AIR UNVERSITY

DEPARTMENT OF MECHATRONICS ENGINEERING

H-BRIDGE CIRCUIT

GROUP MEMBERS

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SUBMITTED TO

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SPRING 2023

ABSTACT

THIS semester project is related to dc motor and directional control. An H-Bridge will allow us to control direction of motors in RC Cars or other machines. In the future we can try to reduce its size as much as we can and use our own H-Bridges in Our RC Cars etc. As its applications are already discussed above so, we have a lot of idea about it.

Our project is in working condition and gave a lot of experience and got us better at stuff.

CONTENTS

1 INTRODUCTION

1.1 Definition

“An H-bridge is an electronic circuit that switches the polarity of voltage applied to a load. These circuits are often used in robotics and other applications to allow DC motors to run **forwards** or **backwards**. The name is derived from its common schematic diagram representation, with four switching elements configured as the branches of a letter **"H"** and the load connected as the cross-bar**”**

1.2 Starting Information

We were asked to design an H bridge circuit to control the direction of a motor with optical isolation and flyback diode, the motor runs at 9V and draws a maximum of 2A current. The motor is to operate continuously for 15 minutes.

We only knew that an H-Bridge is used in RC cars or other motor controlled devices and is used to switch the direction of motor that is clockwise or anti clockwise

1.3 Design Plan

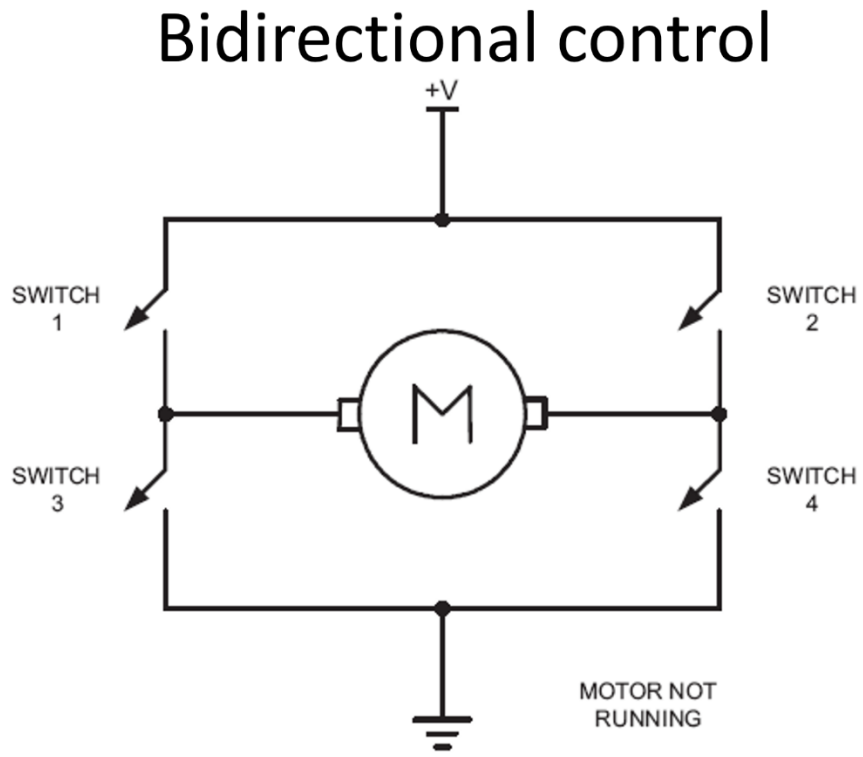
We planned to design this circuit using mosfets as it was providing the best voltages and the design was easy execute and we wanted to try something new. Before that I tried to make designs using BJTs but they were not up to the

expectations so I designed it using mosfets and it worked incredibly well so, we proceeded with this design.

2 Simulation And Components

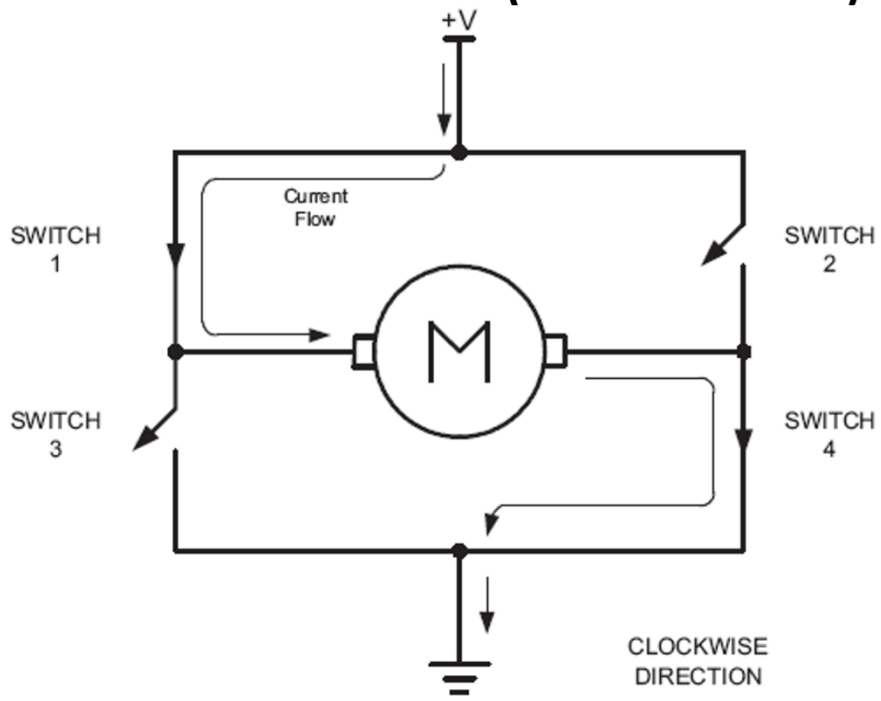
2.1 Initial Design

To Start with the Project, we got the initial design provided as following:



