Project documentation

- -MAHADEV SHARMA (7519341)

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• Purpose of project: -

To design a PCB layout which could connect and operate all the interfaces such as:

1. **First of all we will decide definition of project.**
2. **Block diagram of project**
3. **Costing of components**
4. **Schematic of project**
5. **To make PCB layout using Altium**
6. **Fabricate the PCB**
7. **Properly assemble the PCB**
8. **Testing and debugging the project**

• Scope of the project: -

This project is designed to solve the problems that are faced while working and building a circuit with too many components on a bread board.

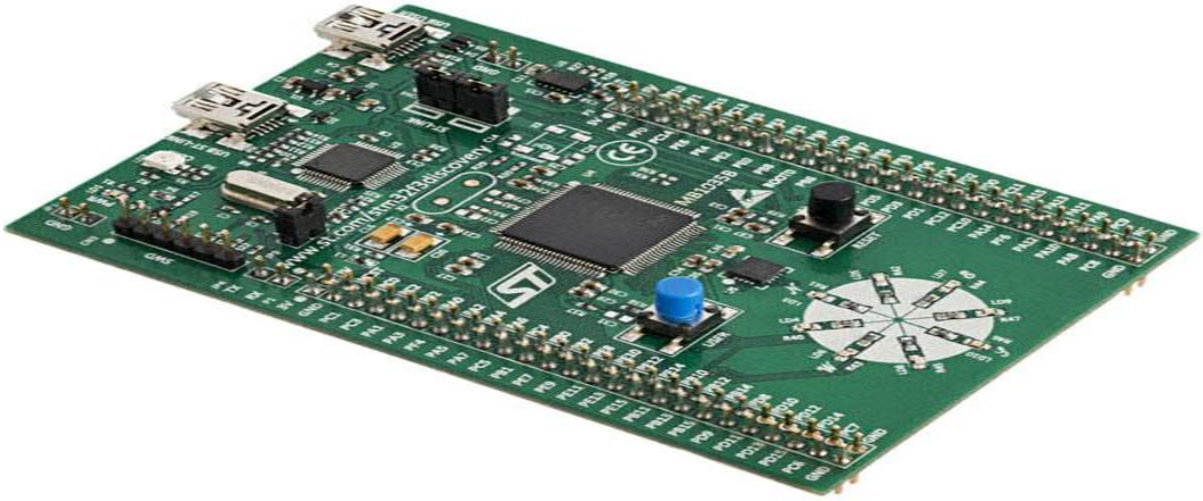
• Intended audience:-

Proff.Jarabek

- **Description of solution: -**

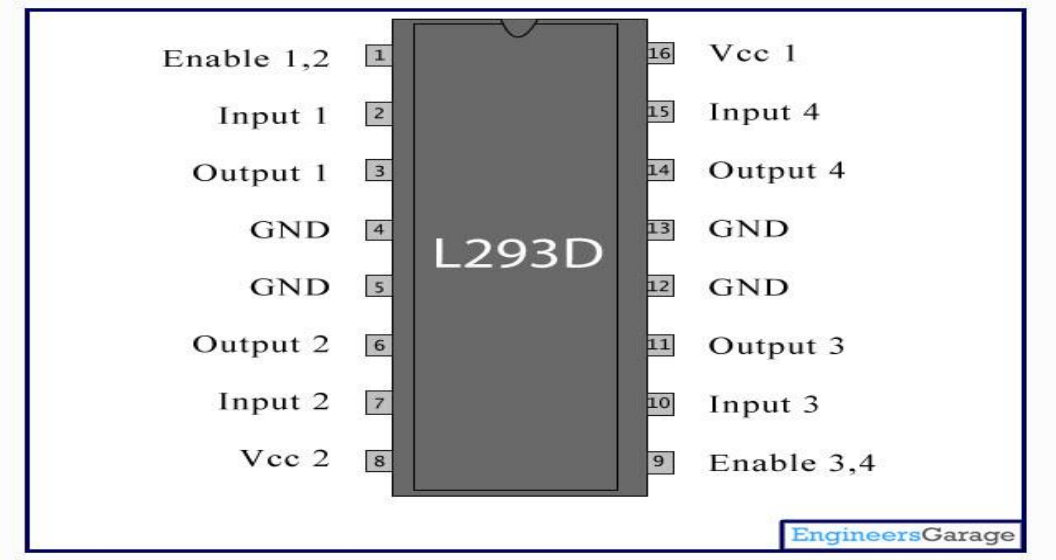
STM32F3 DISCOVERY BOARD:

It includes accelerometer, gyroscope, USB connection, led and push buttons. STM32F303VCT6 microcontroller having 256- kb of flash and 48-kb RAM. We are using type "C" board. It works on 5v DC external supply from USB cable. It has ten led for different purpose. Two push buttons one is assigned for user and other is assigned for reset.



