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Gesture Navigator Automobile

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ABSTRACT: A robot is the system which deals with construction, design and operation. This system is related to robot and their design, manufacture, application.

Robotics is currently focused on developing systems that modularity, flexibility, redundancy, fault tolerance. One of the major and most commonly performed was as the human travels their hand, the accelerometer also starts moving accordingly. Motion of the hand sensor displaces and this sensor senses object or parameter according to motion of hand. Gesture control car is a type of car that can be controlled using hand gestures instead of a traditional remote control. The car is equipped with sensors that can detect different hand gestures, such as waving, pointing, and swiping, and interpret them as commands. By using hand gestures to control the car, users can enjoy a more intuitive and immersive experience, as if they were driving a real car.

KEYWORDS: Gesture controlled, Bluetooth, Accelerometer, wireless communication.

I. INTRODUCTION

Gesture refers to the movement of a person's hands and face. The main purpose of this project is to control the car using human gestures. Human movements are detected with the help of accelerometers. It is coded to complement human gestures. People do jobs such as using dangerous chemicals, treating patients with deadly diseases such as Ebola and Corona, defusing bombs, carrying heavy objects that can cause danger in their workplaces.

So in such places people are replaced by such tools to work. This device is used to move large movements with small feet. The main purpose of this study is to control the movement of the car with gestures using accelerometers.

Traditionally, all objects can be moved by some outside force, usually people. Our project can move objects away with small hand movements. Small movements spread over large areas.

This concept can bring great comfort, convenience and physical cost reduction to daily life and work.

The direction of the car can be changed by moving the hand in one direction. This project is beneficial for people with disabilities because they can move things with their weak body. A plus for this project is the ability to control the car with an analog stick or joystick.

The robot is a system that deals with construction, design and operation.

The system is about the robot and its design, construction and use. Robotics now focuses on the creation of machines with changes, modifications, violations, and some researchers have completed the manufacturing process or tasks by providing material sensors. robot. Recent developments in the industry and workforce are crucial to achieving this goal. In order to save manpower, automation plays an important role in the system. This system is used for regular and active work.

The important and most important task is to select and place from place to place. In this system, the robot recognizes the movement of the human hand through sensors and follows the movement.

When the person moves his hand, the accelerometer starts to move the movement of the hand sensor accordingly, and the sensor detects the object or measurement according to the movement of the hand.

This is a pointing controllable car. This project has great applications especially in the field of health.

For example, a disabled person in a wheelchair can control their wheelchair using only their hands.

We know how scary it can be to meet a positive covid-19 patient or a patient we should stay away from.

This function can also be used to wirelessly open doors and deliver food to patients with just hand gestures by robots or robotic vehicles. Performing tasks such as using dangerous drugs, treating patients with deadly diseases such as Ebola and Corona, defusing bombs, carrying heavy objects in working areas can be dangerous for humans.

So in these places, people are being replaced by this car-oriented work.

This technique is used to move large movements by taking only small steps. The main purpose of this project is to control the movement of the vehicle using the accelerometer.



II.LITERATURESURVEY

Development of accelerometer and gyroscope based motion recognition sensors for manual control of an underwater remote controlled robot. The pointing device in this article is based on accelerometers and gyroscopes. The gyroscope is a sensor that detects the position of the operator's hand while working with the gyroscope attached to it. One handed. An expert can easily use the joystick to control the system, which is a bit difficult for beginners. The system has two main components, the ground station where the user uses hand movements and the ground station where the robot hand can control. Here, accelerometers and gyroscopes are embedded in the wrist joints. Display monitor, wireless mouse and keyboard. In this article, human computer communication tools are the best communication tools used for interacting with devices and other devices. In case of communication with the machine, a pointer is used as a command. Here, physical interactions must be carefully planned for user relationships that are effective and minimize rejection. Experiments involve physical interactions between humans and humanoid robots.

It gives the best result after many tests. It is user friendly and easy to operate.

