WIRELESS HUMAN VOICE CONTROLLED ROBOT WITH ARM USING VISUAL BASIC & MICROCONTROLLER

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Abstract:

Voice controlled system is new technology to increase the efficiency of robot, reduced errors and is used to close the gap between effective production and required administration. A new technology suitable for many warehouse operations is voice recognized .It has also proved to reduce handling errors with often more than 50%. Anyone can use it by activating its own voice profile. The voice command is sensed via microphone. Ex: - When the person says forward in the mike the robot will go in the forward direction, Similarly, it will also work on the instruction like going Backward, Right-Left, Gripping, Lifting etc. It is laptop based robot and controlled through "visual basic". This robot has two sections transmitting section is connected to laptop uses USB to serial adapter that sends respective code depends on respective voice commands into serial data. Such radio frequency that modulates data at 433MHz using ASK (amplitude shift keying) technique; data modulated in air is received by antenna. The receiver section is mounted on robot, which uses IC 89C52 and L298 ICs. Two L298 IC's are used to drive four DC motors. Such robot is able for doing tasks like gripping, lifting, moving forward-backward, turning right-left and pushing. Such wireless robot can work in 200meter area having speed of 150 rpm enable to lift the weight of 2.5 kg with his arm [5]. It is widely applicable in hospitals for paralyzed, handicapped and blind person. It utilizes hand free interface. It has industrial application and the place where manual work is not possible such as coal mines, can do the robot using our voice .The old man who is unable to do his work, the voice controlled

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robot can do it very easily[6]. The benefit of such robot would be high processing power & great efficiency. So, it would simple to add camera, fire sensors, and temperature sensors. The advantages of such robot is as follows-

1) *Data acquisition using microphone and sound card has been successful.*
2) *Data acquired has been segmented into separate words and quit period are dumps.*

By adding sensors, such robot is introduced to replace people to access to the accident when the underground gas and dust explosion happens under coal mine. Voice controlled robot can also used as a Spy robot by connecting a wireless web camera.

I. INTRODUCTION

The past two decades, we have seen the introduction of technology that has radically changed the way in we analyzed and controlled the world around us. Every year the industry develops the new technologies, new trends and Research in technical field it become incredible factor in development of world. In such case micro controller plays very glamorous role in them. [1]. "A better process supported by the right technology creates the results." A new technology suitable for many warehouse operations is voice reorganization. Voice control is simply a new technology to close the gap between effective production and required administration. The robot, which we have created is computer controlled, is extra ordinary, multifacilited &ambitious robots. The control system of robot is wireless connected by radio modems that have the range of about 200 meters.

As we see an intelligent technology is growing very rapidly but on other hand, it creates the hazardous effects on the people of their carelessness in technical defects. Now days, number of accidents are going on increasing. Today, overall the world, the percentage of handicapped person is 12.7%. In such cases, the robot which is voice controlled is very useful. The jobs which human can't do manually such as in miles, can do the robot using our voice .The old man who is unable to do his work, the voice controlled robot can do his job very perfectly.[8][9]

How Smart?

- Multi-facilitated robot
- Computer/Laptop Based
- Has a great speed
- Dedicated Functionality
- Ambitious & Efficient
- Simple to design &operation
- Effortless
- Extraordinary

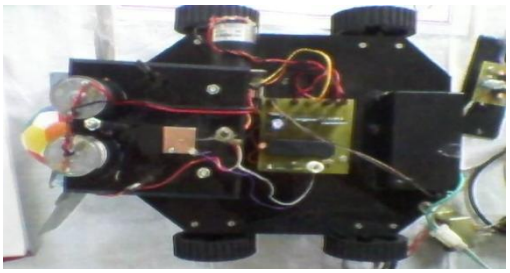


Fig. 1 : Wireless human voice controlled robot

Voice controlled robot is youngest & cleverest one in the electronic technology construction of robot involves interfacing of sensor & more importantly dealing with the physical connection between computer & control board (via serial port).Utilizing robotic Technology, robot has been designed especially for the purpose of holding, lifting, pushing.. It can be turned or rotate in any direction. In addition to the demo program, the robot include following programs-

- Going forward-backward
- Turn right-left
- Arm open-closed
- Bending over to peak up items &carry, etc

