



WHEEL CHAIR WITH ATTACHMENT FOR B-TYPE OXYGEN CYLINDER FOR COPD PATIENT

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Abstract:

The movement of a person from one place to another during his/her unhealthy conditions becomes a tedious task. It is required to move the patient within the hospital campus for the and helping staff.

The main objective of this wheel chair system project is recommended a wheel chair by using speech recognition module. The system is designed to control a wheel chair using the commands of person. The objective of this project is to provide the movement of the people who are disable or handicapped and early people who are not able to move well. The goal of this system will allow certain people to live a life with less dependence on other for their movement as a daily need. Speech recognition technology is a key technology which will provide a new way of human interaction with machine or tools.

Therefore, the problems that they face can be solved by using speech recognition technology for the movement of wheel chair. This can be realized and optimized with use the smart phone device as an intermediary or interface. In this project interface have been designed therefore to develop a program for commands also control the movement of chair and handle or manage the graphical commands.

Keywords: Arduino uno, servomotor, DC motors, BVM Bag.

Introduction:

In present world around 650 million people are physically challenged. Hence it is highly essential to build a system in order to make their lives happy and more flexible. An advanced wireless wheel chair system in order make physically challenged person's life's convenient and flexible. In the present project a hand gesture-based wheel chair system is developed for handicapped person, those who are partially paralyzed. In this process the physical movement of the physical movement of the hand is sensed with sensors.

The sensed signal is converted into electrical signal and then the signal is transmitted after converting Analog signal into digital signal. The designed system is enabled and working based on user hand/finger movement commands.

The low cost machine design is one of the main concerns to develop this machine. In most of the times the disable persons feel different when they need to move from one place to another place hence, depends on other persons to move from one location to another for their movement as a daily need. Speech recognition technology is a key technology which will provide a new way of humans interactions with machine or tools. Therefore, the problem that they face can be solved by using speech recognition technology for the movement of wheel chair.

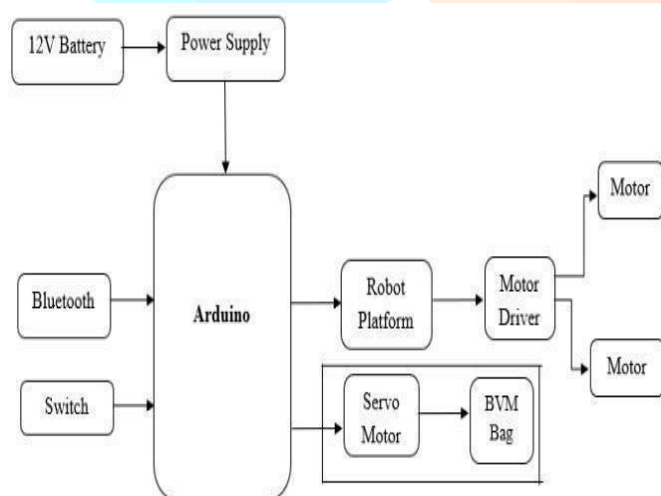
Proposed System

Firstly, the user Bluetooth application is connected with the wheelchair Bluetooth device. The user is supposed to type the specific commands through the application. Then the commands is checked and sent to Arduino. Then it processed further to controller, It check for the valid input and the gives specific instruction to the motor drive for its movement towards left, right, straight, backward otherwise stop.

Oxygen will be pumped to the patients whenever required. Switch has to be pressed so that the oxygen cylinder will open and servo will starts operating BVM Bag which provides Oxygen. Therefore, the problems that they face can be solved by using speech recognition technology for the movement of wheelchair. This can be realized and optimized with use the smart phone device as an intermediary or interface.

In this project interface have been designed therefore to develop a program for commands also controls the movement of chair and an application which can handle or manage the graphical commands.

Block Diagram:



Hardware Requirements:

- Arduino uno
- Bluetooth Module
- Servo motor
- Motor driver
- Battery

Hardware Description:

Arduino uno:

Arduino uno is very valuable addition in the electronics that consists of USB interfaces, 14 digital I/O pins,

6 Analog pins, and microcontroller It also supports serial communication using Tx and Rx pins.

There are many version of Arduino boards introduced in the market like Arduino Uno, Arduino Due, Arduino Leonards, Arduino Mega, however most common versions are Arduino Uno and Arduino mega. If you are planning to create a project relating to digitals electronics, embedded system then using Arduino Uno would be the best easy and most economical option.