The carries heavy loads with less manpower. Candidates' physical activity is important. EMG input and output record muscles wirelessly to computer. Easy to use. There are no restrictions. Performance and accuracy. In indoor work, we need to control the robot's path using gestures. The device is guessed on the microcontroller code to avoid unwanted effects of the robot. Our marking device works on the principle of a sensor that records the movement of the hand and sends this information to the comparator and provides the voltage level suitable for the movement. This information is sent to the encoder and made ready for radio frequency transmission. On the receiving side, the data is received wirelessly via RF, determined and transmitted to the microcontroller, which makes various decisions based on the received data. These decisions are communicated to the motor driver IC, which causes the different motors to move the robot in a particular direction. Gesture recognition is an important method for human computer interaction. One of the main applications of all sign language skills is language skills. In particular, much progress has been made in this area, for example, from the recognition of static or isolated actions to the recognition of regular or dynamic movements. The process of recognition of dynamic motions includes ROI segmentation, tracking of key points, feature extraction and motion classification.

Classification is the final step in the gesture recognition process and involves computer processing of information from actions or gestures and determining how the information relates to a particular point.

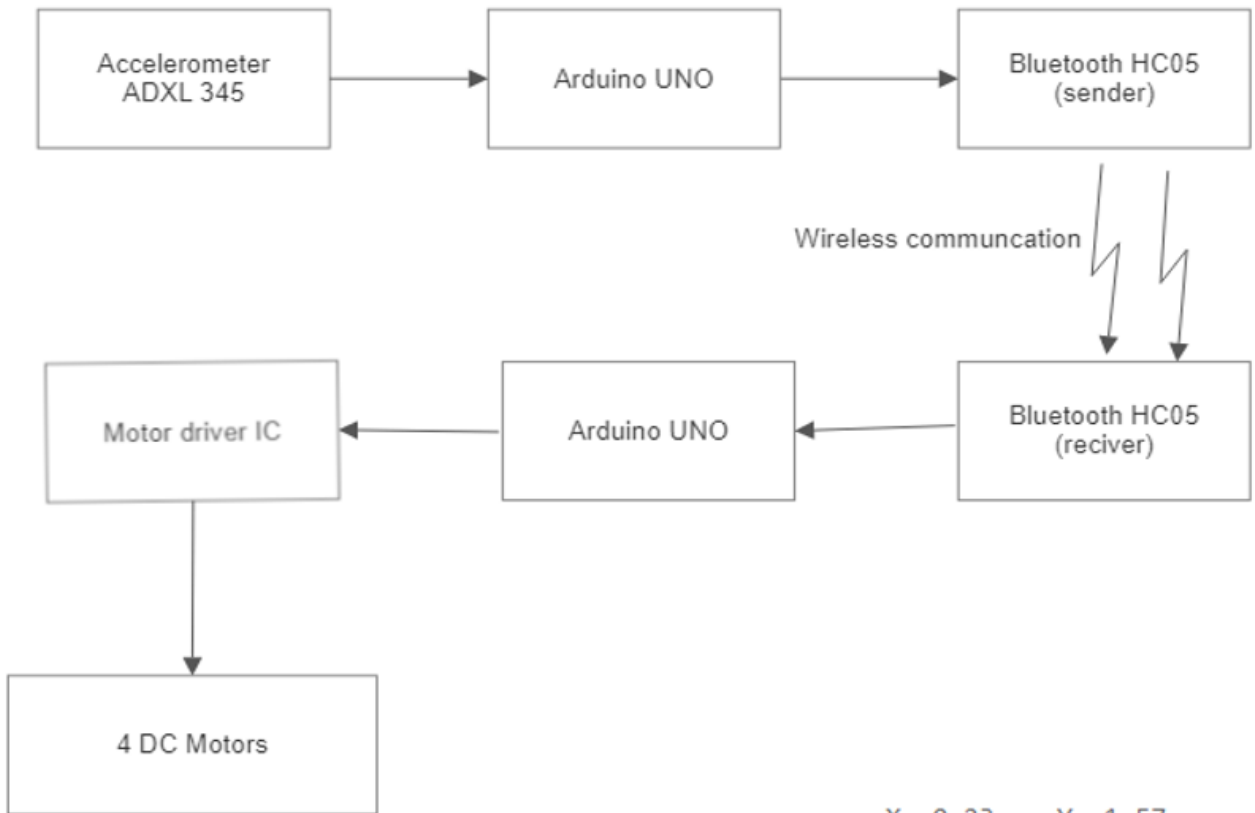
Dr. R. V. Dharaskar S.A. Chhabria Sandeep Ganorkar said that the human machine voice interface plays an important role in many application areas. Here they use a voice interface to control the robot. Human gestures are a form of human communication that can be used in many situations. Stefan Waldherr and Sebastian Thrun presented a motion interaction system to control a multirotor robot with motions. Here uses cameras to monitor people and pick up signals and robot movements. However, it allows robots to be used for monitoring and to complete routine tasks.