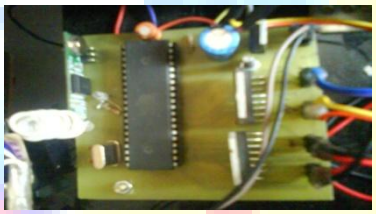
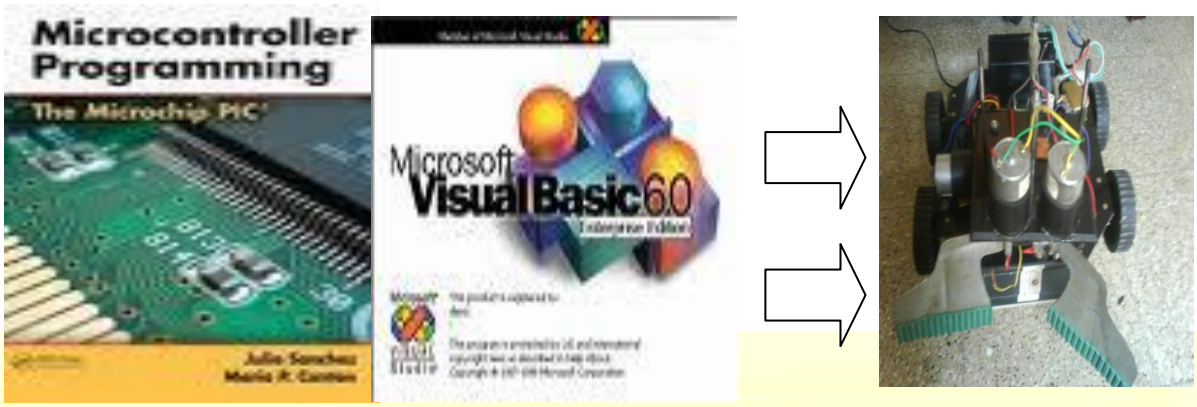


figure 2. Receiver circuit

How voice controlled?

As we are using a microphone connected through PC is an acoustic to Electric transducer or sensor that converts sounds to an electric signal & according the program will run. After giving a voice commands, program starts running continuously. [3]As far the instruction is concerned, it moves forward normally unless & until the microphone detects the signal, forwards or backward .when microphone detects the noise it will turn back &lefts for few seconds &then it will keep forward moving, Until the next signal is received by the microphone the program continuous……



II. Block Diagram

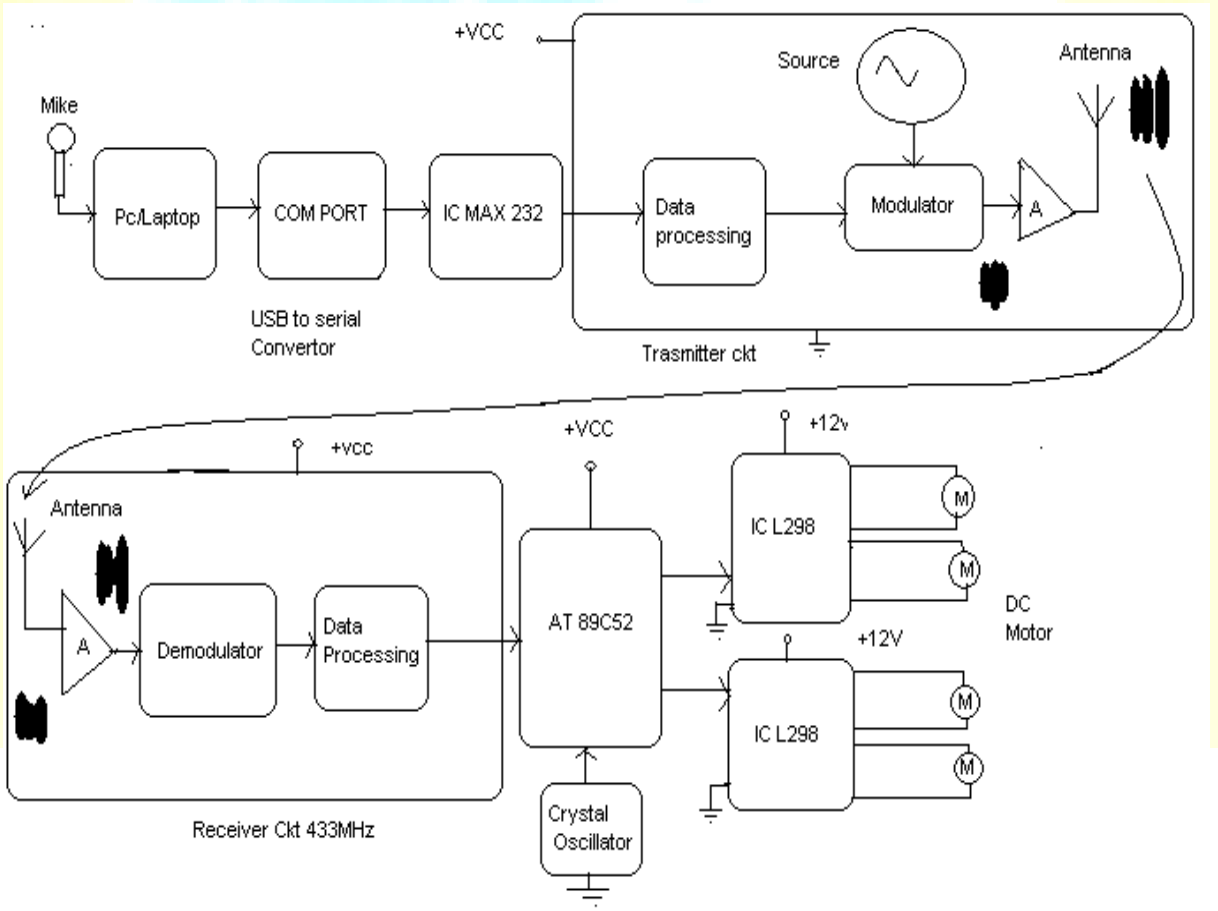


Figure 3. Transmitter & receiver circuit

III. BLOCK DESCRIPTION

The block diagram contains the following blocks described as following:-

1) Microphone:

