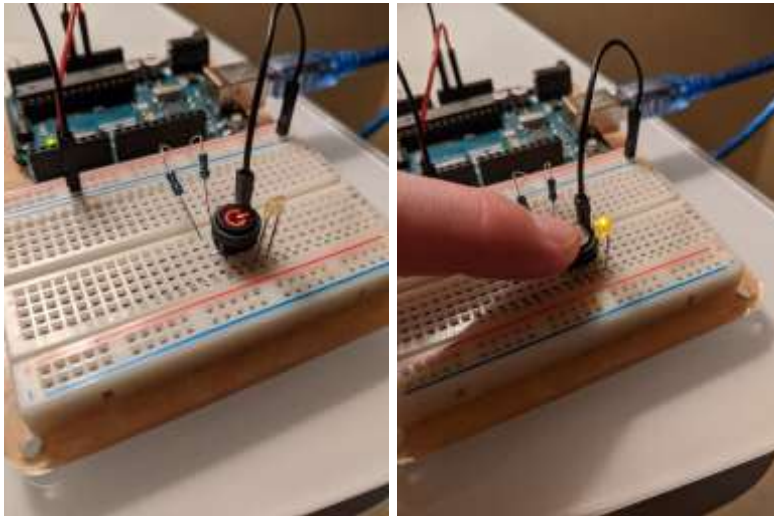


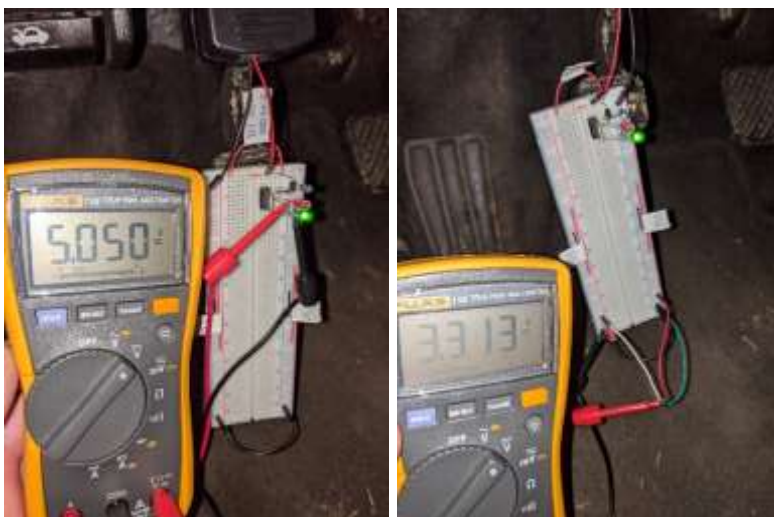
1. ~~Test and confirm LEDs work using an external power supply or the ESP32 microcontroller~~

Completed Jan 11, 2021.



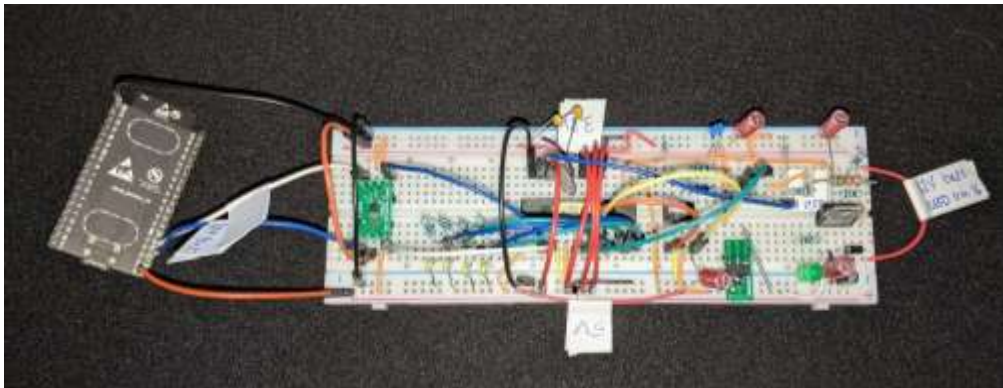
2. ~~Assemble required power circuitry on breadboards, measure and record all relevant voltages~~

Completed Jan 16, 2021.



