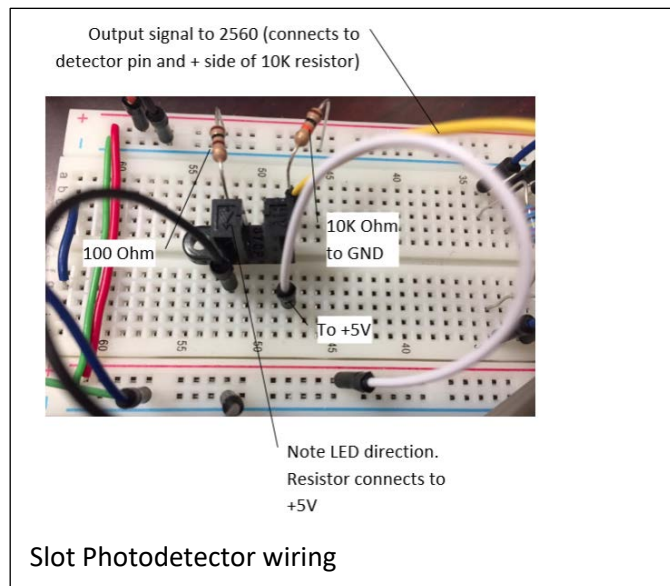
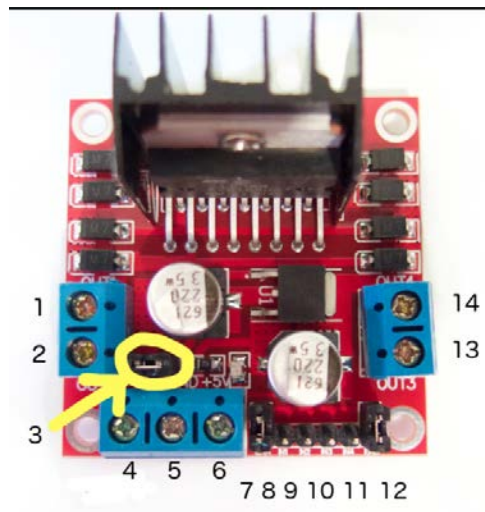
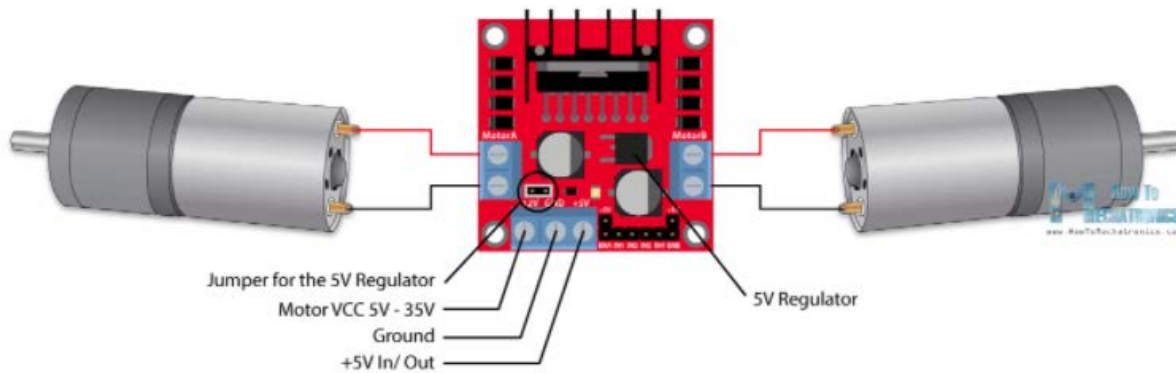


Robot Documentation

The mobile robot consists of the following subsystems:

- 1 MEGA2560 microcontroller board
- 2 wheel motors
- 2 slot photodetectors (measure wheel speed)
- 1 L298N driver board
- 1 HC-SR05 Ultrasonic range finder
- 2 IR photodetector proximity modules (for tape/track sensing)
- Chassis, small breadboard, wheels, battery holder (4 x AA), 9V battery (for micro)



Part	Connects to:	Notes	Micro Resource Used
MEGA2560	5V and GND	To breadboard	9V battery power when not tethered to USB
L298N		No jumpers used (remove them) (3, 7 and 12 above)	
Pin 4 Motor VCC	4 x AA switch		
Pin 5 (Ground)	System GND		
Pin 6 (+5V in/out)	5V in for logic	From breadboard	
Pin 7	Micro PWM	Using phase/freq correct PWM mode of TIMER5 (mode 8) , 1KHz PWM freq, CLK/8 prescaler	OC5A (Digital pin 46)
Pin 12	Micro PWM	Using phase/freq correct PWM mode of TIMER5 (mode 8), 1KHz PWM freq, CLK/8 prescaler	OC5B (Digital pin 45)
Pins 8-9	Micro digital I/O	0bxx10 right forward, 0bxx01 right reverse	PORTC bits 1-0 (pins 37-36)
Pins 10-11	Micro digital I/O	0b10xx left forward, 0b01xx left reverse	PORTC bits 3-2 (pins 35-34)
Motors			
Right motor	L298N pins 13,14		
Left motor	L298N pins 1,2		
Slot Photo-Detectors			
Right Wheel Slot Photodetector		See figure above for signal output	PORTJ bit 0, PCINT9 (Digital pin 15)
Left Wheel Slot Photodetector		See figure above for signal output	PORTJ bit 1, PCINT10 (Digital pin 14)
HC-SR05 Ultrasonic Range Finder			
Trigger			PORTK bit 1, PCINT17 (Analog pin 9)
Echo			PORTK bit 0, PCINT16 (Analog pin 8)
IR Receiver			
IR Receiver Input		Use TIMER4 input capture mode to capture and time pulses for IR command.	PORTL bit 0/IPC4 (Digital pin 49).
IR Proximity Sensors			
Right sensor			
Left sensor			

Robot API

Top level	Lower levels	Notes
Threads		
executive_thread		Maintains system state and responds to input (commands and sensors) based on state. Commands are used to change mode of operation as well as to provide immediate action (e.g. "STOP!").
ir_receiver_thread		
tracker_thread		
range_sensor_thread		
propulsion_thread	follow_track find_track find_nearest find_farthest pivot forward reverse turn	
Initialization Functions		
init_robot	init_ir_receiver	
	init_wheel_motors <ul style="list-style-type: none"> init_driver_pwm init_speed_sensors 	
	init_ir_proximity	
	init_range_sensor	