A microphone (colloquially called a mike) is an acoustic to electric transducer or sensor that converts sound into an electrical signal using a phone we can give instruction to robot [2]

2) PC/ Laptop:

Microphone is connected to laptop/ PC. The VB program which enables robot to run or work is installed in the PC/ Laptop. According to instructions given to Robot through mike are taken to precede though PC/ Laptop.

3) Com Port:

Circuit is connected to PC/ Laptop (which is a) USB to serial convertor / adaptor. The digital data processing from PC/Laptop is converted to serial data using such a com port device. [1]

4) IC Max 232:

Transmitter section includes IC Max 232 which plays a vital role in it. Data from com port is driven to IC Max 232 asynchronous. Its main function is to convert NMOS logic level to TTL one. Since transmitter section family only works on TTL Logic Family. [4]

6) Transmitter & Receiver Architecture:

- Frequency Synthesizer**:**

In order to make the information signal (e.g. data) pass through the air, it must be modulated on to a carrier signal whose frequency is well suited to the propagation environment, conforms to the licensed operating bands, and is sufficiently stable to allow detection by a tuned receiver in the presence of interference.

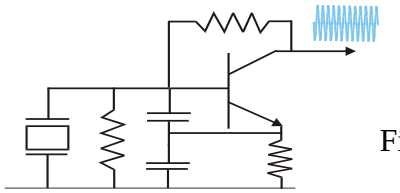
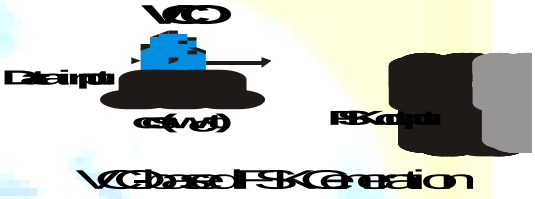


Figure 4 Frequency Synthesizer

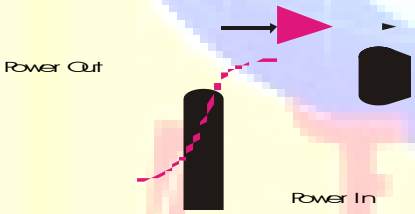
- Modulation**:**

The method of imposing the information signal onto the carrier signal is termed modulation and must be accomplished cost effectively and accurately for maximum range and minimum interference. [8][9]

- Amplification:

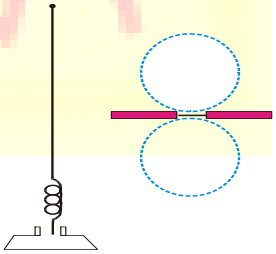


The amplifier is a key part of the transceiver, and must be efficient (dc power in to RF power out), low cost, non-polluting, and possibly linear. Output power is dictated by regulation, range requirement, battery life, and cost and linearity considerations.



- Antenna:

The antenna is often the most poorly engineered part of a radio system. Good design will ensure maximum range, high amplifier efficiency (good matching), good selectivity, minimal pollution, good interference rejection, good sensitivity, reduced design headaches. [1]



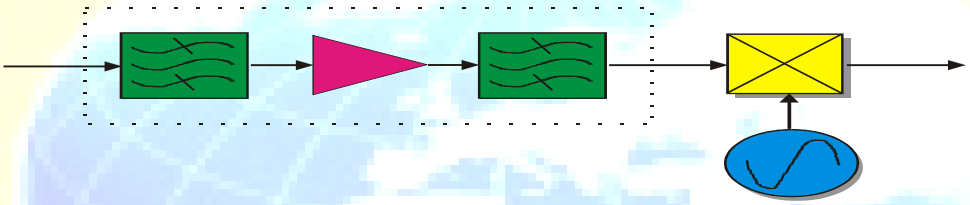
- Reception:

Key to the sensitivity, dynamic range and strong signal handling properties of the radio is the receiver 'front end'. The main task is to boost weak wanted signals, often in the presence of

strong unwanted signals whilst introducing minimal noise and distortion. In many cases, some selective filtering is required to assist this task. [6]

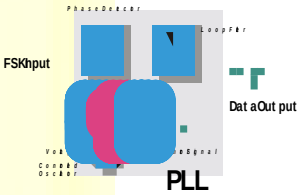
- Demodulation:

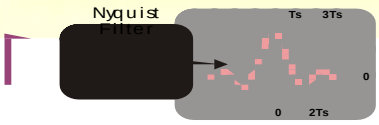
The process of removing the information signal from the carrier is termed demodulation. The challenge is to design a circuit (or algorithm) that will achieve this task optimally in the presence of noise, interference and varying signal strength, frequency and phase, whilst being compact, power efficient and cheap. [7]



- Data Processing:

Pre and post processing of the information signal is often an afterthought for low power radio applications, usually implying some form of microprocessor or DSP engine with the presumed complexity, cost, power consumption and size penalties. The benefits of matched filtering, error detection and correction (coding), channel equalisation, etc, are however significant in terms of range, robust transmission, power conservation and data rate optimisation. [4]





The following sections cover each of these building blocks in greater detail. We obtained original from the O/P in its original form.

- IC 89C52:

Receiver ckt is connected to ac supply is given from receiver to the IC 89C52, original digital data is given from receiver to the IC 89c52 ,the AT 89C52 is a low power, high performance CMOS8 BIT MICRO Computer with 8K byte of flash programmable and erasable read only memory (PROM). RC ckt is used to reduce the load over the microcontroller.[1]

- RC CKT**:**

  CKT is not shown in block diagram RC CKT is connected (to pin no. 9) to reset Pin (RST) it operates on power on – self set rest mechanism.

- Crystal Oscillator:

  It is used to provide oscillations & to reduce unwanted distorted noise two capacitors C1 & C2 are connected to crystal oscillator to the ac which are grounded. [3]

- IC L298:

The L298 is an integrated monolithic CKT in lead multiwatt IC. It is a high voltage, high current, dual full bridge driver design to accept standard TTL logic level & drive inductive loads such as relays, DC & Stepping motors. The O/P from microcontroller IC 89C52 are driven towards the two L298 ICS. At 12v supply is given to the both L298 ICS, & grounded respectively.[4]

- DC Motors:

A DC Motors is design to run on DC Electric power. It is brushed type DC Motor which use internal common create an oscillating AC current from DC source, signal L298IC is used to drive two DC Motors which are used for Moving, forward, backward, right & left. Another L298IC is used to drive another 2 DC Motors which used for lifting & gripping.[8]