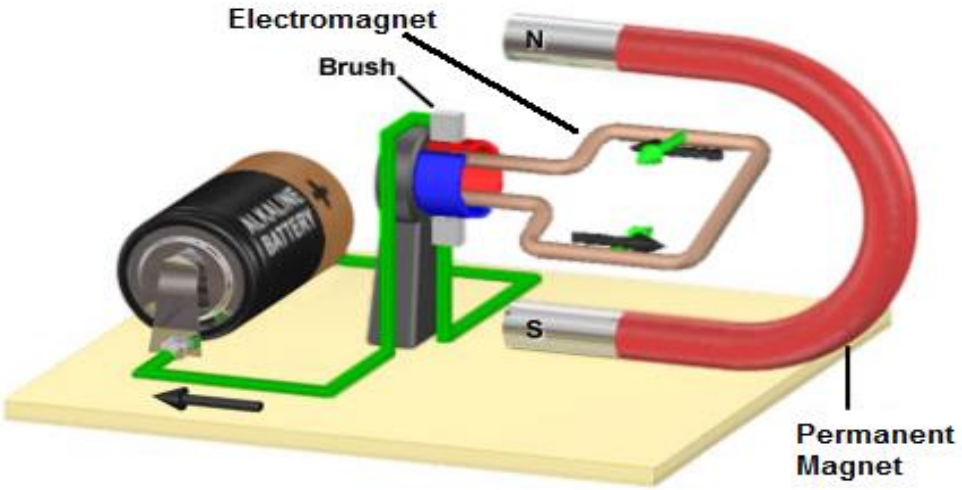
H-BRIDGE DRIVER:

L293D is a dual H-bridge motor driver integrated circuit. Motor drivers act as current amplifiers, they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors, relays , solenoid , bipolar stepping motores.L293D is designed to provide bi-directional drive currents up to 600 amp at voltage from 4.5v to 36 voltages.



DC MOTOR:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.



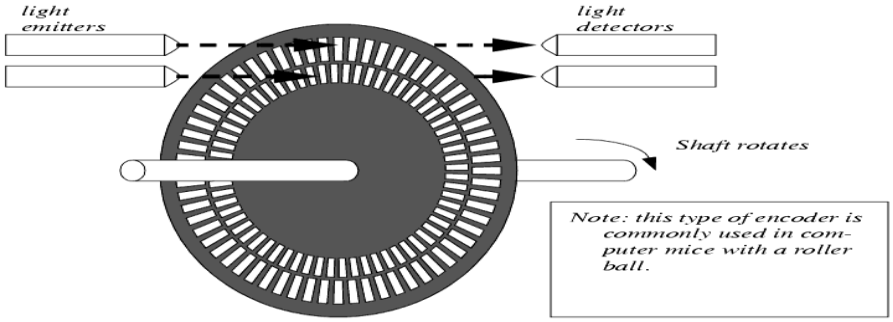
STEPPER MOTOR:

Stepper motors are DC motors that move in discrete steps. They have multiple coils that are organized in groups called "phases". By energizing each phase in sequence, the motor will rotate, one step at a time.

With a computer controlled stepping you can achieve very precise positioning and/or speed control. For this reason, stepper motors are the motor of choice for many precision motion control applications.

QUADRATURE ENCODER:

These encoders uses phototransistors and led to track the position of shaft. When more resolution is needed, it is possible for the counter to count the leading and trailing edges of the quadrature encoder's pulse train from one channel ,which doubles the number of pulses per resolution.



