

Lafayette College | Electrical and Computer Engineering

VSCADA User Manual

ECE 492 Spring 2017

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Initial Setup

1. Download etcher from <https://etcher.io/>
2. Download latest Raspbian img/iso from <https://www.raspberrypi.org/downloads/>
3. Follow etcher.io install instructions
4. Change keyboard to US in Preferences -> Mouse and Keyboard Settings -> Keyboard -> Keyboard Layout

```
sudo raspi-config -> Interfacing options
    SSH -> Yes
    I2C  -> Yes
```

5. Connect to internet/wifi (should just need to select network and follow prompts accordingly)
6. ping www.google.com to check that connection works
7. Update apt-get to latest version

```
sudo apt-get update
```

8. Download tools for PI:

```
sudo apt-get --assume-yes install maven vim
oracle-java8-jdk can-utils
```

9. Download tools for server:

```
sudo apt-get --assume-yes install hostapd isc-dhcp-server
```

10. Download additional tools for server

```
sudo apt-get --assume-yes install iptables-persistent
Select Yes to both prompts
```

Prevent Screen from Sleeping

```
sudo echo "xserver-command=X -s 0 dpms" >>  
/etc/lightdm/lightdm.conf
```

Optional Configurations for VIM

```
echo "set nu" >> ~/.vimrc
```

~/.bashrc Enhancements

```
vim ~/.bashrc  
add:  
    alias ip='ifconfig wlan1 | grep "inet addr" | cut -d ':' -f  
2 | cut -d ' ' -f 1'  
  
save and close  
source ~/.bashrc
```

Server Setup

Option 1:

Follow the below tutorial (change wlan0 to wlan1 and omit mention of the driver, I'd recommend commenting it out.

<https://learn.adafruit.com/setting-up-a-raspberry-pi-as-a-wifi-access-point>

Option 2:

Follow the tutorial I have provided on the last page

CAN Setup

```
sudo modprobe can  
sudo modprobe can_raw  
sudo modprobe can  
sudo ip link add dev can0 type can bitrate 125000  
sudo ip link set up can0
```

Getting and Running VSCADA

```
git clone
https://github.com/LafayetteFormulaElectricVehicle/VSCADA.git

cd VSCADA/

./compile

./viewer or ./cockpit
```

Editing VSCADA Code

It is recommended that you use IntelliJ as it is a clean and simple user experience with great debugging tools. Additionally it handles all work with imports and it's very easy to import new packages. If you need another reason, IntelliJ is available on Linux, Mac and Windows. You can get the latest version of IntelliJ from <https://www.jetbrains.com/idea/download/>.

Running Code from the Command Line With Maven

Compiling:

```
mvn compile
```

Executing:

```
mvn exec:java -Dexec.mainClass="<yourMainClassNameHere>"
```

Server Setup

1. `sudo su`
2. Vim nano `/etc/dhcp/dhcpd.conf`
 - a. Comment out
 - b. `option domain-name "example.org";`
 - c. `option domain-name-servers ns1.example.org, ns2.example.org;`
2. Ensure authoratative line is uncommented
3. Enter into file at end:

```
subnet 192.168.42.0 netmask 255.255.255.0 {  
    range 192.168.42.10 192.168.42.50;  
    option broadcast-address 192.168.42.255;  
    option routers 192.168.42.1;  
    default-lease-time 600;  
    max-lease-time 7200;  
    option domain-name "local";  
    option domain-name-servers 8.8.8.8, 8.8.4.4;  
}
```

4. Save and close file
5. `vim /etc/default/isc-dhcp-server`
6. Set `INTERFACES="" -> INTERFACES="wlan1"`
7. Save and close file
8. `ifdown wlan1`
9. `vim /etc/network/interfaces`
10. Comment out any existing lines for wlan1 except for the one regarding hotplug
11. Add the lines

```
iface wlan1 inet static  
    address 192.168.42.1  
    netmask 255.255.255.0
```

```
ifconfig wlan1 192.168.42.1
```

12. vim /etc/hostapd/hostapd.conf

13. Paste in the code

```
interface=wlan1
ssid=VSCADAWifi
country_code=US
hw_mode=g
channel=6
macaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
wpa=2
wpa_passphrase=notSCADA
wpa_key_mgmt=WPA-PSK
wpa_pairwise=CCMP
wpa_group_rekey=86400
ieee80211n=1
wme_enabled=1
```

14. Save and close

15. vim /etc/default/hostapd

16. Make sure the line with DAEMON_CONF reads as follows and is uncommented

```
DAEMON_CONF="/etc/hostapd/hostapd.conf"
```

17. Save and close

18. vim /etc/sysctl.conf

19. Ensure the line about net.ipv4.ip_forward is as follows

```
net.ipv4.ip_forward=1
```

20. Save and close

21. sh -c "echo 1 > /proc/sys/net/ipv4/ip_forward"

22. Run the following commands

```
sudo iptables -t nat -A POSTROUTING -o eth0 -j MASQUERADE
sudo iptables -A FORWARD -i eth0 -o wlan1 -m state -state
RELATED,ESTABLISHED -j ACCEPT
sudo iptables -A FORWARD -i wlan1 -o eth0 -j ACCEPT
sudo sh -c "iptables-save > /etc/iptables/rules.v4"
```

23. To start the server

```
hostapd /etc/hostapd/hostapd.conf
```

24. Additional Steps to start server on boot

```
sudo service hostapd start
sudo service isc-dhcp-server start
sudo update-rc.d hostapd enable
sudo update-rc.d isc-dhcp-server enable
```

25. Reboot PI

26. Everything should be up and running