IV CIRCUIT SCHEMATIC

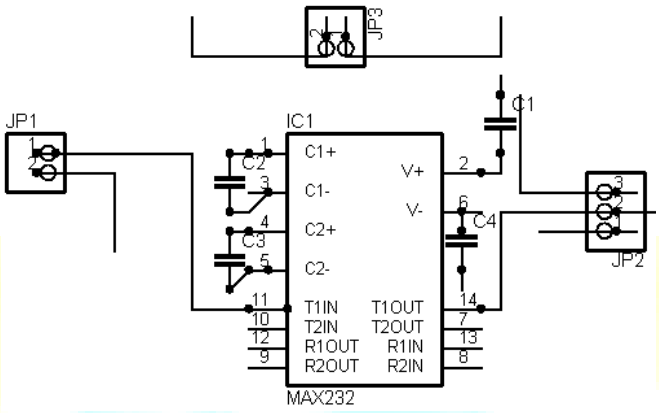


Figure 5 Transmitter

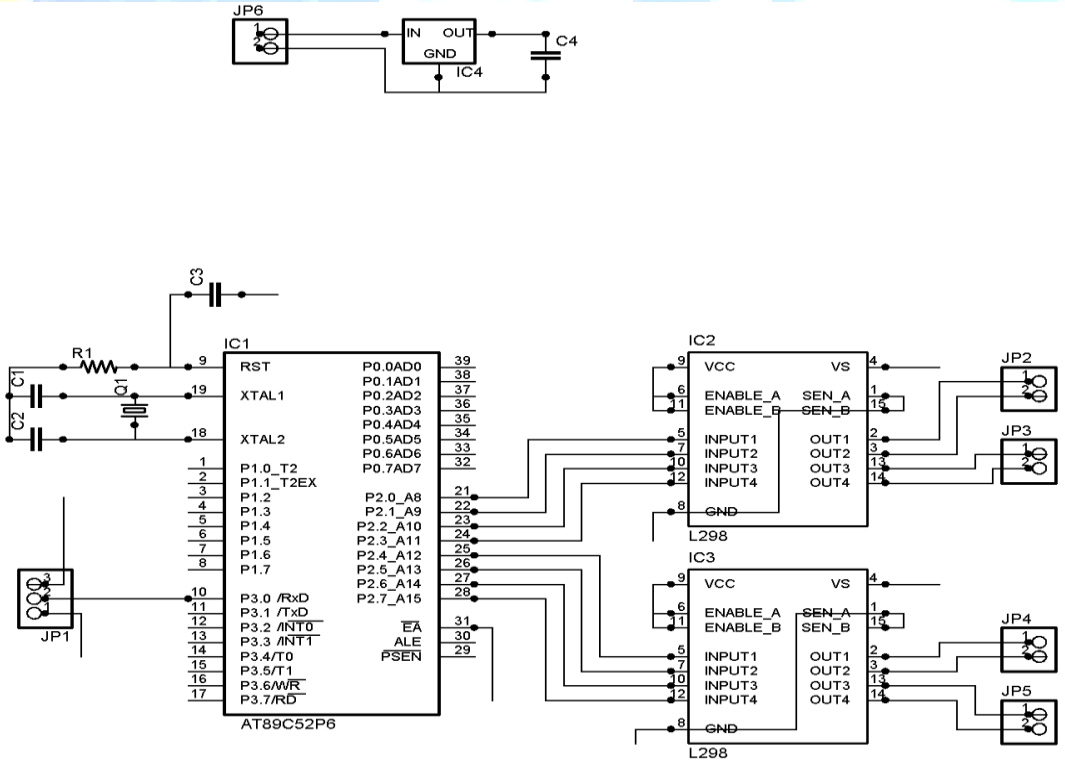


Figure 6 Receiver

V WORKING

In this art a microphone is connected to pc/laptop (normally +5v supply) is provided in the computer for microphone. In condenser microphone also called a capacitor or electrostatic microphone, the diaphragm acts as one plate of capacitor & vibrator produces the change in distance between the plates with DC based microphone the plates are based with a fixed charge 'q'. The voltage maintain across the capacitor plates changes with the vibration in the air according to capacitor equation –

$$C = q/v,$$

A DC power supply is given to circuit .A visual Basic program is installed in pc/laptop. When any one gives the instruction to microprocessor via microphone, program starts running [4] i.e. program is continuously running in PC or laptop. E.g. when any one says forward, VB program generates a data, '01' at serial port with baud rate of 4800 bits / sec. (A comport is connected to PC/laptop for USB to serial conversion.) The data is given to max 232 IC through pin no.11 (T1 in) Vcc supply of (+5v) is given to max232 IC through USB port then this data is given to max 232 IC of its input. It converts CMOS to TTC logic level which is given to transmitter modules since PC operates on CMOS logic level and RF transmitter section operates on TTL logic level.

As shown in pin diagram of transmitting section capacitor C1 is connected between pin1 & 3 (i.e. C1+ & C1-), capacitor C2 is connected between pin 4 & 5 of IC Max 232 for pure DC supply. A Vcc is given to the capacitor C3 which is connected to the Pin no.2 (i.e. +) a capacitor C4 is grounded which is connected to pin no.6 (i.e.-) output from max 232 is given to the middle pin of transmitter circuit . A two pins of USB ports are connected to pin head which gives a +5v supply to overall circuitry. The transmitting section consist of three parts [1] [2] –

1) Data processor
2) Modulator
3) Amplifier

Digital data coming from IC max 232 is processed in the data processor then, a carrier signal which is obtained from data processor is given to the modulator where the signal gets

modulated & modulated output is amplified through amplifier. Radio frequency modulators data at 433 MHz using ask techniques, data modulated in air is received by receiver antenna.

The receiver section consists of amplifier, demodulator & data processor where we get the original digital signal. Such digital data is given to the pin no. 10 (i.e.RXD) of microcontroller AT89C52.[8]

Port P1 is the input port of the IC 89C52 & port P2 is the output ports of the IC 89C52 RC CKT is connected to PIN no. 9[3] (i.e. RST) of microcontroller AT89C52 capacitor C3 in RC CKT is connected VCC & resistor R1 is connected to the GND which uses power on – self, reset, CKT crystal oscillator which is connected but PIN 18 & 19 (i.e. XTAL1 & XTAL2), Two capacitor are connected to crystal oscillator which are grounded. It is used to provide the oscillation & to reduce the unwanted & distorted noise. A VCC Supply is given to PIN no.31 (i.e. EA) as we are using the internal memory. The controller given the data serially via port 2 i.e. P2 0 to P2 7 to the input is port motor drive ICL298, microcontroller compares the original signal & sees the look up table which instruction is given i.e. it checks what instructions is given a proceed nibble from port p2 o to p2 .3 is given to the input of 1st L298IC & another nibble coming from P2.4 to P2.7 is given to another motor drive ICL298. PIN 11, 6, 9 i.e. enable a, enable b, VCC are connected to the each other for VCC supply of ICS L298 respectively. PIN 1, 25, 8 are grounded. A +12v supply is given to the truth table [7]

Look up table**:**

Forward	1010 0000	A0H
Backward	0101 0000	50H
Right	0110 0000	60H
Left	1001 0000	90H
Grip ON	0000 1000	08H
Grip RELEASE	0000 0100	04H
Lift	0000 0010	02H

Lift Down	0000 0001	01H

A single L298 IC is used to drive the two DC motor. The robot will move according to the instruction? Given in the Truth Table. Two DC motors which are connected parallels are used to turn right similarly for left one motor is used for lifting & another two DC motor which are connected anti parallels used for gripping & releasing. [9]

Voltage Regulator: It is 3 terminals the regulator IC which gives fixed output wattage this IC is used to provide supply (voltage) to whole circuitry which is grounded. A signal battery is connected to if to provide +12v supply to it.