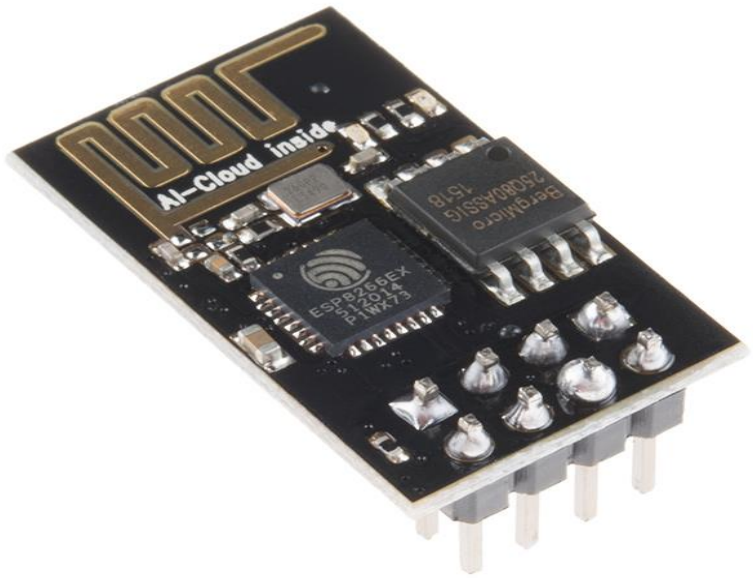
PWM CONTANT CURRENT MICROSTEPPING DRIVER:

The LV8731 is a 2-channel H-bridge driver IC that can switch a stepper motor driver, which is capable of micro-step drive and supports 4W 1-2 phase excitation, and two channels of a brushed motor driver, which supports forward, reverse, brake, and standby of a motor. It is ideally suited for driving brushed DC motors and stepper motors used in office equipment and amusement applications.

CHARACTER LCD: **We used 16*2 character LCD. It works on +5Vdc.**

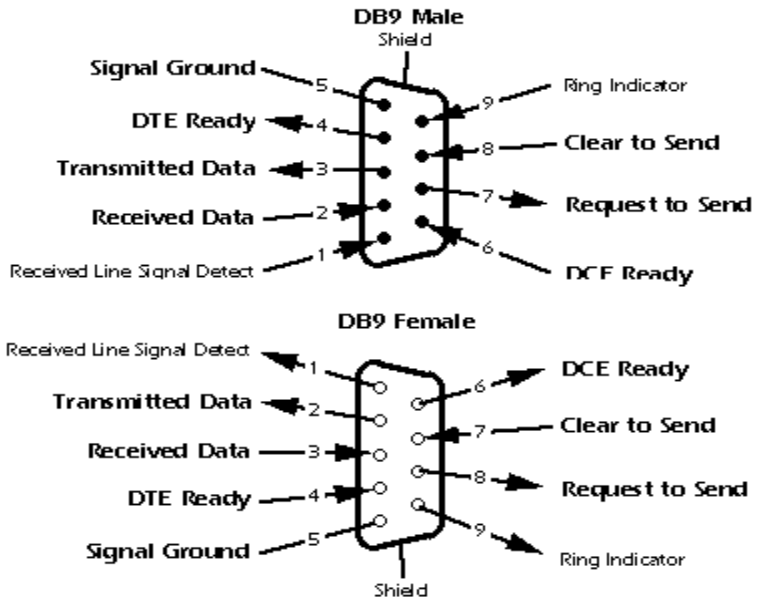
WIFI MODULE (ESP 8266):

The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware. It has 3-GPIO pins and 1-reset pin, top left GRD and bottom right 3.3v DC

