Hack-A-Jeep Documentation

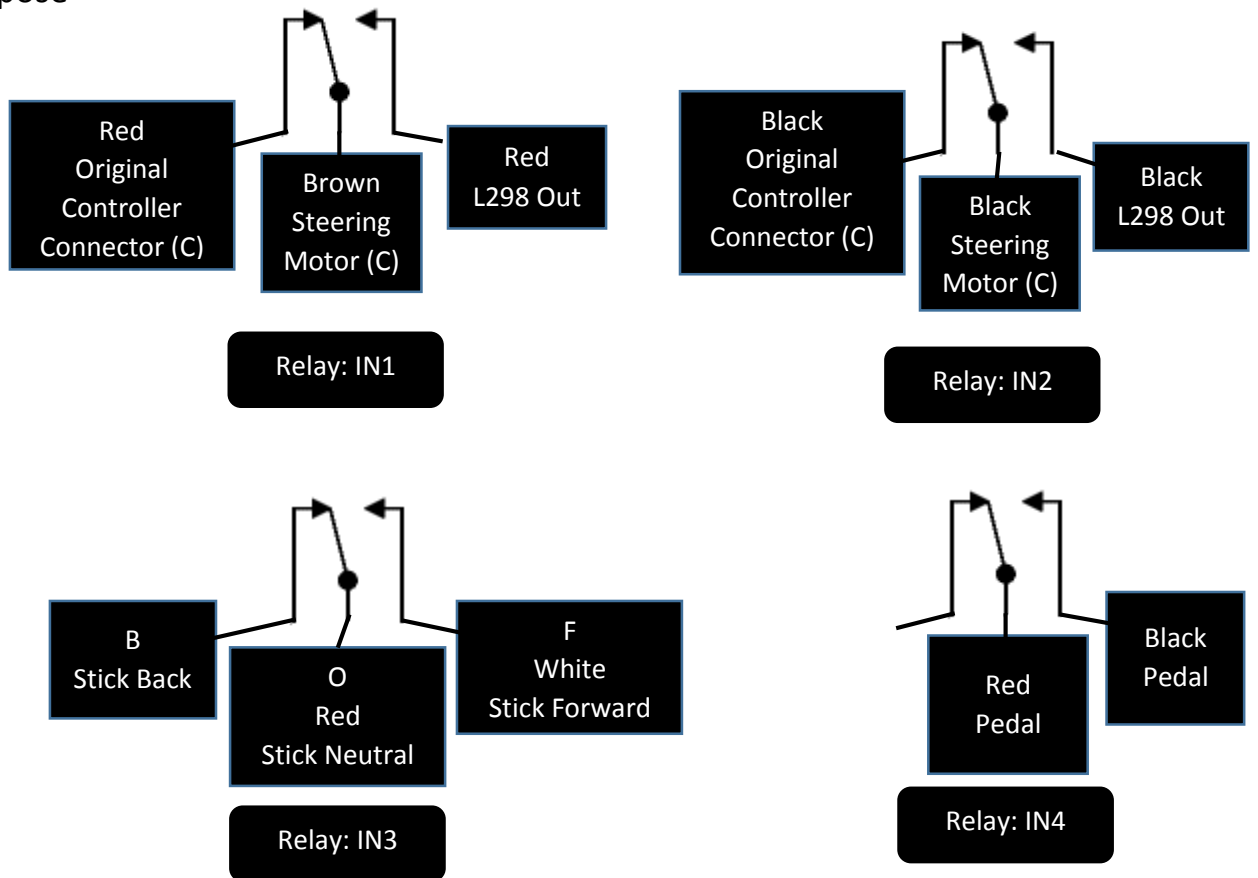# First Hack (Sharon, Saad, Dona, Hannah)

Pin Connections (rows connected)

Arduino	L298	Relay	Buttons	Original Car Controller
2	IN D			
3	IN C			
4		IN 1 (relay 2)		
5		IN 2 (relay 2)		
6		IN 3 (relay 2)		
7		IN 4 (relay 2)		
8	EN A			
9	EN B			
10				
11	IN B			
12	IN A			
13				
5v	5v x2	5v	Red Wire in	
GND	GND	GND	Black Wire in	
A0			Forward Button	
A1			Back Button	
A2			Left Button	
A3			Right Button	
A4				
A5 – Jumper to GND				
				A (Battery x2 7.4v)
				B (Rear wheel motor x2)
				C (Steering motor)
				D (Pedal, Stick, lights)
	A and B Motor out connected in parallel			