III. SYSTEM DESCRIPTION

In this design, a mobile robot controlled by hand movements is created. The main components of the robot are accelerometer ADXL335, Arduino UNO, Motor driver IC L293D. When the generator is energized, the accelerometer detects the input and sends it to the Arduino UNO. This data is captured by the Arduino, which also sends the relevant data to the Motor Car Circuit. According to the information obtained, the motion of the object is defined, which means that the force of the object is strong.

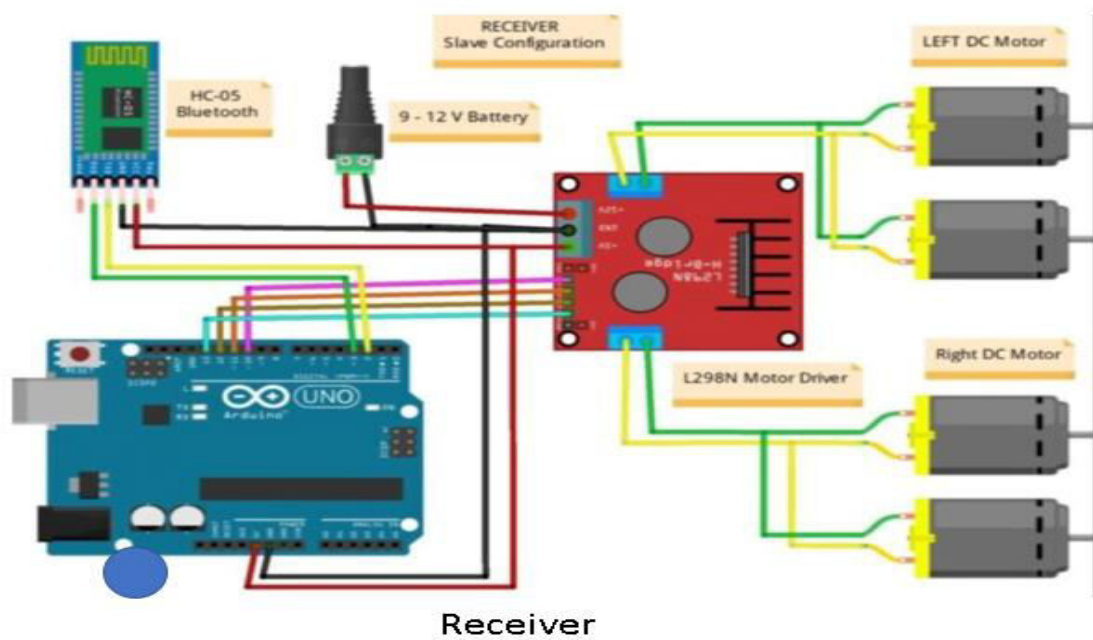
The robot moves as follows:-

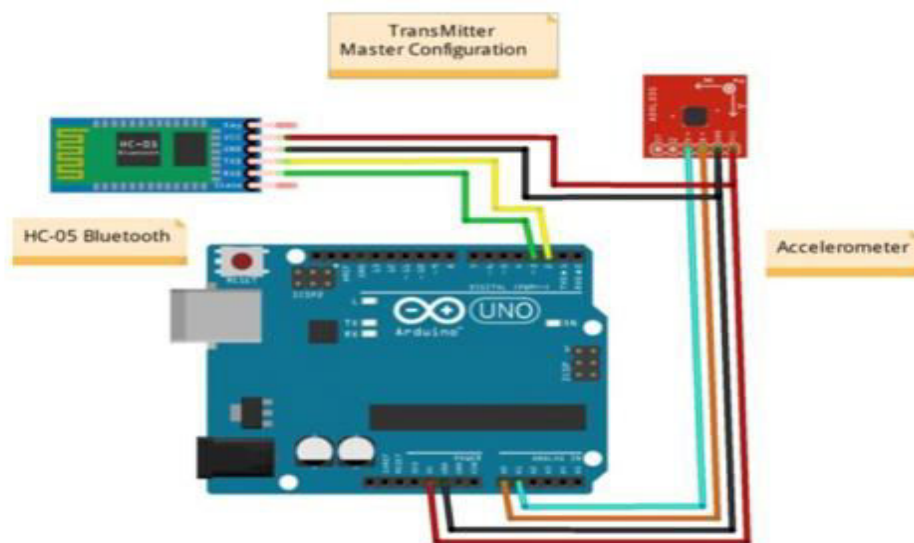
- When the X-axis of ADXL335 is less than 250, the robot moves forward.
- When the X-axis of ADXL335 is less than 300, the robot moves backwards.
- The robot moves to the left when the Y-axis of ADXL335 is less than 250.
- The robot moves to the right when the Y-axis of ADXL335 is less than 300.
- Robot stops moving when ADXL335's X-axis becomes 250.



X= 0.23 Y= 1.57

Fig:-Block Diagram





Transmitter

Fig:-Circuit Diagram

IV.HARDWARE DESIGN

1) Arduino UNO :

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital I/O pins, 6 analog I/P, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header, and a reset button. Arduino Uno can be programmed using the Arduino IDE, and it can communicate with other devices using different communication protocols such as UART, SPI, and I2C.

Arduino Uno is a microcontroller board based on the ATmega328P. It is widely used in various projects due to its flexibility and ease of use. In a project, Arduino Uno can be used as the brain of the system to control and monitor various sensors and actuators.

To use Arduino Uno in a project, you would first need to write a program in Arduino IDE (Integrated Development Environment) or any other compatible programming environment, which will define the behavior of the board.

