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1 HARDWARE SETUP

Problem 1. Assemble the motors, chassis and wheels to build the toy car.

Problem 2. Stick the breadboard to the chassis of the toy car.

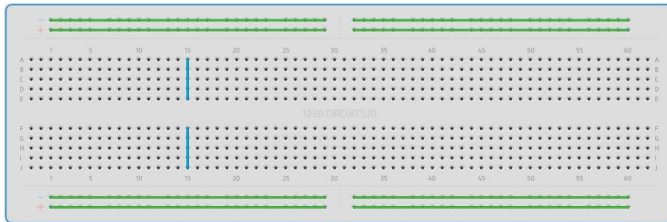


Fig. 2

Problem 3. Stick a 9V battery to the breadboard and connect the positive and negative terminals to extreme ends of the breadboard.

Problem 4. Stick a 9V battery to the breadboard and connect the positive and negative terminals to extreme ends of the breadboard.

Problem 5. Provide 9V to the supply pin of the Arduino.

Problem 6. Plug the L293D motor driver IC in Fig. 6 on the breadboard.

Problem 7. Connect the L293D pins according to Table 7.

Problem 8. SM0038/TSOP1738, IR Sensor is used to detect IR radiations emitted from IR remotes and convert it into a sequence of numbers to be transmitted serially to Arduino or any microcontroller. Every

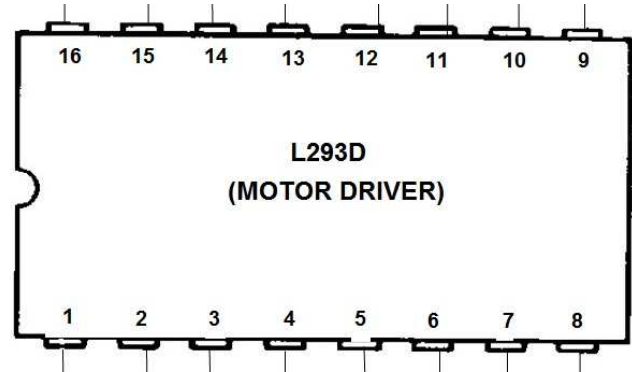


Fig. 6

Power	L293D			
9V	1	8	9	16
GND	4	5	12	13

Arduino	D2	D3	D4	D5
L293D	2	7	10	15

Motor	+		-	
L293D	3	11	6	14

TABLE 7

remote follows IR protocols and transmits serially at 38 KHz frequency. The sequence transmitted is unique for any protocol. It is a 48 bit sequence. Plug the IR sensor in Fig. 8 to the breadboard.

Problem 9. Connect the OUT pin of the IR sensor to the D11 pin of the Arduino. Connect the GND and V_S pins to the respective pins of the Arduino.

Problem 10. Download the IRremote library from the internet and copy it into libraries in the Arduino folder.

Problem 11. Connect the Arduino to the computer.

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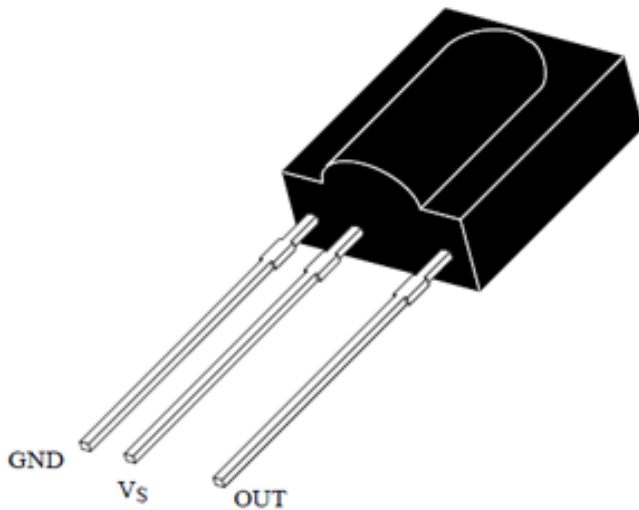


Fig. 8

2 SOFTWARE CONTROL

Problem 12. Upload the following code into the Arduino.

```
#include "Arduino.h"
#include <IRremote.h> //header
    file for IR receiver
int irpin = 11; //pin number to
    which IR sensor is connected
IRrecv irrecv(irpin); //object of
    class IRrecv included in the
    header file IRremote.h which
    specifies which pin of arduino
    is connected to the sensor
decode_results results; //object
    of class decode_results included
    in the header file IRremote.h
    which specifies the obtained
    value from the sensor

const int m1n=3; //pin for (-ve)
    direction of motor1
const int m2p=4; //pin for (+ve)
    direction of motor2
const int m2n=5; //pin for (-ve)
    direction of motor2
const int m1p=2; //pin for (+ve)
    direction of motor1

void setup() {
```

```
Serial.begin(9600); //Setting the
    baud rate of serial
    communication
irrecv.enableIRIn(); // Start IR
    receiver

pinMode(m1p, OUTPUT);
pinMode(m1n, OUTPUT);
pinMode(m2p, OUTPUT);
pinMode(m2n, OUTPUT);

}

void loop() {
    if (irrecv.decode(&results)) //
        checking whether decoded value
        is not a null value
    {
        Serial.println(results.
            value);
        if (results.value==16758855){
            //code for button press 2
            digitalWrite(m1p, HIGH);
            digitalWrite(m1n, LOW);
            digitalWrite(m2p, HIGH);
            digitalWrite(m2n, LOW);
        }
        else if (results.value
            ==16756815){ //code for button
            press 8
            digitalWrite(m1p, LOW);
            digitalWrite(m1n, HIGH);
            digitalWrite(m2p, LOW);
            digitalWrite(m2n, HIGH);
        }
        else if (results.value==16767015)
        { //code for button press 4
            digitalWrite(m1p, HIGH);
            digitalWrite(m1n, LOW);
            digitalWrite(m2p, LOW);
            digitalWrite(m2n, LOW);
        }
        else if(results.value
            ==16754775){ //code for
            button press 6
            digitalWrite(m1p, LOW);
            digitalWrite(m1n, LOW);
            digitalWrite(m2p, HIGH);
            digitalWrite(m2n, LOW);
        }
        else if(results.value
```

Button	2	4	6	8	5
Motion	Forward	Left	Right	Back	Stop

TABLE 13

```

    ==16750695){
    digitalWrite(m1p, LOW);
    digitalWrite(m1n, LOW);
    digitalWrite(m2p, LOW);
    digitalWrite(m2n, LOW);
}
  irrecv.resume(); //for checking
                    next value, resume()
                    function is included from
                    IRrecv class of IRremote.h
                    header file
}
}

```

Problem 13. Use Table 13 for controlling the vehicle motion.