

## Design Brief 4: Electronics

### **Battery Details**

- Voltage: 12 V
- Capacity: 2000 mAh
- Max discharge rate:  $(1C / 1344.5\text{mA}) = 0.74 \text{ hr} = 44.4 \text{ minutes}$

### **Calculations for Total Current Draw**

- Total current drawn using stall torque
  - $(1600\text{mA})4 + 2(36 \text{ mA}) + 2(15 \text{ mA}) + 2.5 \text{ mA} = 6504.6 \text{ mA}$
- Total current drawn using max efficiency
  - $(310\text{mA})4 + 2(36 \text{ mA}) + 2(15 \text{ mA}) + 2.5 \text{ mA} = 1344.5 \text{ mA}$

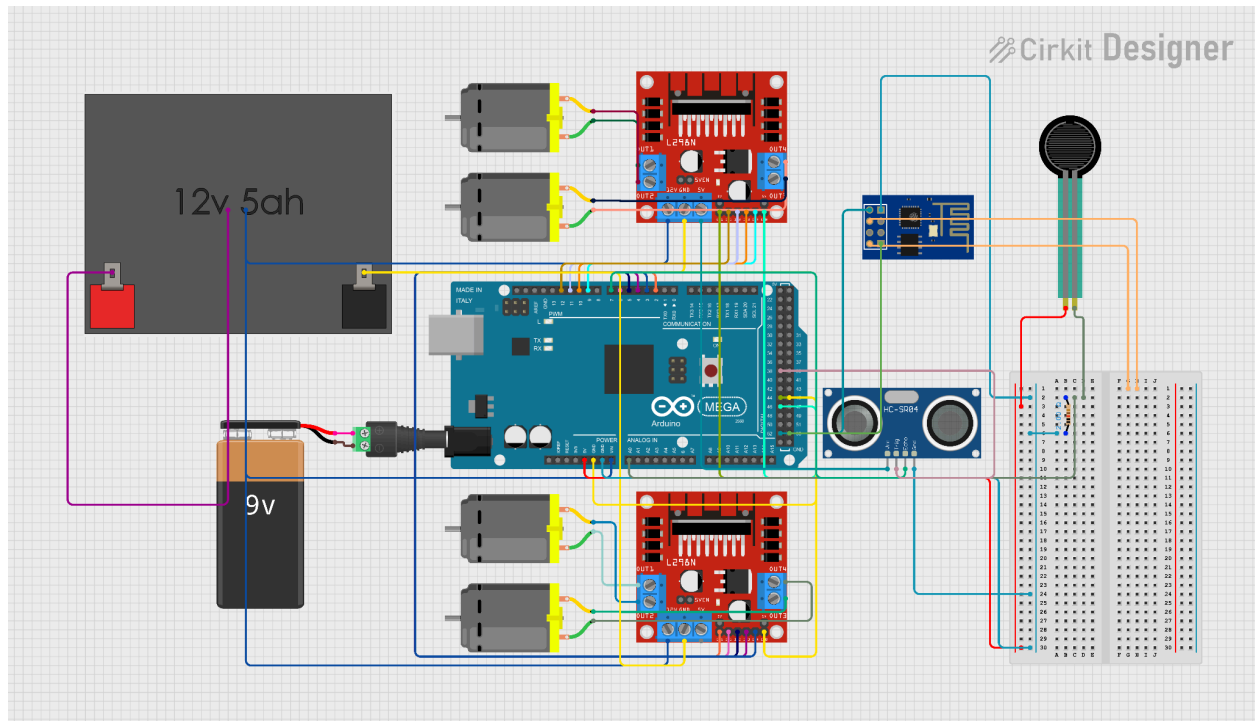
### **Run-Time Calculations (time to power OTV before recharging)**

- Runtime worst case
  - $2000 \text{ mAh} / 6504.6 \text{ mA} = 0.307 \text{ hours} = 18.45 \text{ minutes}$
- Runtime best case
  - $2000 \text{ mAh} / 1344.5\text{mA} = 1.487 \text{ hours} = 89.25$

### **Details on modulating power to the propulsion and mission actuators**

Our 12 volt battery will be connected to a kill switch that connects in parallel to our motor controllers using one wire that splits into 2 separate connectors, one of which will be connected to each motor controller. We have a second 9v battery that is powering our arduino to give the wifi module the most stable power connection. Our 2 motor controllers will be connected to our 4 motors with 2 motors per controller that each have power in and ground pins. The controllers will take up 6 digital pin slots in our arduino mega. The ultrasonic sensor will be connected to the motor controllers that have 5v outputs to power them, as well as having 2 analog connections to our arduino, the ground pin on the ultrasonic sensors are connected to the breadboard that is connected to the ground pin on the arduino. The wifi card is connected to our arduino 5v output. Finally the load sensor will get power from the 5v on the breadboard with a 10kΩ resistor.

## Circuit Schematic



## Arduino Pin Assignment Chart

Pin #	Wire	Pin #	Wire	Pin #	Wire	Pin #	Wire
Barrel Connector	Wired from battery	GND	Wire to breadboard	GN D	Wire to battery	A0	Wire to force resistor
12	IN 1 controller 1	11	IN 2 controller 1	10	IN 3 controller 1	9	IN 4 controller 1
6	IN 1 controller 2	5	IN 2 controller 2	4	IN 3 controller 2	3	IN 4 controller 2
44	ENA controller 1	46	ENB to controller 1	2	ENA controller 2	45	ENB controller 2
7	ECHO US 1	38	TRIG US 1	52	TX wifi chip	53	RX wifi chip

## Control flow algorithm