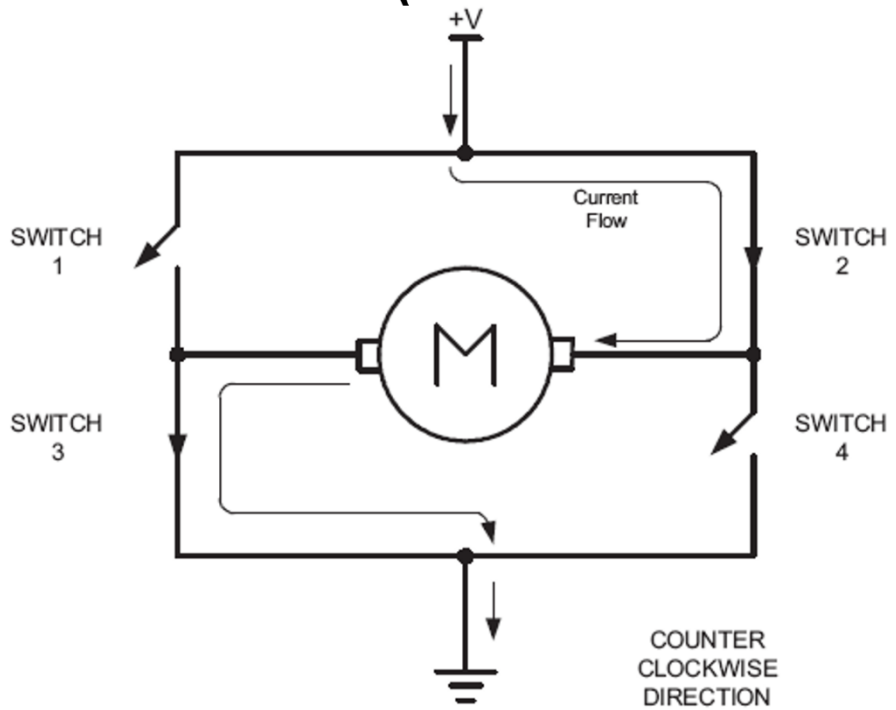
87

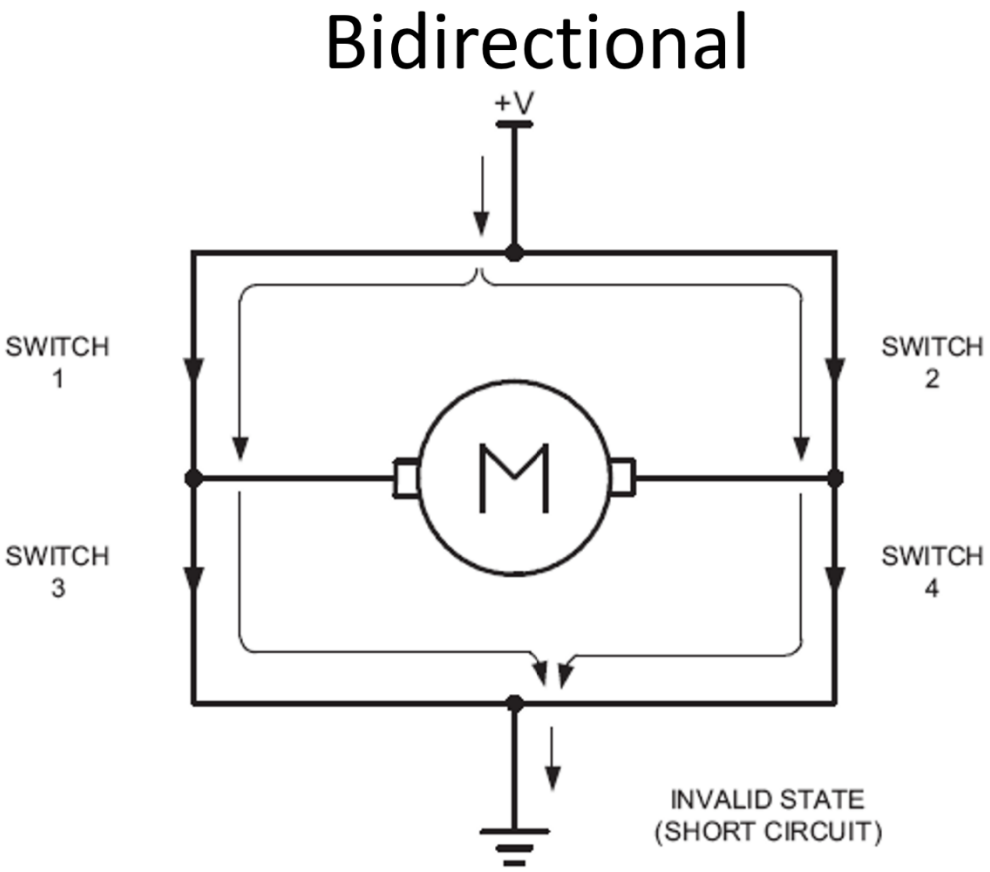
Bidirectional (clock wise)