The program is written in a language similar to C++, and it can be uploaded to the Arduino Uno using a USB cable.

Once the program is uploaded, the Arduino Uno will execute the program and interact with various sensors and actuators connected to it through its input/output pins. The Arduino Uno can read inputs from sensors such as accelerometers and gyroscopes, and based on the programmed logic, it can control the behavior of output devices such as motors, LEDs, and displays. Overall, Arduino Uno is a versatile microcontroller board that can be used in a wide range of projects to control and monitor various components.

2) Accelerometer (ADXL345):

The movement of the robot is determined based on the gestures made by the hand. If the X-axis of the accelerometer sensor is less than 250, the robot moves forward. If it is greater than 300, the robot moves backward. Similarly, if the Y-axis of the accelerometer sensor is less than 250, the robot moves left, and if it is greater than 300, the robot moves right. If the X-axis of the accelerometer sensor is between 250 and 300 and the Y-axis of the accelerometer sensor is between 250 and 300, the robot stops moving.



Accelerometers are sensors that measure acceleration in a particular direction. They detect changes in motion, speed, and direction, and can provide valuable information for various applications, such as robotics, gaming, and navigation systems. Accelerometers work based on the principle of capacitance. They consist of a small mass connected to a spring that is surrounded by two electrodes. When the accelerometer experiences acceleration, the mass inside moves and causes a change in the distance between the electrodes, resulting in a change in capacitance. This change is then detected by an electronic circuit, which converts it into an electrical signal that can be used for further processing.