Relay Connections

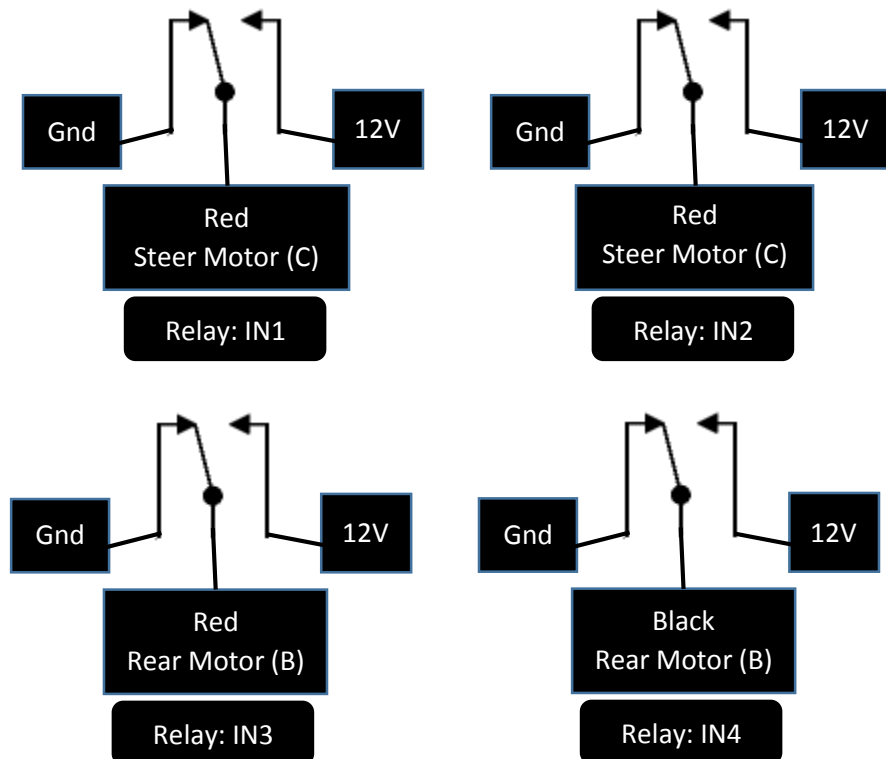- Label
- Wire Color
- Purpose

Red Original Controller Connector (C) — Brown Steering Motor (C) — Red L298 Out

Relay: IN1

Black Original Controller Connector (C) — Black Steering Motor (C) — Black L298 Out

Relay: IN2

B Stick Back — O Red Stick Neutral — F White Stick Forward

Relay: IN3

Red Pedal — Black Pedal

Relay: IN4

Connector D (Original Controller)

Color	Yellow	Orange	Blue	Black	White	Red
Marking		Center	Back		Forward	

Second Hack (Shi En, Hannah) 9 Sep 16

Pin Connections

Arduino	Relay	Buttons	Bluetooth
2	IN 1		
3	IN 2		
4	IN 3		
5	IN 4		
6		Forward	
7		Backward	
8		Left	
9		Right	
10			TX pin
5v	5v	5v (Red)	5v in (regulator)
Gnd	Gnd	Gnd (black)	Gnd