VI. INTRODUCTION TO VISUAL BASIC

VISUAL BASIC is a high level programming language which was evolved from the earlier DOS version called BASIC. BASIC means Beginners' All-purpose Symbolic Instruction Code. It is a very easy programming language to learn. The codes look a lot like English Language. Different software companies produced different version of BASIC, such as Microsoft QBASIC, QUICKBASIC, GWBASIC, and IBM BASICA and so on. However, it seems people only use Microsoft Visual Basic today, as it is a well developed programming language and supporting resources are available everywhere. Now, there are many versions of VB exist in the market, the most popular one and still widely used by many VB programmers is none other than Visual Basic 6. We also have VB.net, VB2005 and the latest VB2008, which is a fully object oriented programming (OOP) language. It is more powerful than VB6 but looks more complicated to master. If you wish to learn VB2008, click on the VB2008 Tutorial.

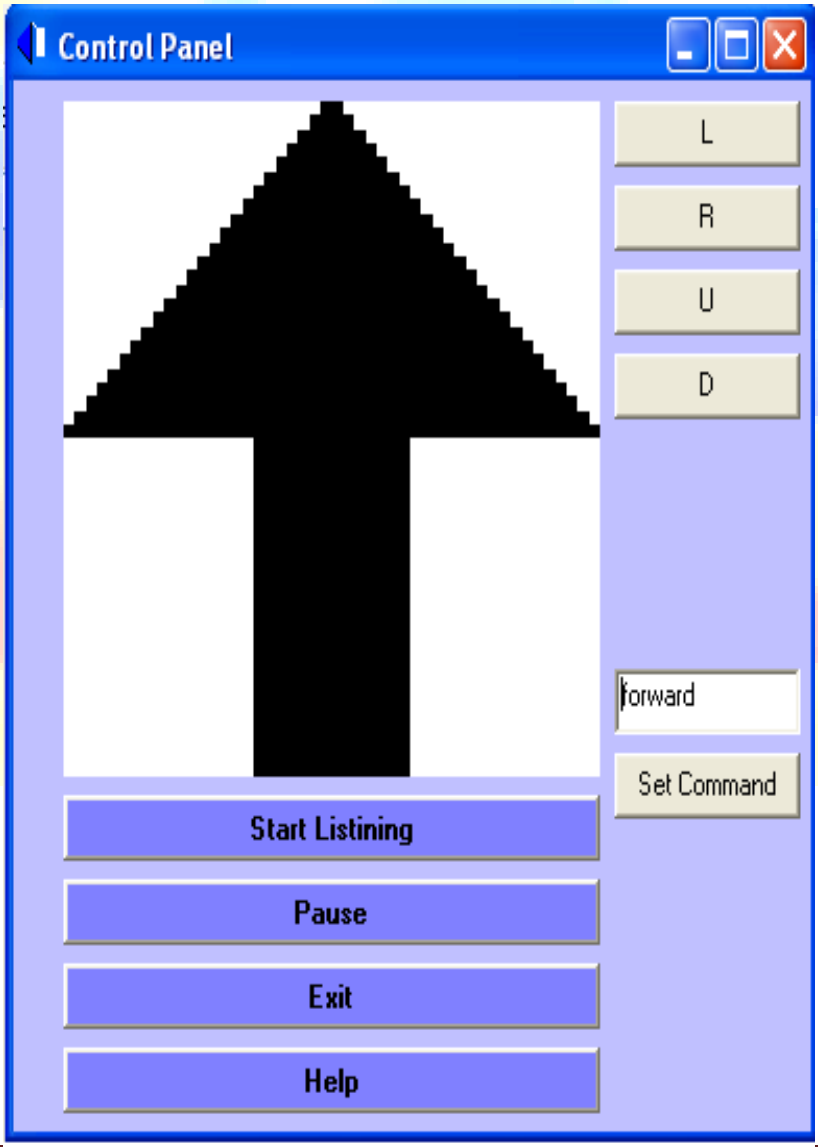
VISUAL BASIC is a VISUAL and events driven Programming Language. These are the main divergence from the old BASIC. In BASIC, programming is done in a text-only environment and the program is executed sequentially. In VB, programming is done in a graphical environment. In the old BASIC, you have to write program codes for each graphical object you wish to display it on screen, including its position and its color. However, In VB , you

just need to drag and drop any graphical object anywhere on the form, and you can change its color any time using the properties windows.