In the context of a robotic project, an accelerometer can be used to detect changes in orientation or motion of the robot. For example, it can be used to detect if the robot is moving forward or backward, or if it is tilting to one side or the other. This information can then be used to control the movement of the robot.

In order to use an accelerometer in a project, it is necessary to interface it with a microcontroller or other electronic circuitry. The Arduino platform, for example, provides a simple way to interface with various sensors, including accelerometers, using its built-in analog and digital input/output pins. The accelerometer sensor is connected to the microcontroller through these pins, and the microcontroller reads the signal from the sensor and processes it to determine the orientation or motion of the robot. In conclusion, the hand gesture-controlled robot project is a simple yet innovative project that can be used for various applications. The system is designed to control the robot using hand gestures, which makes it user-friendly and interactive. The system can be further extended by adding more features and functionalities, such as obstacle avoidance and remote control.

3) HC-05 Bluetooth Module:

The HC-05 Bluetooth module is a wireless communication module that allows the Arduino Uno to communicate with other devices over a Bluetooth connection. It operates on a voltage range of 3.3V to 5V and has a communication range of up to 10 meters. It supports UART communication and can be easily interfaced with the Arduino Uno using its serial communication pins.

In this project, the HC-05 Bluetooth module is used to receive the motion data from the accelerometer attached to the user's hand and transmit this data wirelessly to the Arduino Uno. This allows the user to control the motion of the robotic car using hand gestures without the need for any physical connection between the user and the car.

4) Motor driver L293D :

The motor driver circuit used in the system is L293D, which is a dual H-bridge motor driver IC. It can drive two DC motors at the same time and control their direction and speed. The L293D motor driver circuit receives the input signals from the Arduino Uno and accordingly drives the DC motors in different directions. The L293D is a popular motor driver IC that is widely used in robotics and other electronic projects to control DC motors. It is designed to provide bidirectional control of two DC motors, or a single stepper motor, by using pulse-width modulation (PWM) signals. The L293D is capable of driving up to 600 mA of current per channel and can handle a voltage range of 4.5V to 36V.

The L293D motor driver IC has 16 pins, which are divided into two halves. The left-hand side of the IC contains pins 1-8 and is responsible for controlling the first motor, while the right-hand side of the IC contains pins 9-16 and controls the second motor.

Here is a brief explanation of the function and working of the L293D motor driver circuit:

- a) Input Pins: Pins 2, 7, 10, and 15 are the input pins of the L293D IC. These pins are used to provide control signals to the motor driver circuit.
- b) Output Pins: Pins 3, 6, 11, and 14 are the output pins of the L293D IC. These pins are connected to the motor and provide the output voltage for the motor.
- c) Enable Pins: Pins 1 and 9 are the enable pins of the L293D IC. These pins are used to enable or disable the output of the motor driver circuit.
- d) VCC Pins: Pins 16 and 8 are the VCC pins of the L293D IC. These pins are used to provide power to the IC. The VCC pin should be connected to a 5V power supply in most cases.
- e) Ground Pins: Pins 4 and 5 are the ground pins of the L293D IC. These pins should be connected to the ground of the circuit.



- f) The working of the L293D motor driver circuit is simple. The input signals received at the input pins of the IC are processed and amplified to produce the output signals at the output pins. These output signals are used to drive the motors in either direction.
- g) To drive a motor in one direction, the two input pins for that motor must be driven high, while the other two input pins must be driven low. To drive the motor in the opposite direction, the input pins must be reversed. The PWM signals can be used to vary the speed of the motor.
- h) In summary, the L293D motor driver IC is a popular choice for controlling DC motors in electronic projects. It is a simple and effective way to drive motors in either direction and to vary their speed using PWM signals.