Bluetooth module:

It is used for many applications like wireless headset, game controller, wireless, mouse, wireless keyboard and many more consumer applications. It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic& urban conditions.

Servo Motor:

A servo motor is a type of motor that can rotate with great precision. Normal this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motor to rotate with great precision. If u want to rotate an object at some specific angels or distance, then use a servo motor. It is just made up of a simple motor which runs through a servo mechanism.

Motor Driver:

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver acts as an interface between Arduino and the motors. The most commonly used motor driver IC's are from the L293 series such as L293D, L293NE, etc. These ICs are designed to control 2DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit of controlling a low current rated motor. Will be referring the motor driver AC as L293D only. L293D has 16 pins.

Battery:

Rechargeable batteries allow for multiple usages from a cell, reducing waste and generally providing a better long term investment in terms of dollars spent for usable device time. This is true even factory in the purchase price of rechargeable for charge. A rechargeable battery is generally more sensible and sustainable replacement to one time use

batteries, which generate current through a chemical reaction in which a reactive anode is consumed.

Software Requirements:

- Arduino IDE
- Embedded C

Arduino IDE:

Arduino IDE where IDE stands for Integrated Development Environment – An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go.

Introduction to Arduino IDE:

- Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module.
- It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process.
- It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment.
- A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more.
- Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code.
- The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board.
- The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module.
- This environment supports both C and C++ languages.

How to install Arduino IDE:

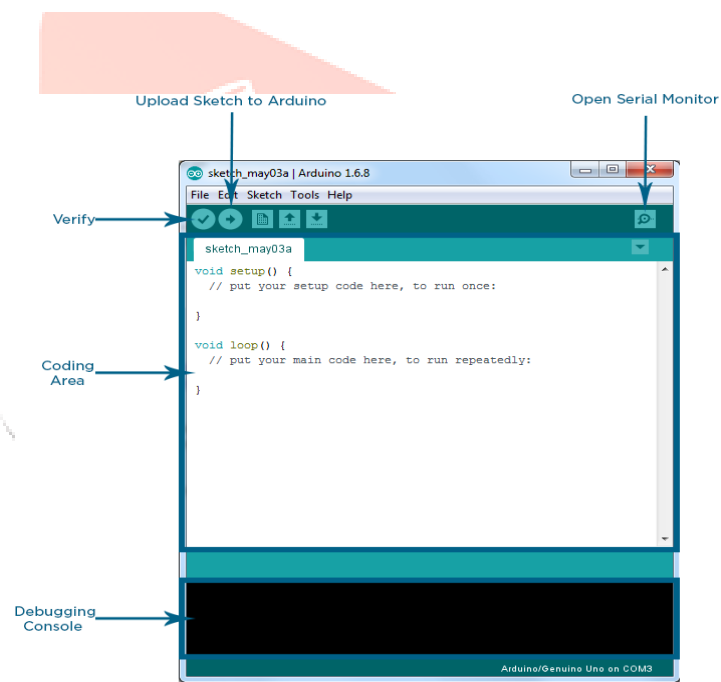
You can download the Software from Arduino main website. As I said earlier, the software is available for common operating systems like Linux, Windows, and MAX, so make sure you are downloading the correct software version that is easily compatible with your operating system.

- If you aim to download Windows app version, make sure you have Windows 8.1 or Windows 10, as app version is not compatible with Windows 7 or older version of this operating system.

The IDE environment is mainly distributed into three sections

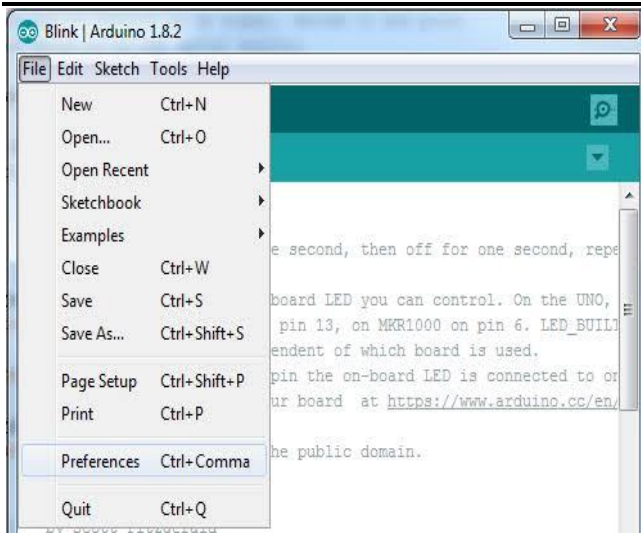
- **1. Menu Bar**
- **2. Text Editor**
- **3. Output Pane**

As you download and open the IDE software, it will appear like an image below.