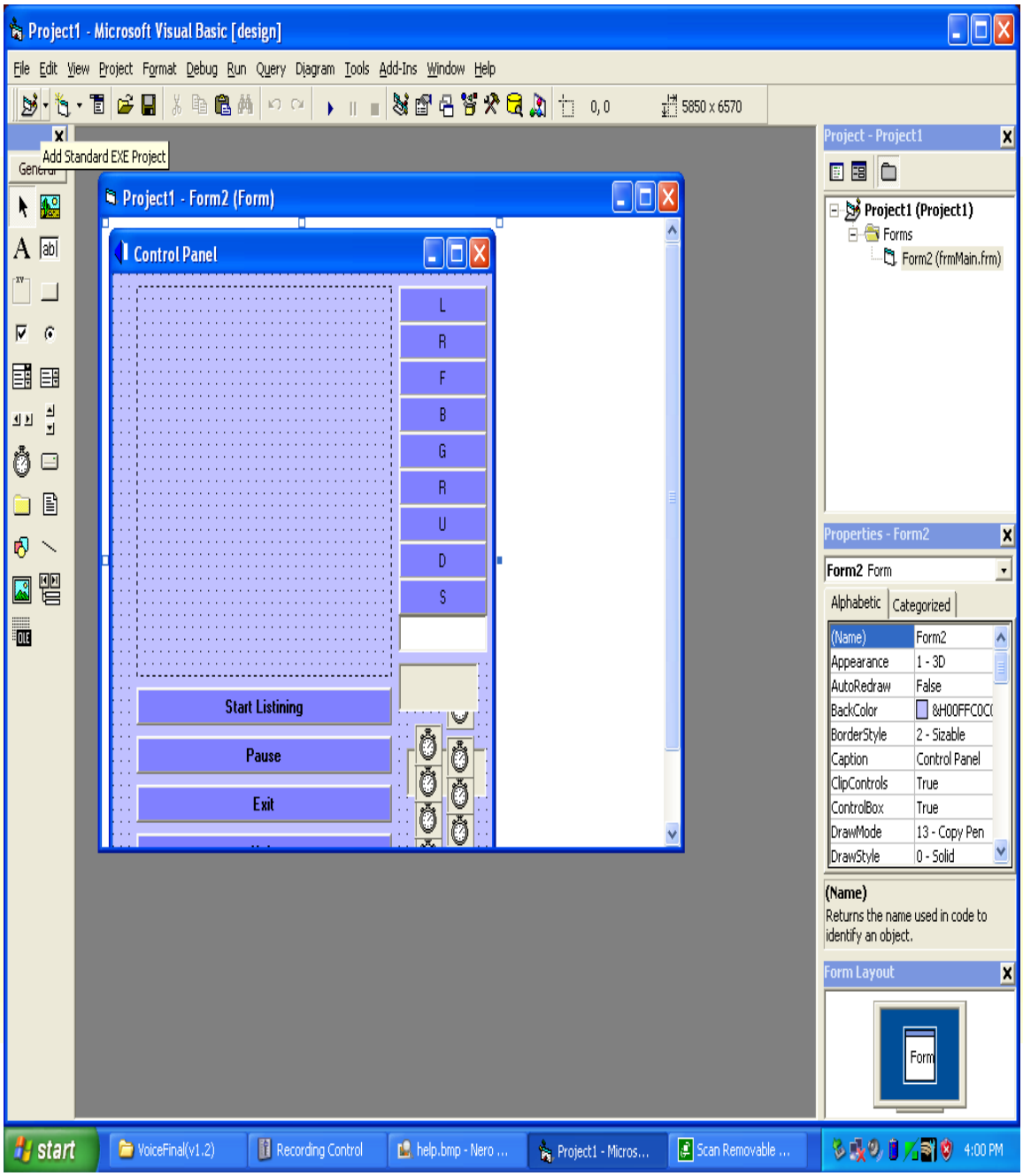
On the other hand, because users may click on certain object randomly, so each object has to be programmed independently to be able to response to those actions (events). Therefore, a VB Program is made up of many subprograms, each has its own program codes, and each can be executed independently and at the same time each can be linked together in one way or another.