5) DC motor :

DC motors are used to provide motion to the robot. They are powered by a power supply and controlled by the motor driver circuit. The system uses four DC motors, which are connected to the motor driver circuit. Two motors are used to control the forward and backward motion of the robot, and the other two motors are used to control the left and right motion of the robot.

DC motors are electrical devices that convert electrical energy into mechanical energy. They operate by using the principle of electromagnetism, where a magnetic field is created by the interaction of an electrical current with a magnetic field. A basic DC motor consists of two main parts: the stator and the rotor. The stator is the stationary part of the motor and contains the permanent magnets or field coils that create the magnetic field. The rotor is the rotating part of the motor and consists of a shaft and a commutator, which is a set of conductive segments that allow the current to flow to the armature coils.

When current is applied to the armature coils, a magnetic field is created around them, which interacts with the magnetic field of the stator. This interaction causes a force to be exerted on the rotor, which causes it to rotate. The direction of rotation can be controlled by reversing the direction of the current flow through the armature coils. DC motors can be controlled in a number of ways, including using pulse width modulation (PWM) to control the speed of the motor. In this method, the average voltage applied to the motor is varied by changing the duty cycle of the PWM signal. Additionally, motor controllers such as the L293D can be used to control the direction and speed of the motor.

The system works as follows. When the robot is powered on, the accelerometer sensor senses the input and transmits it to the Arduino Uno. The Arduino Uno receives the input and processes it based on the defined logic. The processed data is then transmitted to the motor driver circuit, which drives the DC motors accordingly.

V. SOFTWARE

a) Arduino IDE :

The Arduino IDE (Integrated Development Environment) is a software application used to develop code for Arduino microcontroller boards. Arduino is an open-source platform that provides a flexible and easy-to-use hardware and software platform for building various electronic projects. The IDE is a software tool that allows you to write and upload code to the Arduino board, making it easy for users to create and program their own electronic devices without needing an extensive background in electronics or programming.

The Arduino IDE provides a text editor with various features such as syntax highlighting, auto-completion, and error detection. It also includes a library manager that allows users to easily add external libraries to their projects. Additionally, the IDE comes with a serial monitor that allows users to interact with their projects in real-time and debug any issues that may arise. The Arduino IDE is available for Windows, macOS, and Linux, and can be downloaded for free from the Arduino website. It has become a popular tool for hobbyists, students, and professionals who want to build and prototype electronic projects quickly and easily.