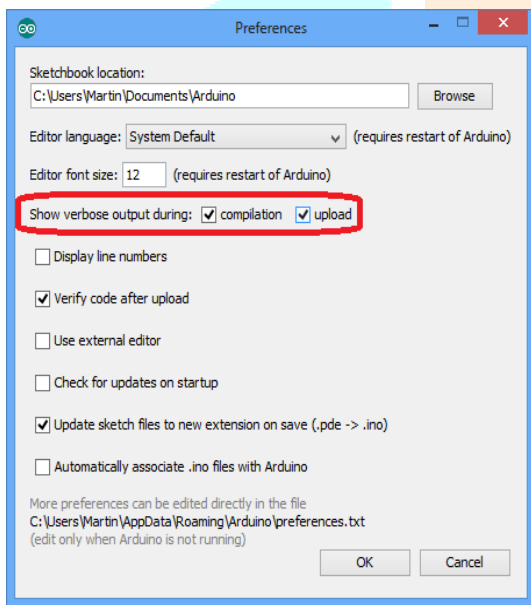


The bar appearing on the top is called **Menu Bar** that comes with five different options as follow

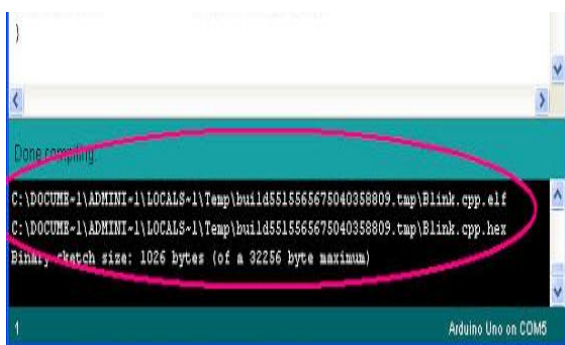
- **File** – You can open a new window for writing the code or open an existing one. Following table shows the number of further subdivisions the file option is categorized into.



As you go to the preference section and check the compilation section, the Output Pane will show the code compilation as you click the upload button.



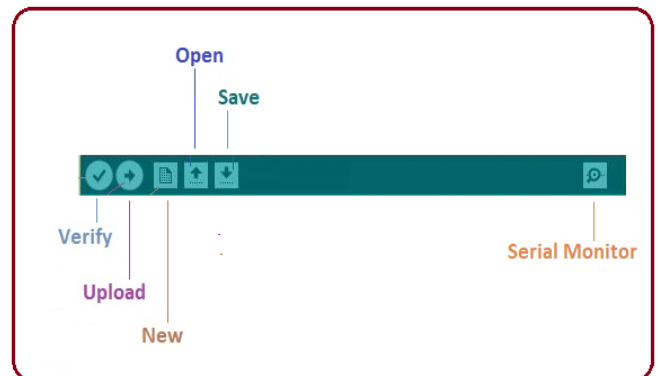
And at the end of compilation, it will show you the hex file it has generated for the recent sketch that will send to the Arduino Board for the specific task you aim to achieve.



- **Edit** – Used for copying and pasting the code with further modification for font
- **Sketch** – For compiling and programming

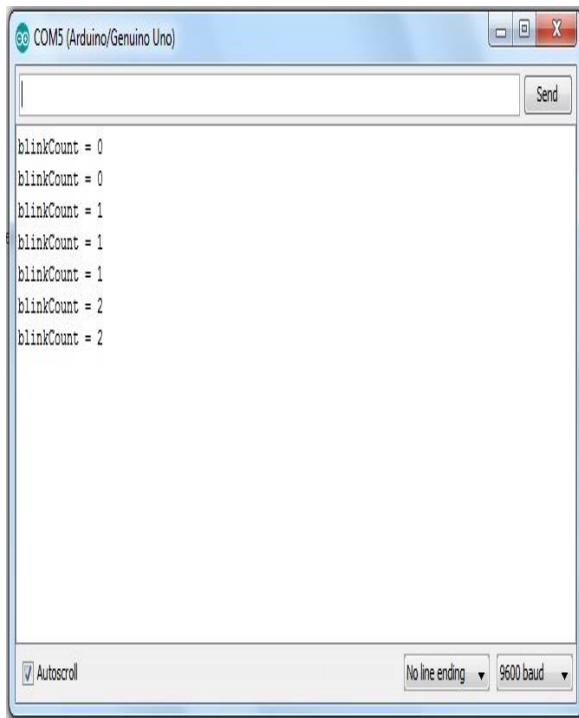
- **Tools** – Mainly used for testing projects. The Programmer section in this panel is used for burning a bootloader to the new microcontroller.
- **Help** – In case you are feeling skeptical about software, complete help is available from getting started to troubleshooting.

