

## DC Motor Controller using Relay and MOSFET - Arduino Interface

The project presented here is a low-cost solution to control high power brushed DC motor speed and direction. Traditional DC motor controllers are based on solid-state circuitry known as H-Bridge. Here we have made an H-bridge configuration using high current 2 x relays which can handle high voltage as well as high current. Additional MOSFETs are used to control the speed of motor. These MOSFETs can be removed in case of only direction control required, short the Drain and source pin of MOSFETs. The project requires 3 control input signals, all inputs are optically isolated to prevent noise and high voltage going in to logic circuitry. A large-size heatsink is a must on MOSFET.

The project requires 3 input signals, 2 x TTL 3V to 5V for direction control and one PWM 0 to 100% Duty Cycle for speed control. Operating supply is 12V DC for logic circuit and relay, Motor supply 12V to 90V DC, Load up to 20A.

**Example Arduino code is provided to test the board. Arduino Uno or Nano is the right choice, refer to the details below for the interface.**

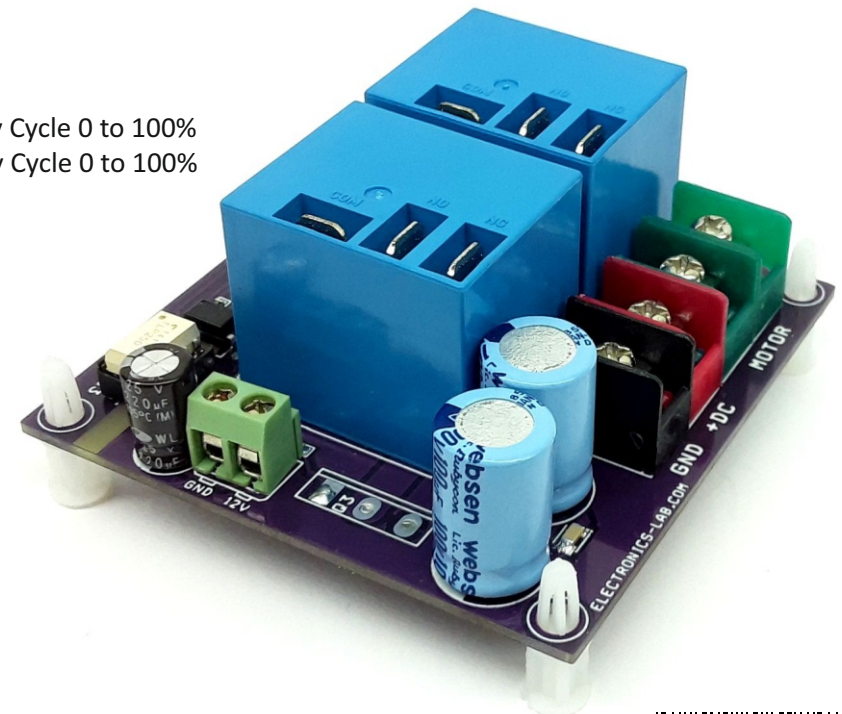
- Arduino Pin D4 = CN4 Pin 1 – A1 (DIR 1)
- Arduino Pin D3 = CN4 Pin 3 – A2 (DIR 2)
- Arduino Pin D5 = CN4 Pin 5 – A3 (PWM)
- Arduino GND = CN4 Pin 2, 4, 6 (C1, C2, C3 cathode of Optocouplers)
- Arduino A0 = Joystick or Potentiometer

