address that requires nothing more than a network connection in order to transfer images. The IP camera connects to a network in exactly the same way as any other standard network device such as a laptop, tablet or printer.

Figure 4:IP Camera

III. Conclusion

This paper provides a module which can monitor a child or old person. The proposed module requires involvement of mobile phones, internet, IP camera etc for the monitoring of the child or old person. It efficiently provides assistance to the child or old person in their basic needs and much more. It not only provides basic needs but also provides protection to the child or old person in case if any fire breaks out which can be done by the flame sensor and also can indicate if any unauthorized person enters the premise through the IP camera and live streaming.

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