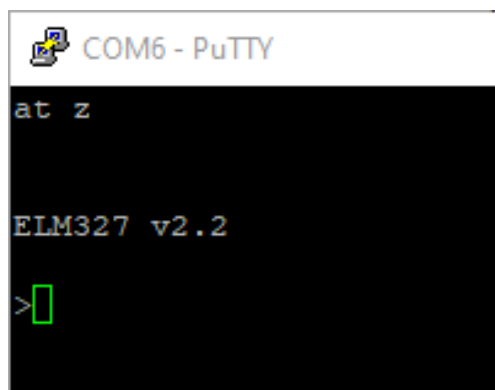
~~3. Finish assembling circuitry on breadboards~~

Completed Jan 23, 2021.



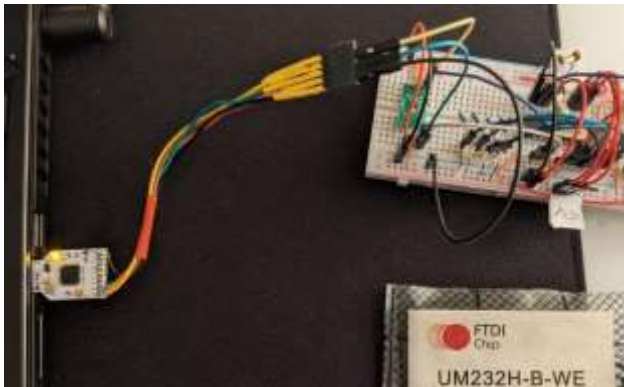
~~4. Test the ELM327 circuit by issuing the command to return the version number~~

Completed Jan 31, 2021.



~~5. Read data from the OBD-II port with a physical connection~~

Completed Jan 31, 2021.



```
>at I
ELM327 v2.2

>at SP 0
OK

>01 00
SEARCHING...
41 00 BE 1F A8 13

>01 05
?

>01 0C
41 0C 00 00

>01 05
41 05 3A
```

6. ~~Interpret data from the OBD-II port with a physical connection~~

Completed Jan 31, 2021.

>at I ELM327 v2.2	at I - returns the version number, confirms the chip is on and functioning
>at SP 0 OK	at SP 0 - tells the ELM327 to search for a protocol automatically based on the connected vehicle
>01 00 SEARCHING... 41 00 BE 1F A8 13	01 00 - initiates the protocol search on the OBD-II port, 41 00 means it is a response to the 01 00 cmd., the last 4 bytes is the requested data (supported PIDs)
>01 05 ?	01 05 - requests the current coolant temperature, this attempt didn't work
>01 0C 41 0C 00 00	01 0C - requests the current engine RPM, the last two bytes, 00 00, is the data indicating 0 RPM (car was off)
>01 05 41 05 3A	01 05 - requests the coolant temperature, the byte 3A is the data in Celcius (58 in decimal), there is an offset of 40 to allow subzero temps. so it is actually 18C/64F
>01 0C 41 0C 00 00	01 0C - confirmed the engine RPM as still 0 then started the car
>01 0C NO DATA	
>01 0C ?	
>01 0C ?	Constantly requesting RPM until car is initialized after starting ...
>01 0C ?	
>01 0C NO DATA	
>01 0C 41 0C 17 0C	Successfully retrieved RPM once car was idling, 17 0C, which is 5,900 but must be divided by 4 since the RPM is read in 1/4 increments, so the RPM was 1,475
>01 0C NO DATA	

## 7. ~~Write data to the OBD-II port with a physical connection~~

Completed Jan 31, 2021.

See image from #6 above.

~~8. Configure the Raspberry Pi to use the external power switch~~

Completed Feb 9, 2021.