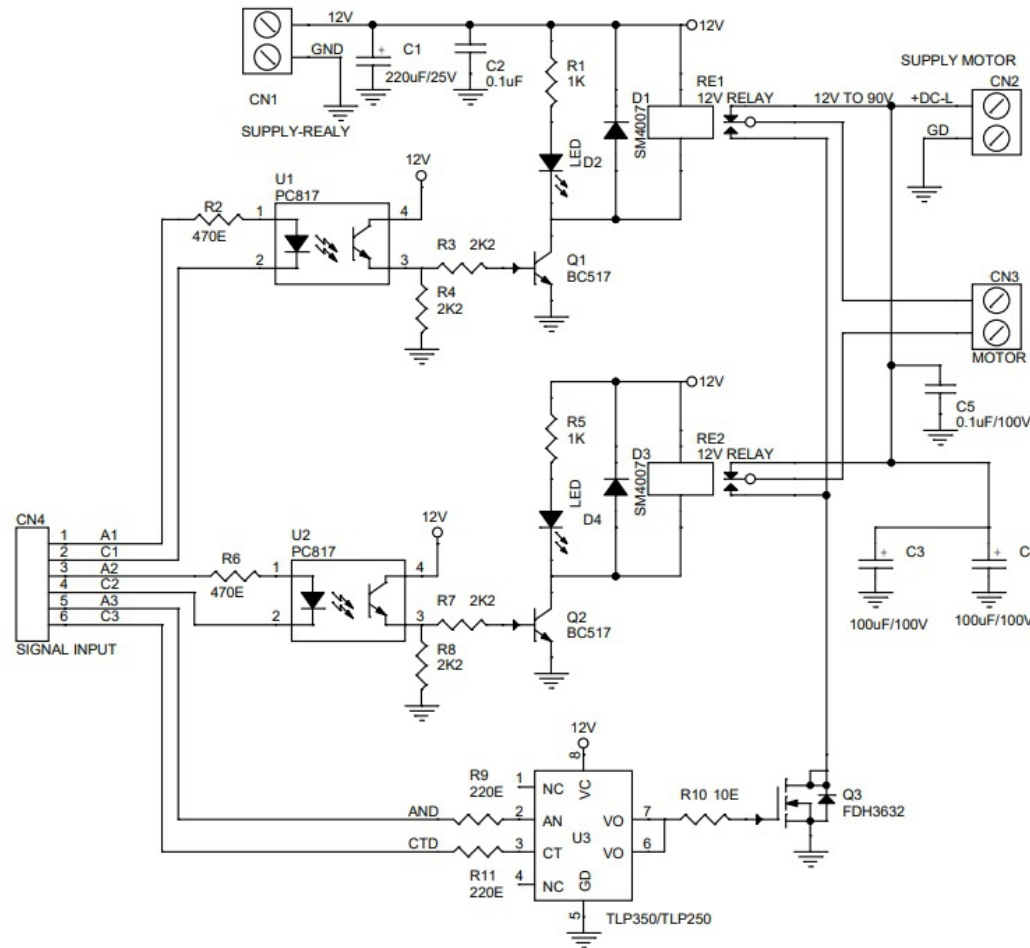
### Input Control Signals (Connect all 3X Cathode C1, C2, C3 to GND of Arduino) Connector Cn4

- DC Motor Forward >> A1 High(3-5V), A2 Low (GND) or Floating, A3 PWM Signal Duty Cycle 0 to 100%
- DC Motor Reverse >> A1 Low (GND) or Floating, A2 High (3-5V), A3 PWM Signal Duty Cycle 0 to 100%