The **Six Buttons** appearing under the Menu tab are connected with the running program as follow.

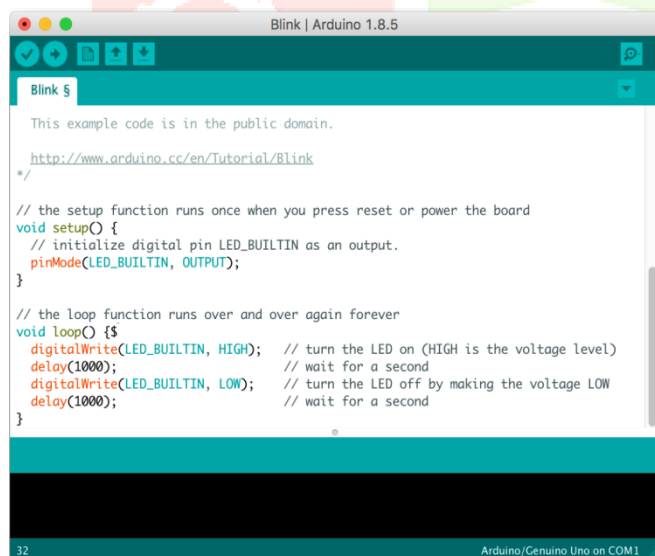


- The check mark appearing in the circular button is used to verify the code. Click this once you have written your code.
- The arrow key will upload and transfer the required code to the Arduino board.
- The dotted paper is used for creating a new file.
- The upward arrow is reserved for opening an existing Arduino project.
- The downward arrow is used to save the current running code.
- The button appearing on the top right corner is a **Serial Monitor** – A separate pop-up window that acts as an independent terminal and plays a vital role for sending and receiving the Serial Data. You can also go to the Tools panel and select Serial Monitor, or pressing Ctrl+Shift+M all at once will open it instantly. The Serial Monitor will actually help to debug the written Sketches where you can get a hold of how your program is operating. Your Arduino Module should be connected to your computer by USB cable in order to activate the Serial Monitor.
- You need to select the baud rate of the Arduino Board you are using right now. For my Arduino Uno Baud Rate is 9600, as you write the following code and click the Serial Monitor, the output will show as the image below.
- You need to select the baud rate of the Arduino Board you are using right now. For my Arduino Uno Baud Rate is

9600, as you write the following code and click the Serial Monitor, the output will show as the image below.



The main screen below the Menu bard is known as a simple text editor used for writing the required code.



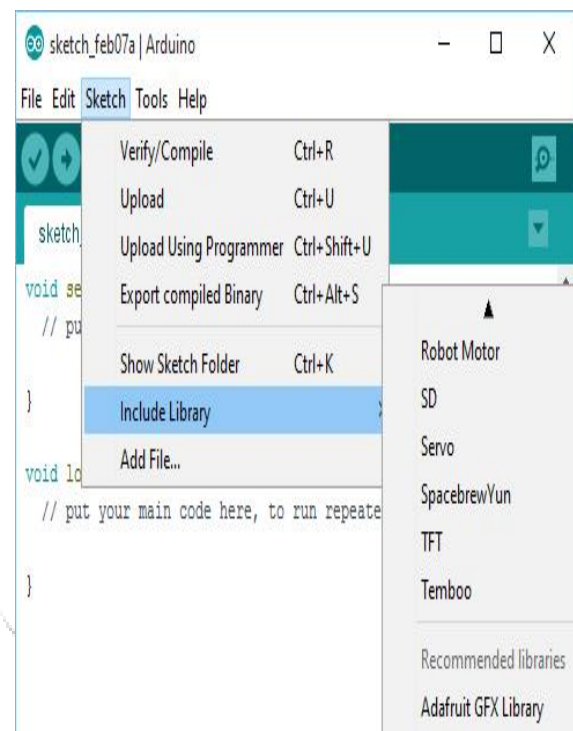
The bottom of the main screen is described as an Output Pane that mainly highlights the compilation status of the running code: the memory used by the code, and errors occurred in the program. You need to fix those errors before you intend to upload the hex file into your Arduino Module.