VII. Different Forms

FORM 1



FORM 2


Project1 - Microsoft Visual Basic [design]
File Edit View Project Format Debug Run Query Diagram Tools Add-Ins Window Help
Add Standard EXE Project
Project1 - Form2 (Form)
Control Panel
L
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G
R
U
D
S
Start Listining
Pause
Exit
Project - Project1
Project1 (Project1)
Forms
Form2 (frmMain.frm)
Properties - Form2
Form2 Form
Alphabetic
Categorized
(Name) Form2
Appearance 1 - 3D
AutoRedraw False
BackColor
BorderStyle 2 - Sizable
Caption Control Panel
ClipControls True
ControlBox True
DrawMode 13 - Copy Pen
DrawStyle 0 - Solid
(Name)
Returns the name used in code to identify an object.
Form Layout
Form
start
VoiceFinal(v1.2)
Recording Control
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Project1 - Micros...
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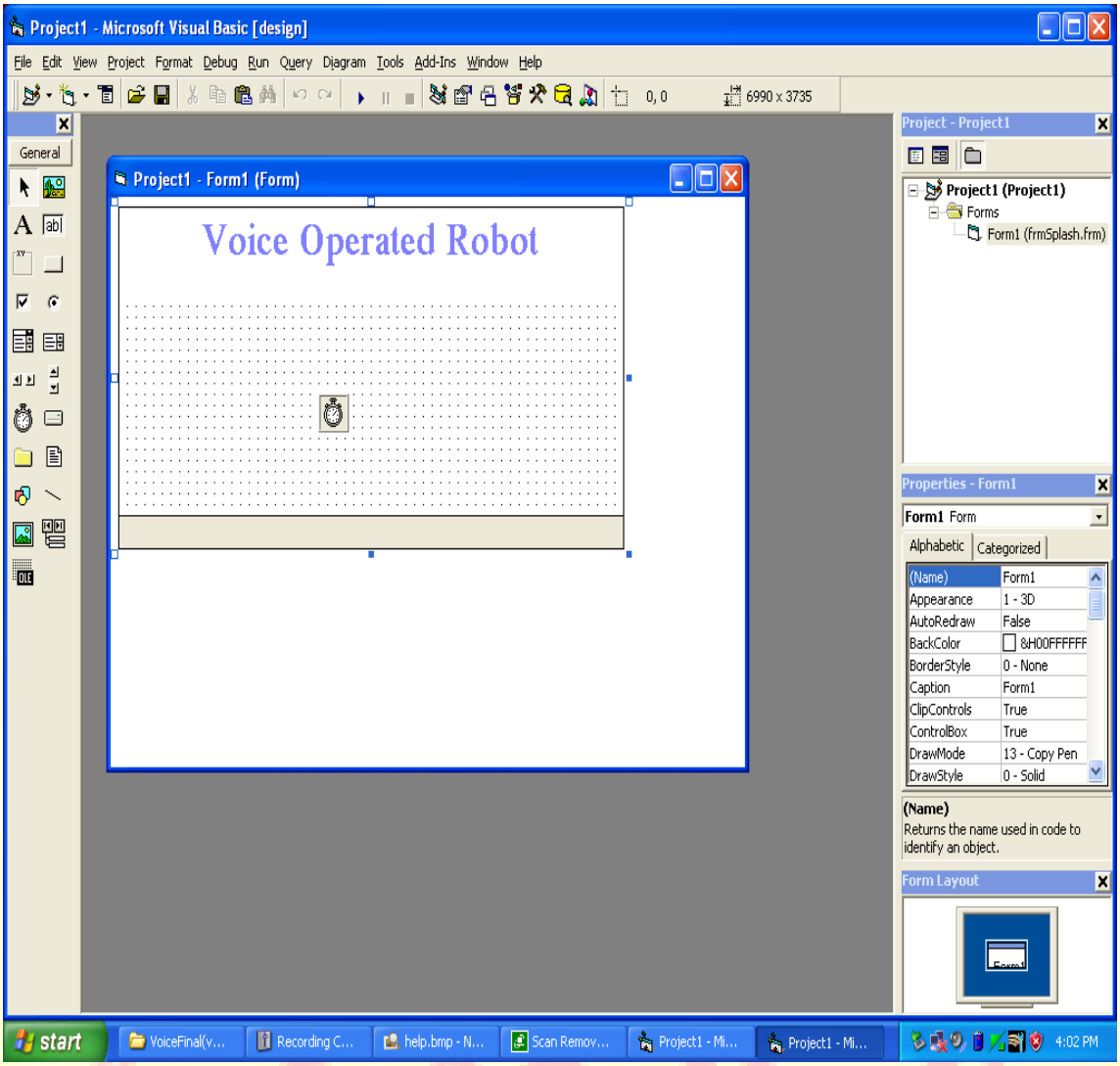
FORM 3



VIII. ADVANTAGES

- More Battery Backup
- Arm Capability 2.5Kg
- Object Lifting Ability
- Web Cam can be used
- Wireless range 200m
- Effortless, Reliable
- Anyone can handle it
- Handy to used
- Portable

IX. APPLICATIONS

1. In Hospital for handicapped &paralyzed person
2. Industrial application.
3. Laboratory application
4. In Coal Mines
5. Military application for bomb defusing purpose, etc

X. CONCLUSION

Thus, a voice controlled robot is a device that can operate on a human voice. It is a right technology that is suitable for many warehouses. It has found a great solution. For, handicapped & paralyzed person, It has developed the problem solving attitude among these people.

To stress a bit more on this, we would like to say. This robot will give you more applications in industries, in military applications for diffusing a bomb or by joining sensor or web cam on robot; it can help us in finding the place where there is fire.

XI. REFERENCES

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