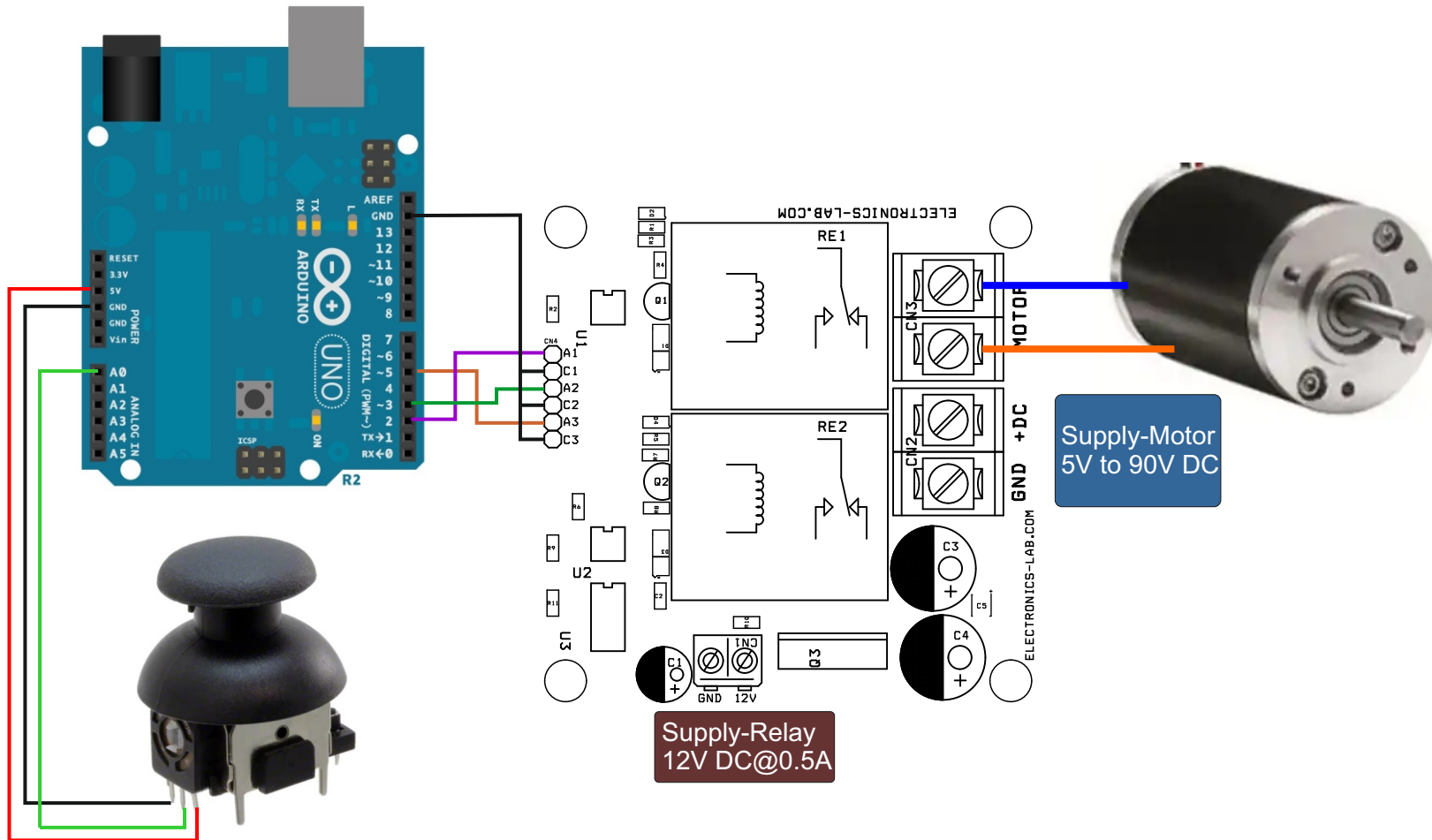
### Features

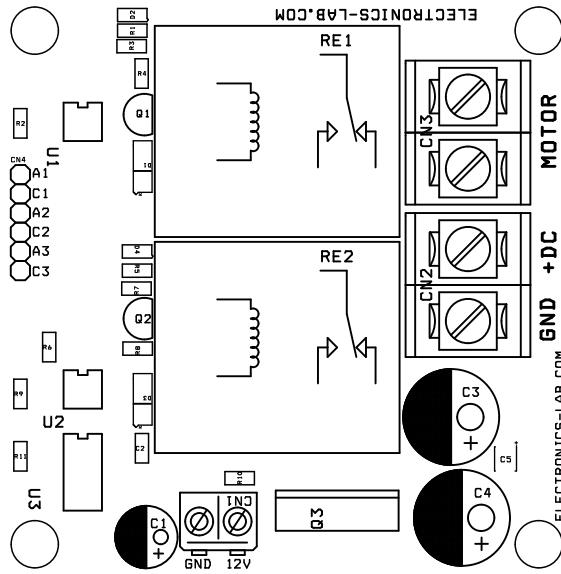
- Power Supply for Relay and MOSFET 12V DC @ 100mA
- Power Supply Motor 12V to 90V DC
- Motor Load 20Amps (Maximum 30Amps)
- All Inputs are Optically isolated
- 2 x Inputs for Direction Control and Brake
- One PWM Signal to Control the speed of Motor 0 to 100 % Duty Cycle
- PWM Frequency 300Hz to 20 KHz
- 2 x LEDs for direction indication
- PCB dimensions: 75.41 x 74.30 mm