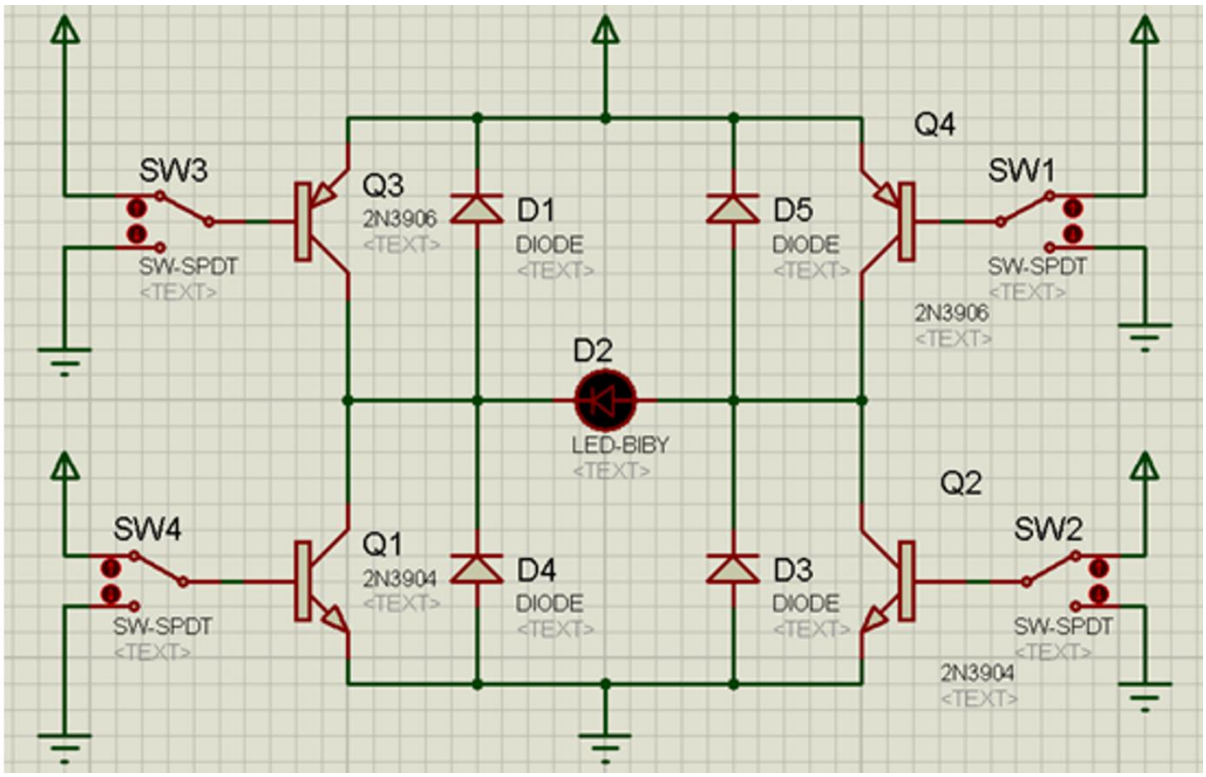
88

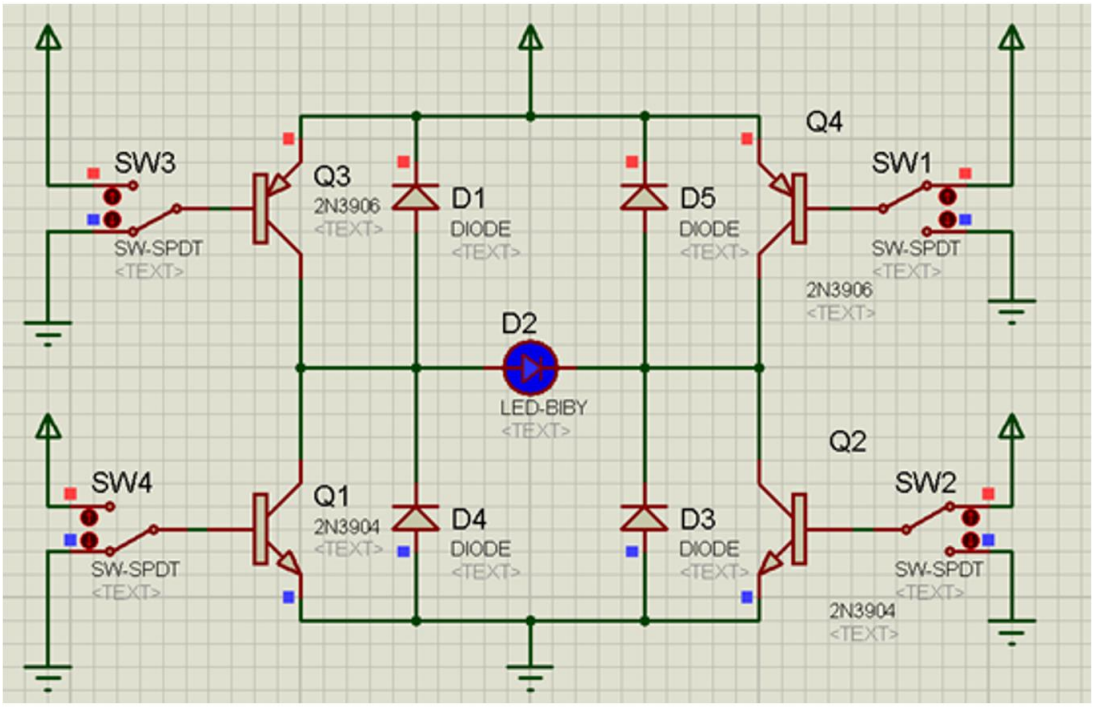
Bidirectional (counter clockwise)