Relay Connections

Gnd — 12V — Red Steer Motor (C) — Relay: IN1

Gnd — 12V — Red Steer Motor (C) — Relay: IN2

Gnd — 12V — Red Rear Motor (B) — Relay: IN3

Gnd — 12V — Black Rear Motor (B) — Relay: IN4

Button Wires

Holes drilled to route wire from undercarriage to hole at steering wheel.
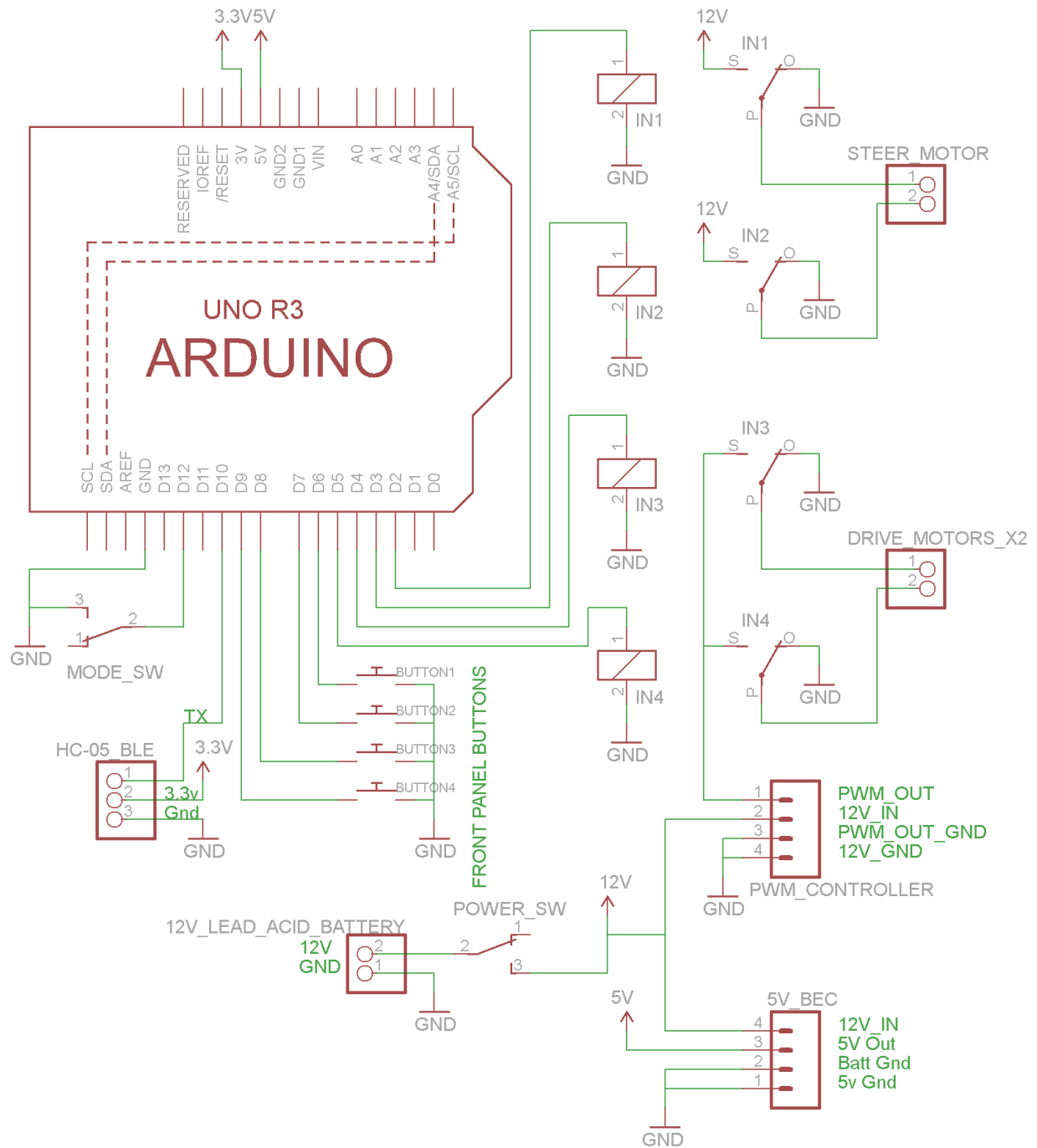
Batteries

2x 7.4 Lead Acid batteries were damaged from undercharging, and was replaced with a 12v Lead Acid battery.

Further work

- Add Speed control from Batteries to motors, jeep drives too fast. Possible solutions to slow it down:
  - Knob PWM Spindle controller
  - L298 and PWM from Arduino
  - 150w Buck converter, reduce voltage from batt to relays

- Complete installation of:
- Power ON/OFF switch
  - Do test of max power for
- Button/Button+BLE Control mode switches
  - Mode 1: Buttons only
  - Mode 2: Buttons and BLE override
  - Mode 3: Stick and Pedal only