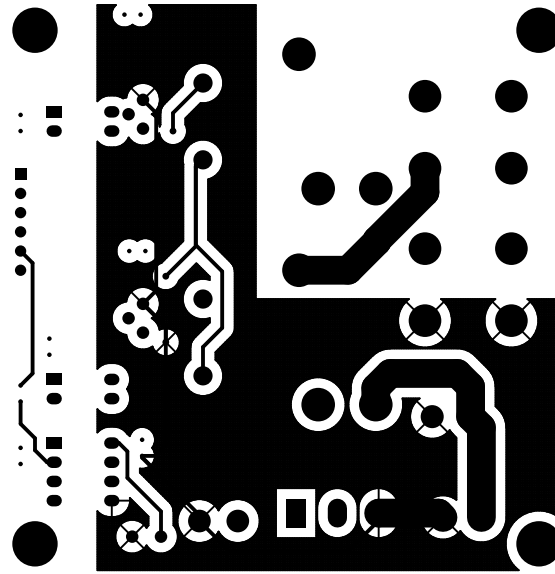


BOM						
NO	QNTY	REF	DESC	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	2 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1247-ND
2	1	CN2	2 PIN BARRIER CONNECTOR PITCH 9.53MM	TE CONNECTIVITY	DIGIKEY	1437664-6-ND
3	1	CN3	2 PIN BARRIER CONNECTOR PITCH 9.53MM	TE CONNECTIVITY	DIGIKEY	1437664-6-ND
4	1	CN4	6 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5319-ND
5	1	C1	220uF/25V	RUBYCON	DIGIKEY	1189-3720-3-ND
6	1	C2	0.1uF/50V SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
7	2	C3,C4	100uF/100V	NICHICON	DIGIKEY	493-13184-3-ND
8	1	C5	0.1uF/100V	KYOCERA	DIGIKEY	478-6107-1-ND
9	2	D1,D3	SM4007	SMC DIODE	DIGIKEY	1655-1N4007FLCT-ND
10	1	D2	RED LED	LITE ON INC	DIGIKEY	160-1427-1-ND
11	1	D4	RED LED	LITE ON INC	DIGIKEY	160-1427-1-ND
12	2	Q1,Q2	BC517	ONSEMI	DIGIKEY	BC517OS-ND
13	1	Q3	FDH3632	ONSEMI	DIGIKEY	FDH3632FS-ND
14	2	RE1,RE2	12V RELAY	GOODSKY/PANASONIC	DIGIKEY	JTV1G-TMP-12V
15	2	R1,R5	1K 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
16	2	R2,R6	470E 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
17	4	R3,R4,R7,R8	2K2 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
18	2	R9,R11	220E SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
19	1	R10	10E 5% SMD SIZE 0805	MURATA/YAGEO	DIGIKEY	
20	2	U1,U2	PC817	TAIWAN SEMI	DIGIKEY	TPC817BC9G-ND
21	1	U3	TLP350/TLP250	TOSHIBA	MOUSER	757-TLP350HF

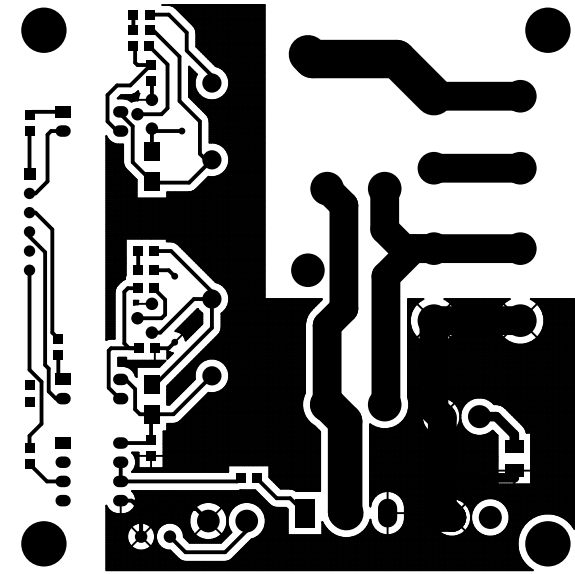




SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 75.41MM X 74.30MM