More or less, Arduino C language works similar to the regular C language used for any embedded system microcontroller, however, there are some dedicated libraries used for calling and executing specific functions on the board.

Libraries:

Libraries are very useful for adding the extra functionality into the Arduino Module. There is a list of libraries you can add by clicking the Sketch button in the menu bar and going to Include Library.



As you click the Include Library and Add the respective library it will on the top of the sketch with a #include sign. Suppose, I Include the EEPROM library, it will appear on the text editor as

```
#include <EEPROM.h>
```

Most of the libraries are preinstalled and come with the Arduino software. However, you can also download them from the external sources.

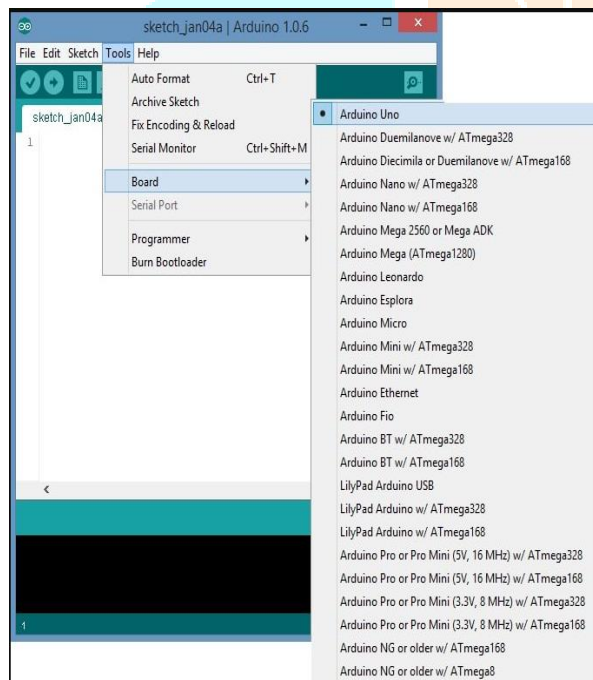
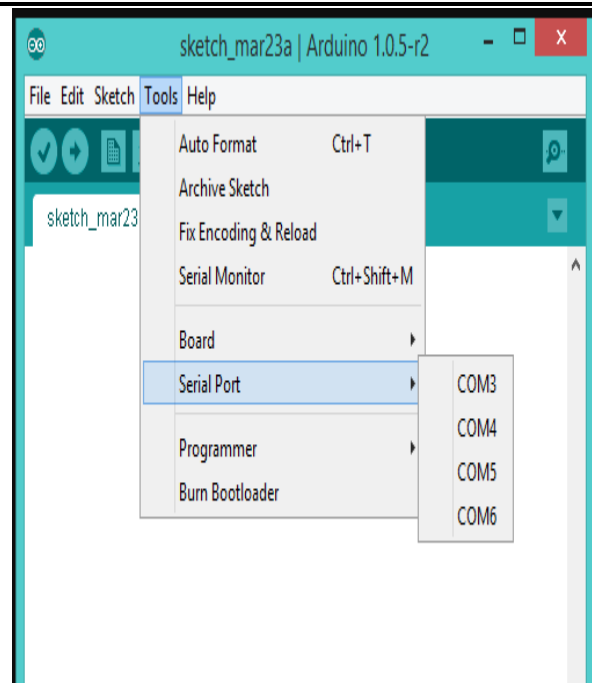
Making pins Input and output:

The `digitalRead` and `digitalWrite` commands are used for addressing and making the Arduino pins as an input and output respectively.

These commands are text sensitive i.e. you need to write them down the exact way they are given like `digitalWrite` starting with small “d” and write with capital “W”. Writing it down with `Digitalwrite` or `digitalwrite` won’t be calling or addressing any function.

How to select the board:

In order to upload the sketch, you need to select the relevant board you are using and the ports for that operating system. As you click the Tools on the Menu, it will open like the figure below.