- Implement Timers to smoothen BLE Code

13 Sep 16

Connection Diagram

3.3V 5V

RESERVED
IOREF
/RESET
3V
5V
GND2
GND1
VIN
A0
A1
A2
A3
A4/SDA
A5/SCL

UNO R3

ARDUINO

SCL
SDA
AREF
GND
D13
D12
D11
D10
D9
D8
D7
D6
D5
D4
D3
D2
D1
D0

12V

IN1
S   O
P
GND

STEER_MOTOR
1
2

1
IN1
2
GND

12V

IN2
S   O
P
GND

1
IN2
2
GND

IN3
S   O
P
GND

DRIVE_MOTORS_X2
1
2

1
IN3
2
GND

IN4
S   O
P
GND

1
IN4
2
GND

3
1   2
GND
MODE_SW

BUTTON1
BUTTON2
TX
HC-05_BLE   3.3V   BUTTON3
1
2   3.3v   BUTTON4
3   Gnd
GND   GND

FRONT PANEL BUTTONS

PWM_OUT
1   12V_IN
2   PWM_OUT_GND
3   12V_GND
4
GND   PWM_CONTROLLER

12V_LEAD_ACID_BATTERY   POWER_SW   12V
12V   2   1
GND   1   2
3
GND

5V   5V_BEC
4   12V_IN
3   5V Out
2   Batt Gnd
1   5v Gnd
GND

Components used

	Freaduino	https://www.aliexpress.com/item/UNO-R3-compatible-improved-version-Freaduino-UNO-free-for-data-line/32293649198.html
	4 Relay Module	https://www.aliexpress.com/item/4-channel-relay-module-4-channel-relay-control-board-with-optocoupler-Relay-Output-4-way-relay/32273435749.html
	PWM Spindle Controller	https://www.aliexpress.com/item/12V-60V-10A-PWM-DC-brush-Motor-Speed-MACH3-spindle-Controller-12V-24V-48V/32494809920.html
	HC05 BLE	https://www.aliexpress.com/item/2pcs-lot-Wireless-Master-Slave-Bluetooth-UART-Serial-Module-HC-05-HC-05-RF-Transceiver-Module/32723037992.html
	Rocker Switch x2	https://www.aliexpress.com/item/Promotion-10pcs-Red-Light-ON-OFF-SPST-Round-Rocker-Switch-6A-250V-10A-125V-AC/32564582334.html
	5v UBEC	https://www.aliexpress.com/item/General-RC-Part-Hobbywing-3A-Switch-Mode-UBEC-5V-6V-max-5A-Lowest-RF-Noise/32363675945.html
	F-F Jumper wire	https://www.aliexpress.com/item/Free-Shipping-400pcs-dupont-cable-jumper-wire-dupont-line-female-to-female-dupont-line-20cm-1P/1701745819.html

Controller by phone app

App: Joy BT Commander (From Google Play Store, Android devices only)
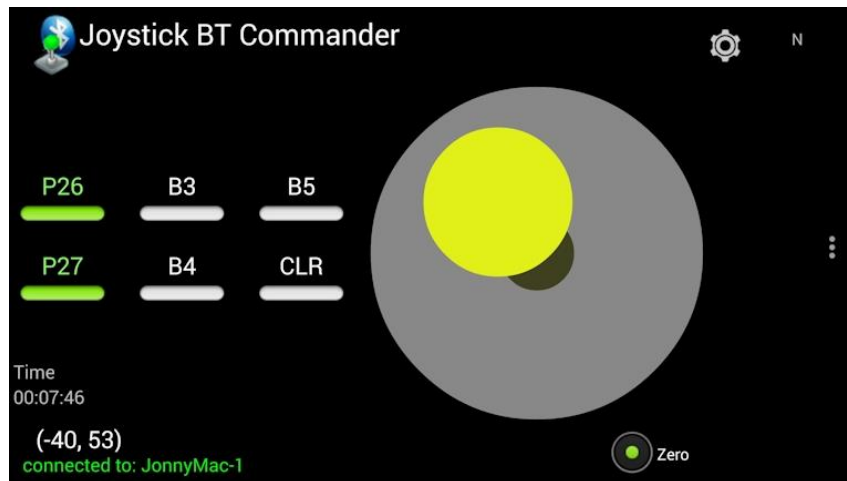
Select

1. Factory settings: Settings – reset Opt.
2. Connect Bluetooth: Connect – Select HC-05
   a. (if not found, go to Bluetooth settings, forget existing bindings)

Code:

https://github.com/Shine16/HackAJeep

Timer integrated for jeep to disable if BLE signal is cut.

> Use of Timer in Arduino: When receiving a BLE signal every 50ms, variable receivedflag is set 1. Variable receivedflag is reset to 0 by the timer service routine every 300ms. If receivedflag is still read as 0 at the start of each 300ms interval, it means that BLE signal has cut off and mode is set to 2, to disable jeep.

> Bluetooth app was chosen as it continuously sends data every 50ms by default even without button presses.

Current configuration

- Switch at rear left top of jeep: Power ON/OFF
- Switch at rear left side of Jeep: 2 modes: Button control, Button and BLE override
    - In Button control mode, control with buttons/joystick only
    - In Button and BLE override, control with buttons/joystick. BLE control will override button/joystick control. If BLE signal disconnects, jeep will be disabled.
- Knob at rear left behind of jeep under light: PWM spindle control, controls forward driving speed.

Further work

- External Leads by screws for connecting 12v lead acid charger to battery for easier charging.
- New front panel Button mounting, possibly 3d print and fit to squarish protrusion at the front panel of car.
- Secure jumper wire connections with hotglue/epoxy.