~~9. Properly configure Bluetooth connection between ESP32 and Raspberry Pi~~

Completed March 8, 2021.

```
pi@raspberrypi: ~
sudo: startx: command not found
pi@raspberrypi:~ $ sudo bluetoothctl
Agent registered
[bluetooth]# scan on
Discovery started
[CHG] Controller DC:A6:32:44:B0:EE Discovering: yes
[NEW] Device 40:F5:20:71:CA:A2 ESP_SPP_SERVER
[NEW] Device 72:96:33:DB:CE:57 72-96-33-DB-CE-57
[bluetooth]# pair 40:F5:20:71:CA:A2
Attempting to pair with 40:F5:20:71:CA:A2
[CHG] Device 40:F5:20:71:CA:A2 Connected: yes
[NEW] Primary Service
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0001
00001801-0000-1000-8000-00805f9b34fb
Generic Attribute Profile
[NEW] Characteristic
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0001/char0002
00002a05-0000-1000-8000-00805f9b34fb
Service Changed
[NEW] Descriptor
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0001/char0002/desc0004
00002902-0000-1000-8000-00805f9b34fb
Client Characteristic Configuration
[NEW] Primary Service
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028
0000abf0-0000-1000-8000-00805f9b34fb
Unknown
[NEW] Characteristic
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char0029
0000abf1-0000-1000-8000-00805f9b34fb
Unknown
[NEW] Characteristic
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char002b
0000abf2-0000-1000-8000-00805f9b34fb
Unknown
[NEW] Descriptor
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char002b/desc002d
00002902-0000-1000-8000-00805f9b34fb
Client Characteristic Configuration
[NEW] Characteristic
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char002e
0000abf3-0000-1000-8000-00805f9b34fb
Unknown
[NEW] Characteristic
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char0030
0000abf4-0000-1000-8000-00805f9b34fb
Unknown
[NEW] Descriptor
/org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char0030/desc0032
00002902-0000-1000-8000-00805f9b34fb
Client Characteristic Configuration
[CHG] Device 40:F5:20:71:CA:A2 UUIDs: 00001800-0000-1000-8000-00805f9b34fb
[CHG] Device 40:F5:20:71:CA:A2 UUIDs: 00001801-0000-1000-8000-00805f9b34fb
[CHG] Device 40:F5:20:71:CA:A2 UUIDs: 0000abf0-0000-1000-8000-00805f9b34fb
[CHG] Device 40:F5:20:71:CA:A2 ServicesResolved: yes
[CHG] Device 40:F5:20:71:CA:A2 ServicesResolved: no
[CHG] Device 40:F5:20:71:CA:A2 Connected: no
Failed to pair: org.bluez.Error.AuthenticationCanceled
[CHG] Device 72:96:33:DB:CE:57 RSSI: -85
[CHG] Device 72:96:33:DB:CE:57 RSSI: -96
[bluetooth]# connect 40:F5:20:71:CA:A2
Attempting to connect to 40:F5:20:71:CA:A2
[CHG] Device 40:F5:20:71:CA:A2 Connected: yes
```



```
[ESP_SPP_SERVER]# info
Device 40:F5:20:71:CA:A2 (public)
  Name: ESP_SPP_SERVER
  Alias: ESP_SPP_SERVER
  Paired: no
  Trusted: no
  Blocked: no
  Connected: yes
  LegacyPairing: no
  UUID: Generic Access Profile (00001800-0000-1000-8000-00805f9b34fb)
  UUID: Generic Attribute Profile (00001801-0000-1000-8000-00805f9b34fb)
  UUID: Unknown (0000abf0-0000-1000-8000-00805f9b34fb)
  RSSI: -37
[ESP_SPP_SERVER]#

[ESP_SPP_SERVER:/service0028/char002b/descriptor002d]# select-attribute /org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char0029
[ESP_SPP_SERVER:/service0028/char0029]# read
Attempting to read /org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char0029
[CHG] Attribute /org/bluez/hci0/dev_40_F5_20_71_CA_A2/service0028/char0029 Value:
  68 05 79 0d 0a      hey..
  68 05 79 0d 0a      hey..
```

10. Read and interpret data from the OBD-II port over Bluetooth

Incomplete.

11. Write data to the OBD-II port over Bluetooth

Incomplete.

12. Implement ability to monitor battery voltage for Raspberry Pi

Incomplete.

13. Implement ability to read a diagnostic code

Incomplete.

14. Implement ability to read speed, temperatures, pressures, etc.

Incomplete.

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9/14 or 64.28% complete.

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