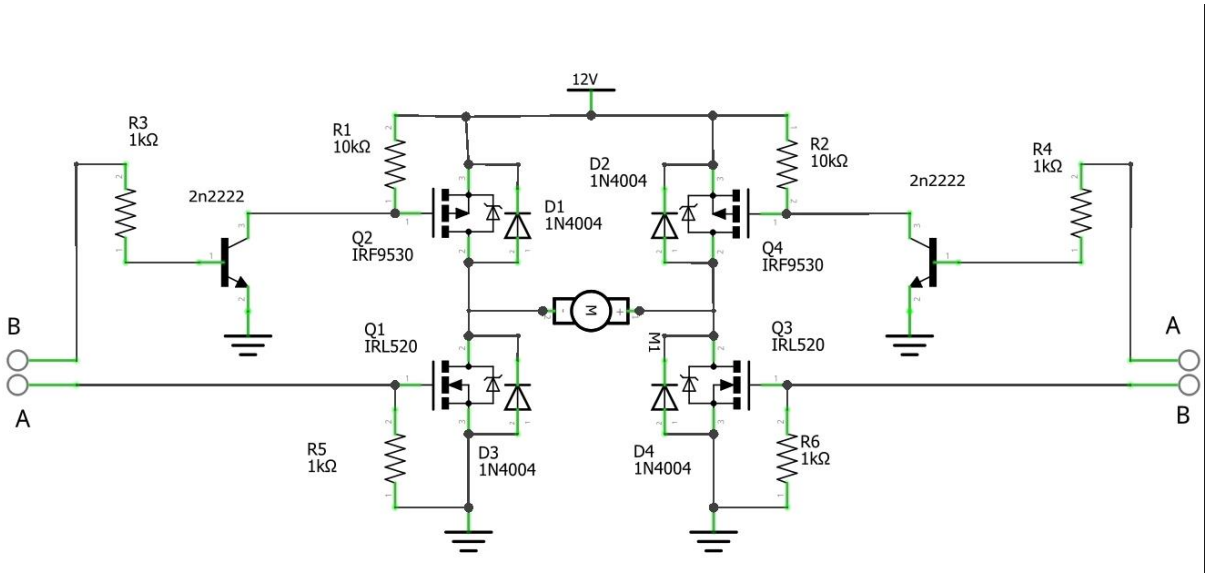


The Initial Schematic Was As Follows:



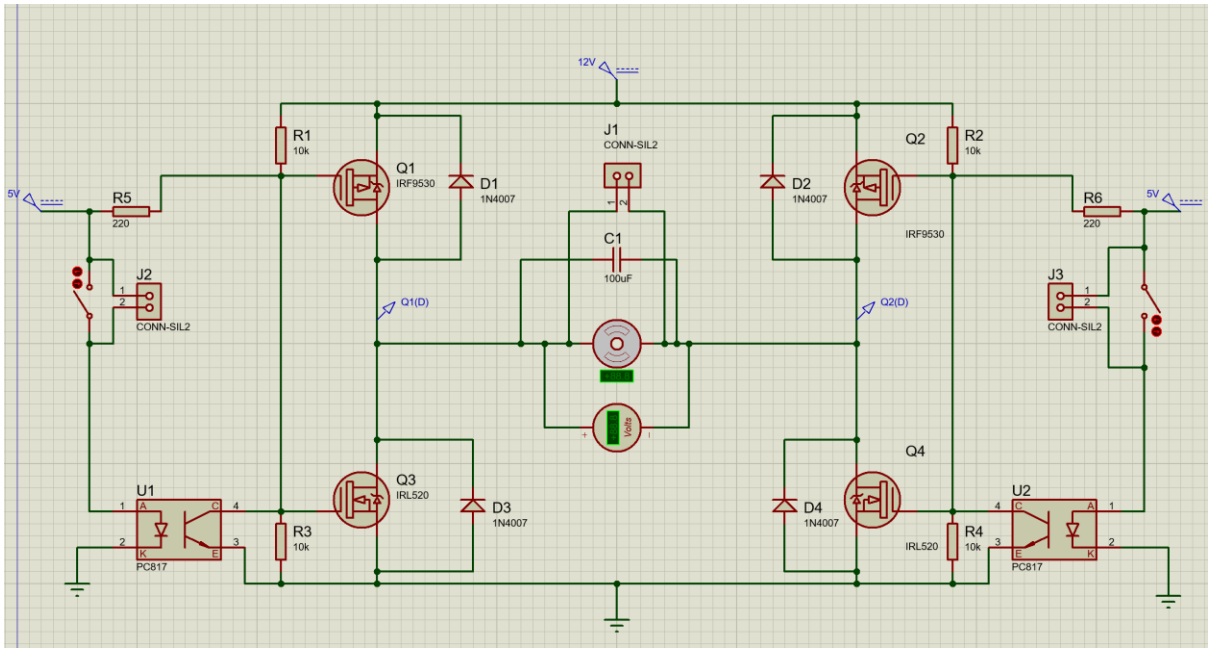


The Design We Finalized On Paper Is As Following:

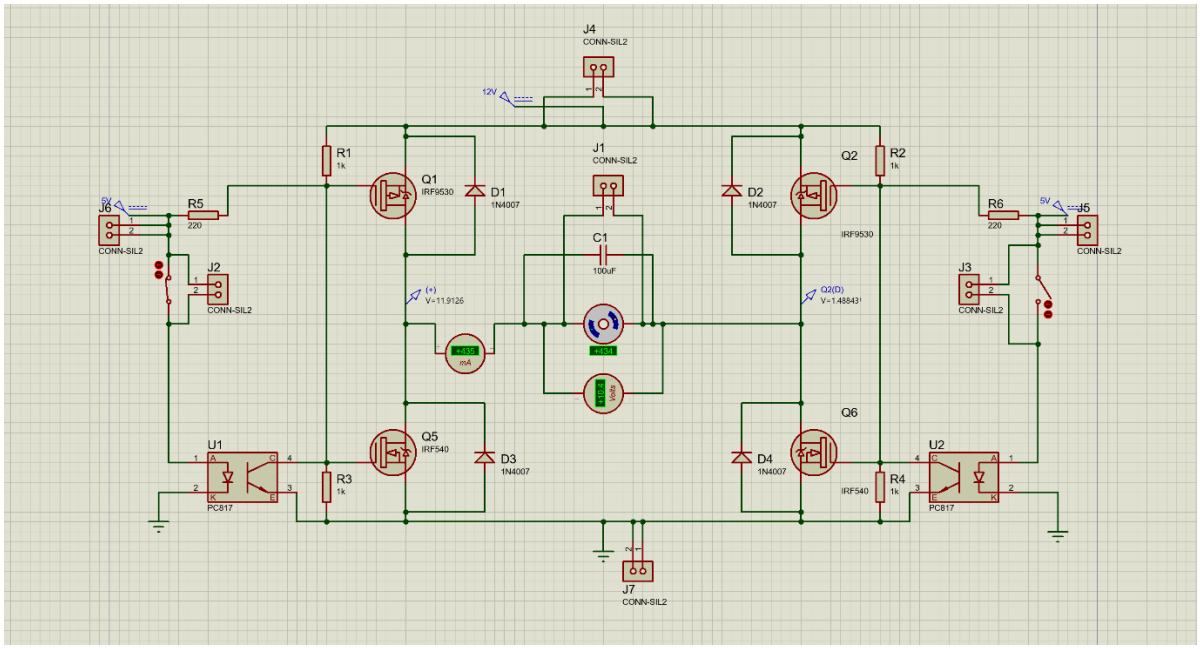


2.2 Schematic

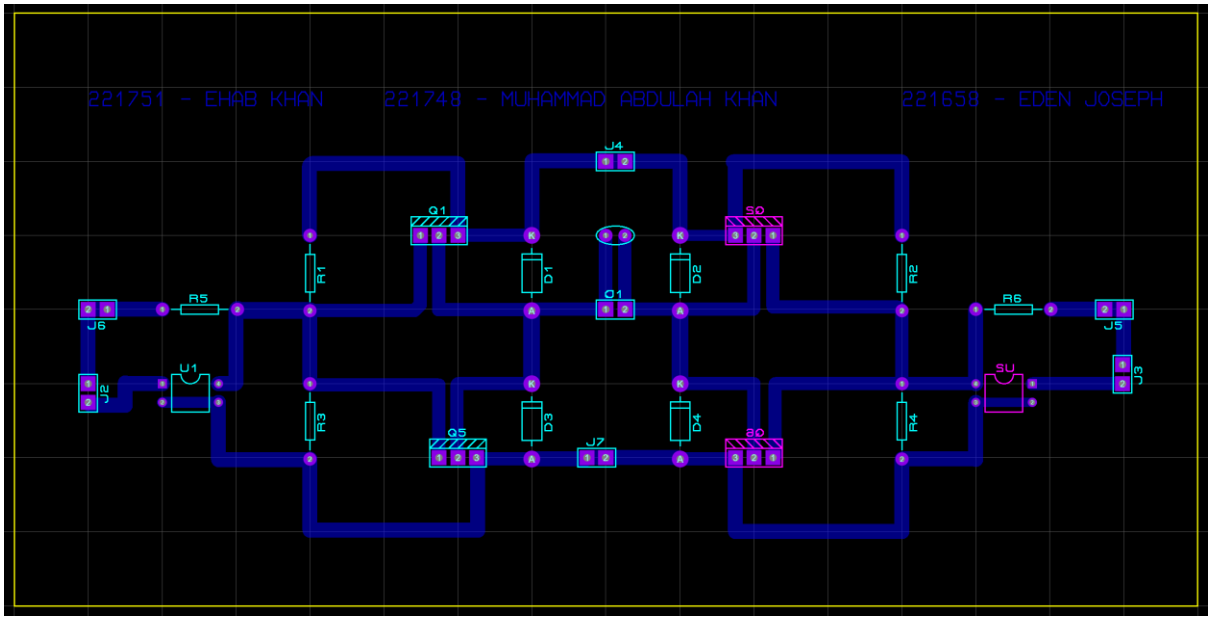
The Schematic Layout on Proteus is Designed Like This :



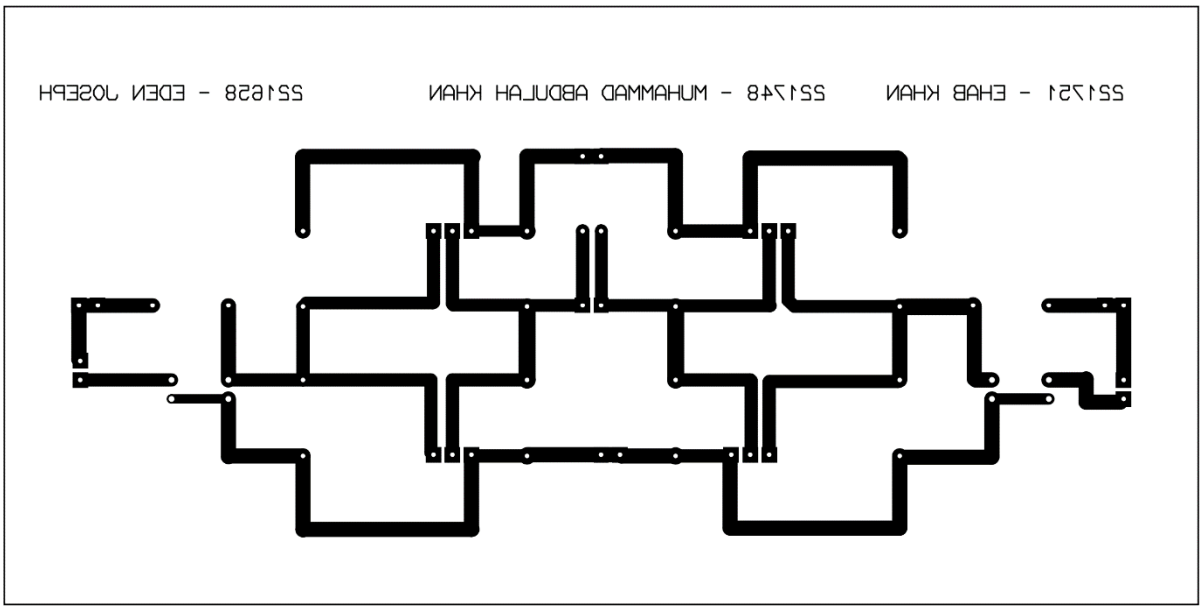
The Maximum Settings It Can Go On Are:



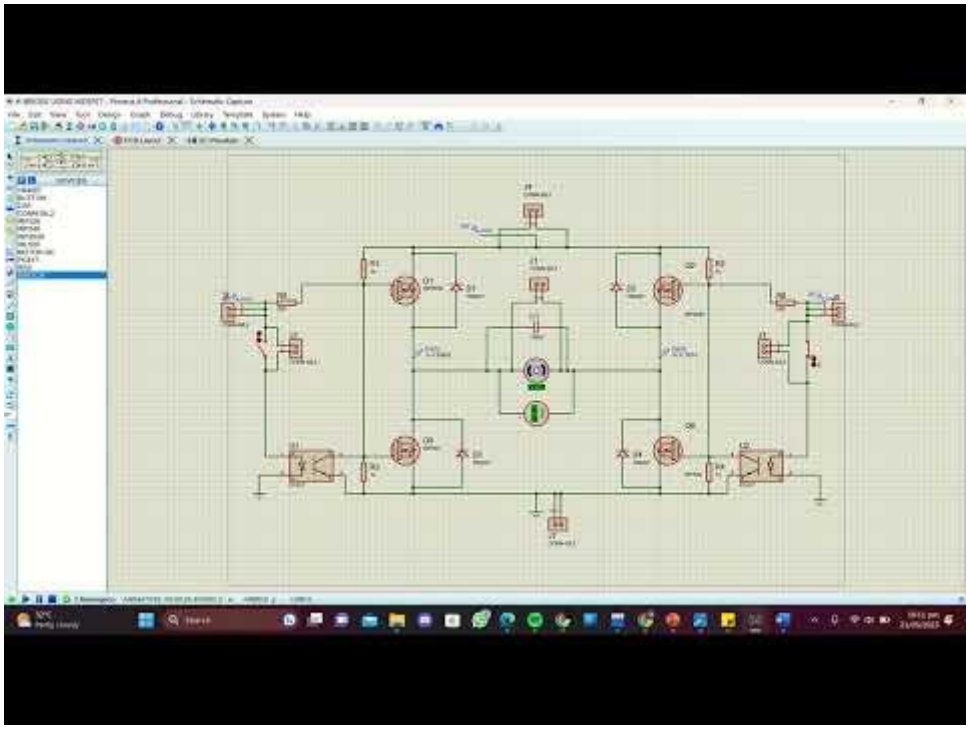
2.3 PCB



PCB Print Is Provided Below :



2.4 Simulation



2.5 Components

ITEM	VALUE
RESISTORS	1kΩ AND 470Ω
CAPACITOR	100uF
DC MOTOR	MAXIMUM 9V
MOSFETS	P-TYPE (IRF 9530) , N-TYPE (IRF 540)

DIODES	1N4007
OPTOCOUPLERS	PC817
CONNECTORS	6-PIN SILICONE CONNECTORS

2.6 Bill Of Material

Bill Of Materials for H-BRIDGE USING MOSFET

Design Title H-BRIDGE USING MOSFET
Author
Document Number
Revision
Design Created Wednesday, 10 May 2023
Design Last Modified Wednesday, 10 May 2023
Total Parts In Design 20

0 Modules

Quantity	References	Value	Stock Code	Unit Cost
Sub-totals:				Rs0.00

1 Capacitors

Quantity	References	Value	Stock Code	Unit Cost
1	C1	100uF		
Sub-totals:				Rs0.00

6 Resistors

Quantity	References	Value	Stock Code	Unit Cost
4	R1-R4	10k		
2	R5-R6	220		
Sub-totals:				Rs0.00

2 Integrated Circuits

Quantity	References	Value	Stock Code	Unit Cost
2	U1-U2	PC817		
Sub-totals:				Rs0.00

4 Transistors

Quantity	References	Value	Stock Code	Unit Cost
2	Q1-Q2	IRF9530		
2	Q3-Q4	IRL520		
Sub-totals:				Rs0.00

4 Diodes

Quantity	References	Value	Stock Code	Unit Cost
4	D1-D4	1N4007		
Sub-totals:				Rs0.00

3 Miscellaneous

Quantity	References	Value	Stock Code	Unit Cost
3	J1-J3	CONN-SIL2		
Sub-totals:				Rs0.00

Totals: Rs0.00

Wednesday, 10 May 2023 6:01:25 pm

OCEANA ELECTRONICS

Deals In: Basic Electronics & Industrial Spare Parts

G-642, DAV College Road, Rawalpindi. Tel: 5555474
Fax: 5538108, Email: oceanaelectronics@yahoo.com

Deals In:
1. Resistor, Capacitors and Ics.
2. All Semi Conductor Devices.
3. Industrial Electronics Parts.
4. Wireless & Telephone Spare Parts.
5. Cables & Wire Used In Electronic Circuits.
6. Optonic & SMD Components.