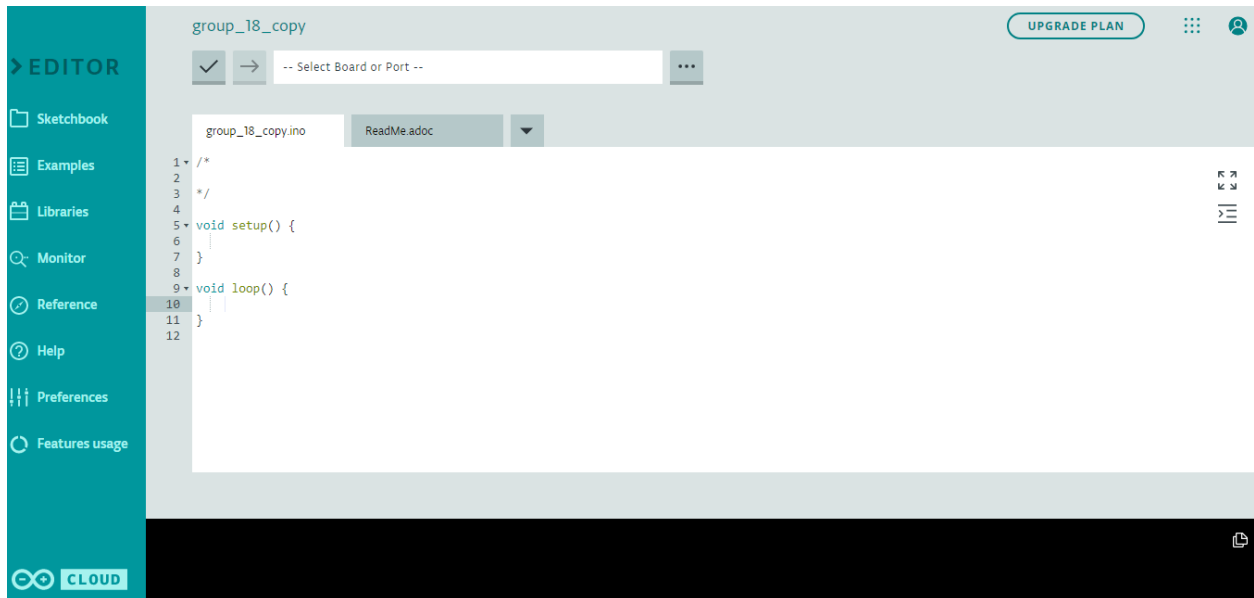


Fig : Arduino IDE

b) Smartdraw:

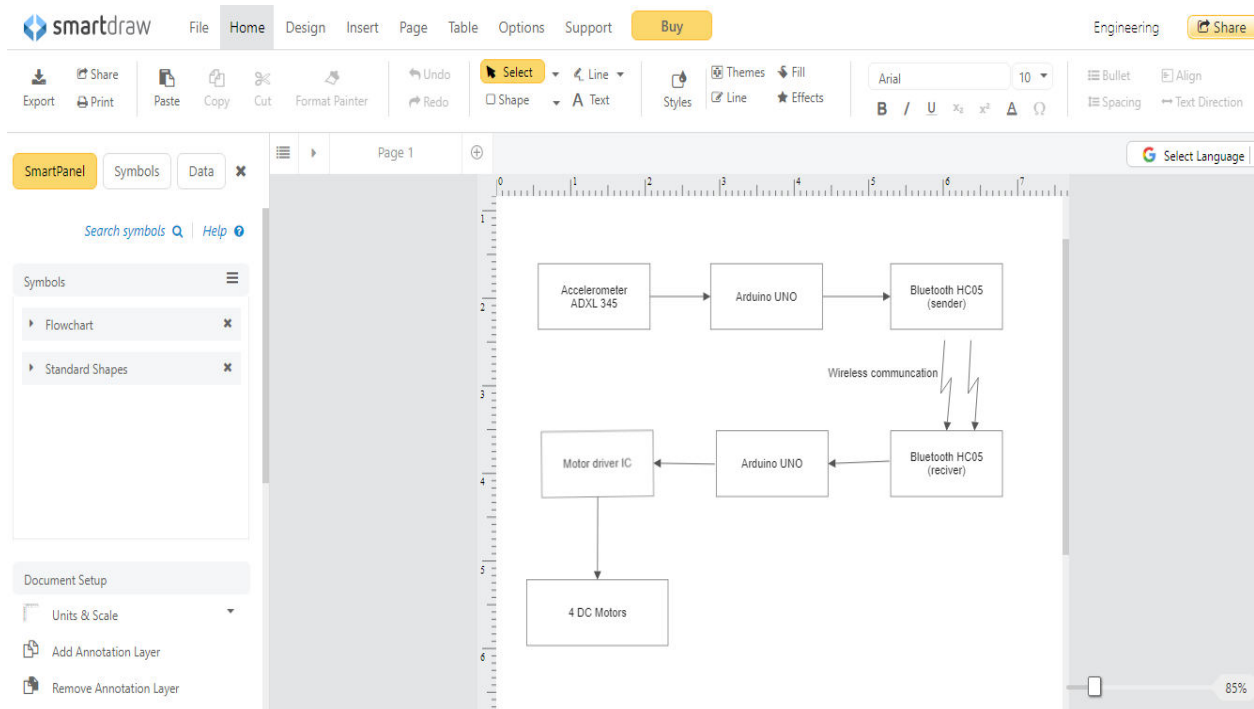


Fig : Smart Draw for Block diagram

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