- Just go to the “Board” section and select the board you aim to work on. Similarly, COM1, COM2, COM4, COM5, COM7 or higher are reserved for the serial and USB board. You can look for the USB serial device in the ports section of the Windows Device Manager.

Following figure shows the COM4 that I have used for my project, indicating the Arduino Uno with COM4 port at the right bottom corner of the screen.

- After correct selection of both Board and Serial Port, click the verify and then upload button appearing in the upper left corner of the six button section or you can go to the Sketch section and press verify/compile and then upload.
- The sketch is written in the text editor and is then saved with the file extension `.ino`.

It is important to note that the recent Arduino Modules will reset automatically as you compile and press the upload button the IDE software, however, older version may require the physical reset on the board.

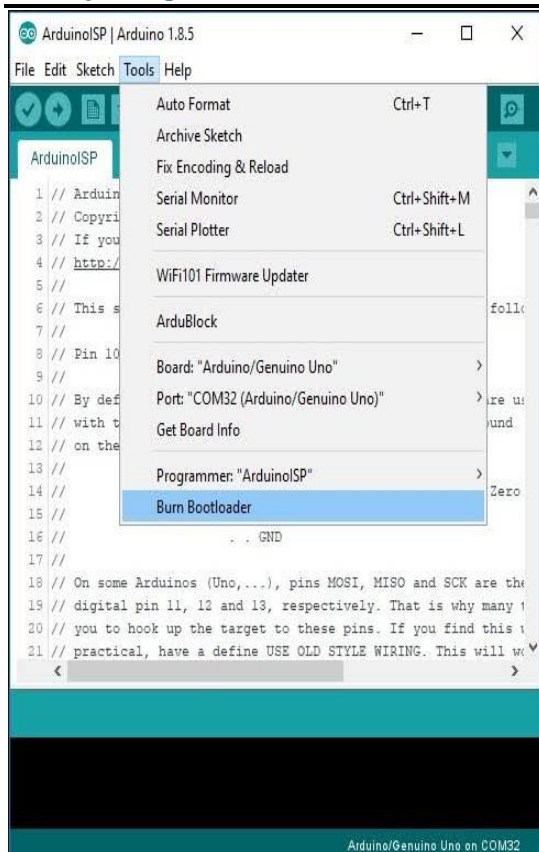
- Once you upload the code, TX and RX LEDs will blink on the board, indicating the desired program is running successfully.

Note: The port selection criteria mentioned above is dedicated for Windows operating system only, you can check this [Guide](#) if you are using MAC or Linux.

- The amazing thing about this software is that no prior arrangement or bulk of mess is required to install this software, you will be writing your first program within 2 minutes after the installation of the IDE environment.

Boot Loader:

As you go to the Tools section, you will find a bootloader at the end. It is very helpful to burn the code directly into the controller, setting you free from buying the external burner to burn the required code.



When you buy the new Arduino Module, the bootloader is already installed inside the controller. However, if you intend to buy a controller and put in the Arduino module, you need to burn the bootloader again inside the controller by going to the Tools section and selecting the burn bootloader.

Conclusion:

The wheelchair can move in accordance to the gesture given by the person who is using the wheelchair. Certain improvisation and improvement can be done to make the wheelchair more reachable to those whose body is not completely paralyzed.

Advantages:

- Can be used anyone
- Easy to used
- Very effective usage

References:

[1] Nobuyuki Otsu, the paper demonstration how the image is segmented using automatic thresholding, Here a section of optimal threshold increases the separability in levels of gray level in the obtained results (Version 4), April 2014, pp.152-158.

[2] In Julian Balcerek a video processing approach is used to help pedestrians in Vehicle detection. In the year of 1991;27:131-3.

[3] Jochen Triesch et.al a vision system was developed which is used for recognition of hand posture. The model is based on Elastic Graph Matching. Computer science has many techniques to recognize patterns. One of which is Elastic matching.

[4] In B.G Lee et. a glove kind of device is used to detect and interpret sign language. The device consists of 5 flex sensors, 2 pressure sensors and a 3-axis inertial motion sensor to differentiate the features in the ASL alphabet.

[5] In Arathi P.N et. al most of the home devices are automed and simply handled by gestures. The patterns are captured by the image capture and are used for processing. Programming part of the implementation is done using algorithms based on MATLAB.

[6] Mahaboob Ali Shaik M Prathyusha "Voice and touch screen direction and speed control so wheelchair for physically challenged using Arduino".