Cash Memo

Date _____

Bill No. 8435

Customer Name _____

S.No.	DESCRIPTION	Qty	Rate	Amount
1	PCB			300
2	Motor			250
3	PC 817			80
4	M.J FET			400
5	R-C-D			50
6	Male to Male			250
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
			TOTAL	1330

Note: Things once sold are not returned or replaced. Signature

3 Readings And Measurements

3.1 Power Supply

The voltages at the power supplies are:

12V Main Supply DC
5V At The Switches

3.2 Measurements Across Mosfets

Q1

D	110.4 mV
G	12.00 V
S	12.00 V

Q2

D	11.90 V
G	46.81 mV
S	12.00 V

Q3

D	110.4 mV
G	4.99 V
S	0.00 V

Q4

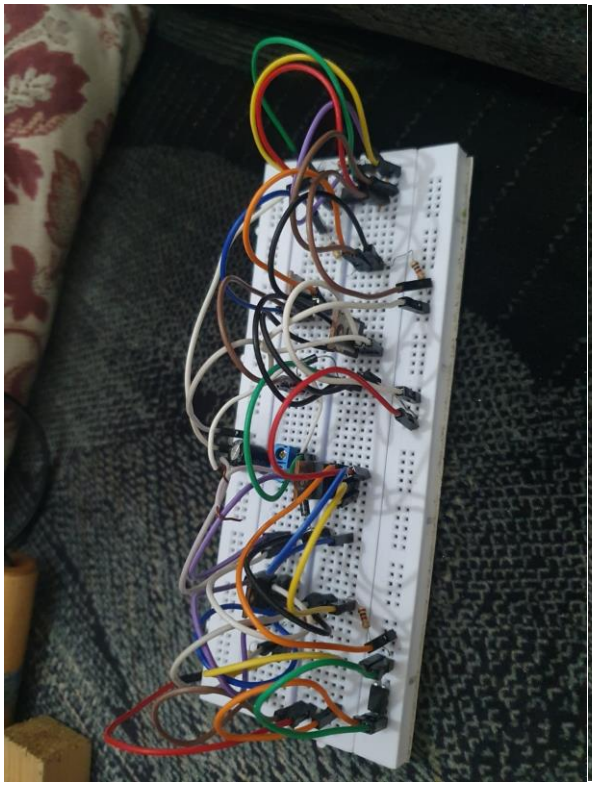
D	11.90 V
G	500 uV
S	0.00 V

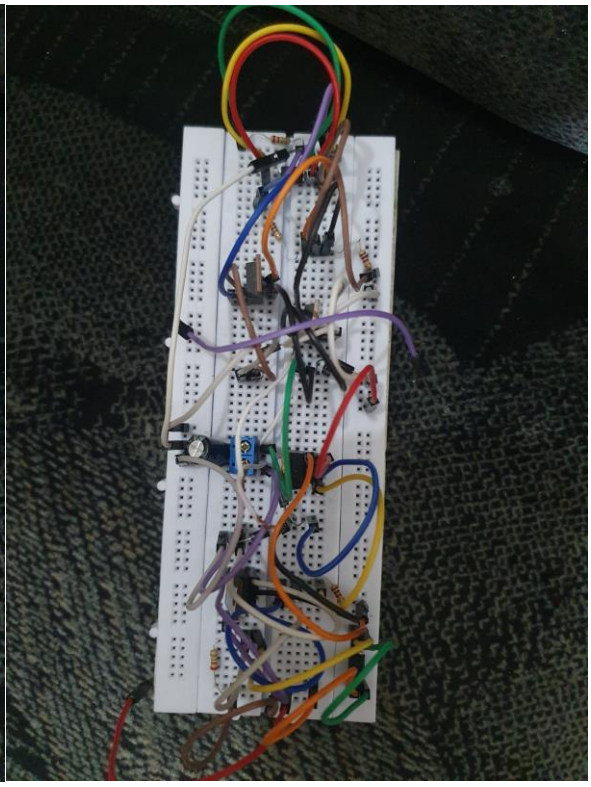
3.3 Measurements Across Motor :