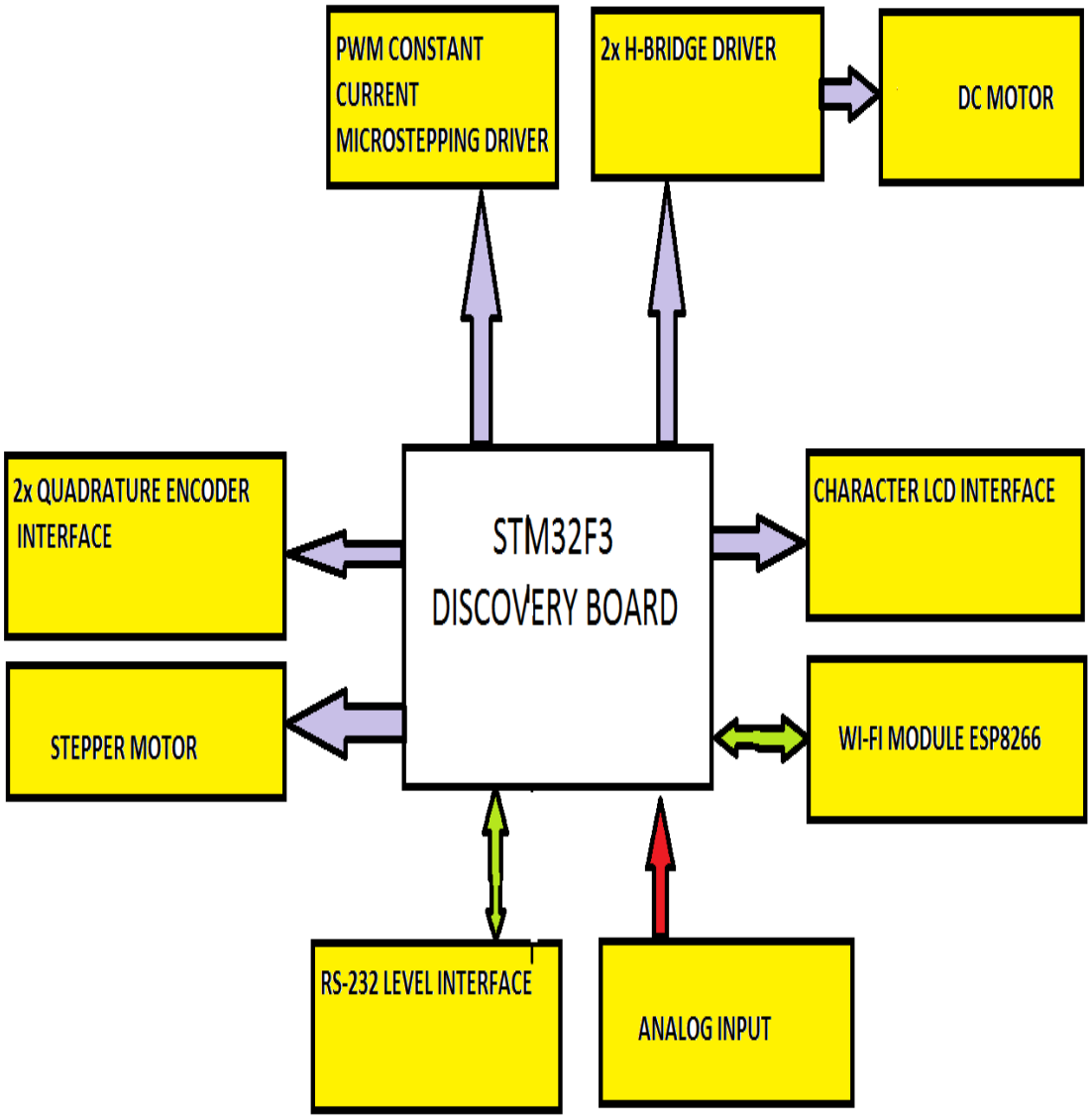


RS-232 LEVEL INTERFACE:

In telecommunications, RS-232 is a standard for serial communication transmission of data. It formally defines the signals connecting between a DTE (data terminal equipment) such as a computer terminal, and a DCE (data circuit-terminating equipment or data communication equipment), such as a modem. The RS-232 standard is commonly used in computer serial ports.



- **Block diagram of solution: -**



- ## Estimated cost breakdown: -

Serial number	Component	Units	Price of component
1.	Resistors	10	$0.15
2.	Capacitors	10	$0.15
3.	Inductors	5	$0.65
4.	LED	5	$1.00
5.	Servo DC motor	2	$7.00
6.	Stepper Motor	1	$10.00
7.	LV8727	1	$15
8.	2x H-bridge driver	1	$1.87
9.	Quadrature encoder	1	$1.5
10.	RS -232	1	$4.00
11.	Wi-fi module ESP8266	1	$3.00

- ## Team members

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2.Mahadev Sharma (7519341)

- ## Background information

https://learn.sparkfun.com/tutorials/pcb-basics

Altium software

http://www.st.com/en/evaluation-tools/stm32f3discovery.html

http://www.engineersgarage.com/electronic-components/l293d-motor-driver-ic

- ## References

1.Digi-key electronics

2.Ebay.com