VOLTAGE	10.4 V
CURRENT	435 mA

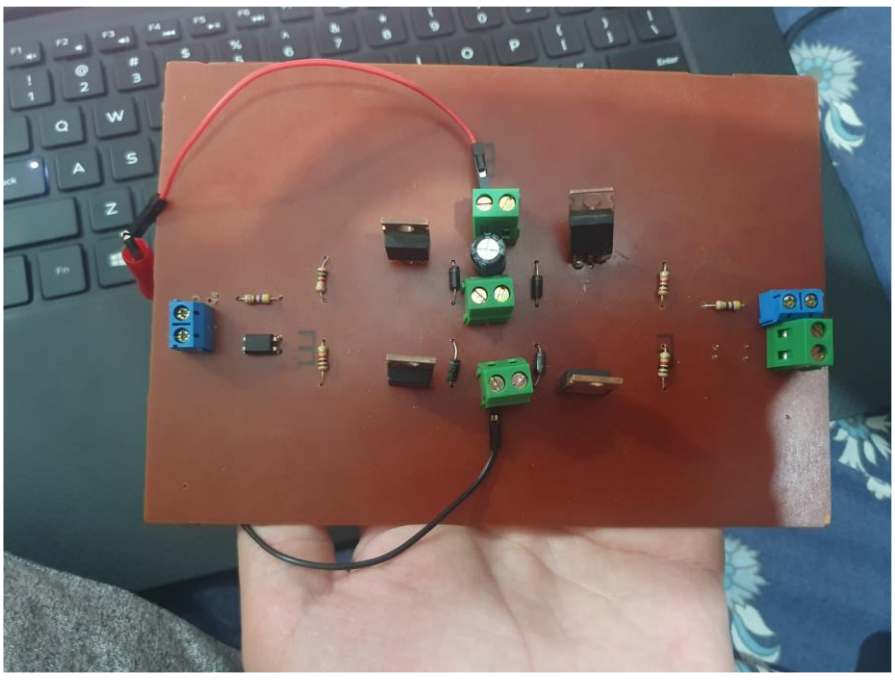
4 Practical Implementation

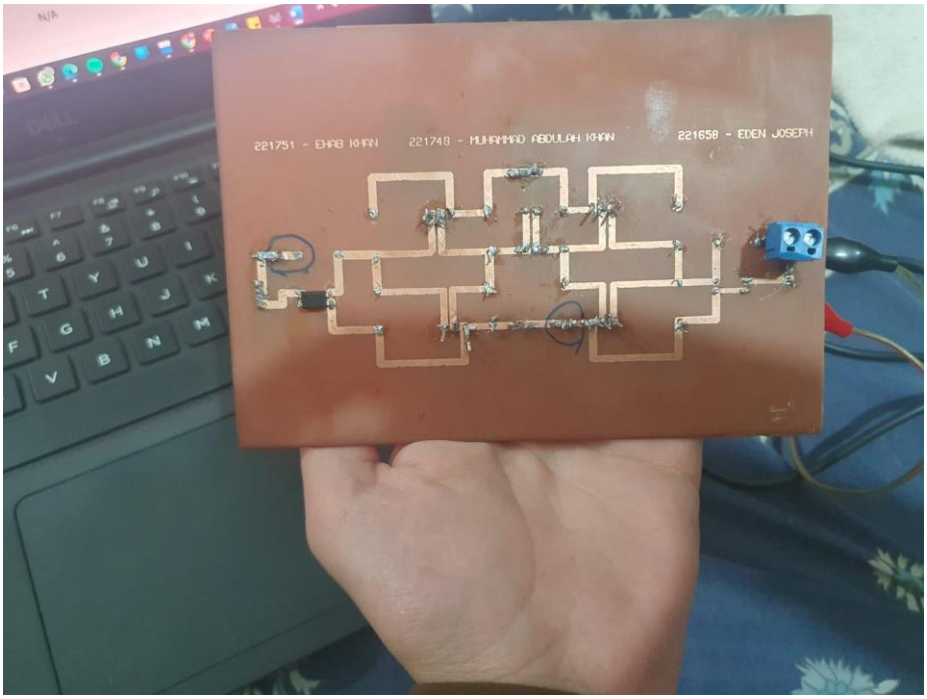
4.1 Breadboard





4.2 PCB

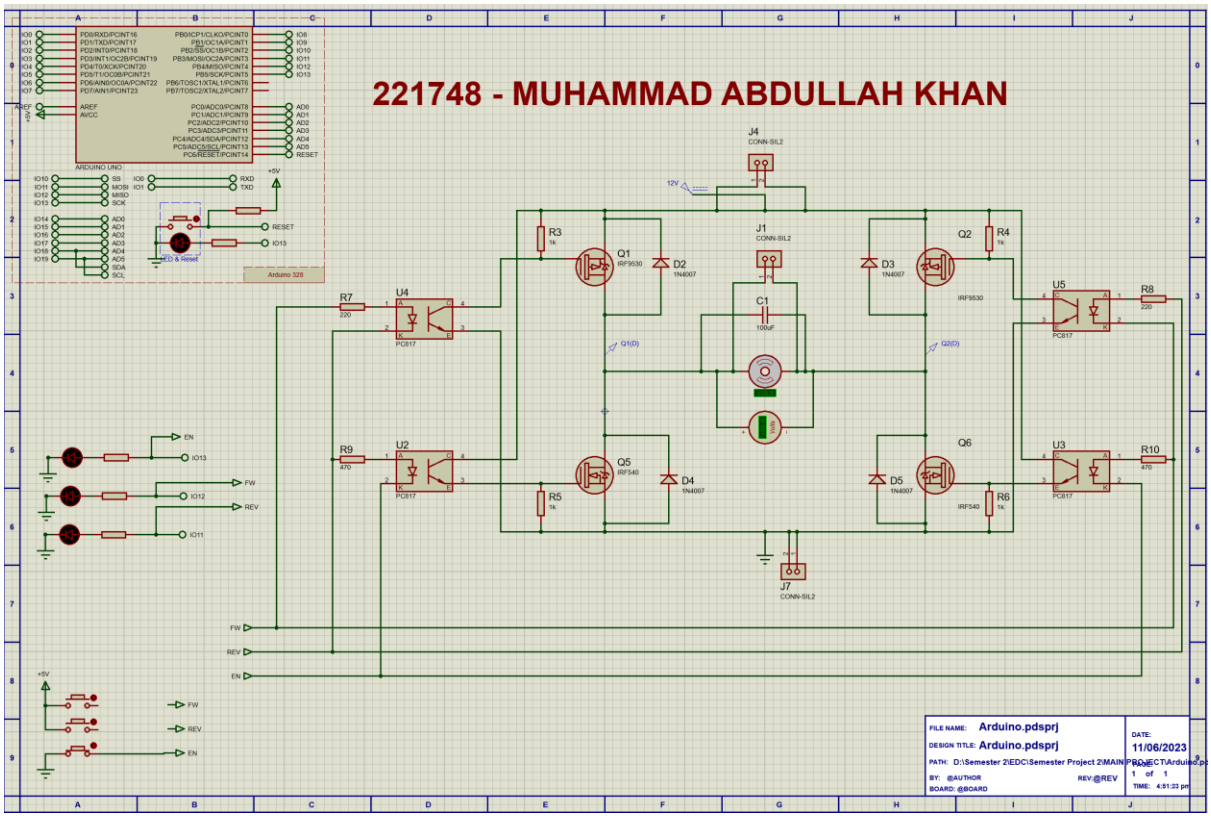




4.3 Finalization

The PCB Is In Perfect Working Condition Both On Simulation And Practical but due to a bit of a technical/design issue, we had to place a T-Block and PC817 optoisolater on the bottom copper side of the PCB circuit But it works fine and we are using T-Blocks as switches instead of buttons.

4.4 Bench Test Activity



5 CONCLUSION

5.1 Summary:

To Summarize, we created an H-Bridge That will control direction of motors and other micro controlling devices using mosfets, flyback diodes and optocouplers which were the requirements.

5.2 Conclusion:

To Conclude, as far the project is concerned it has been a success and was executed to success and we are looking forward to further projects.

THANK YOU !