



Arduino, meet Fonera

Quick & Dirty Wireless Networking for your uC Project

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Existing Options

- Ethernet: shield + XPort = \$35-\$65
... but has wires
- Bluetooth: \$65 BlueSMiRF
... but no IP
- Wifi: nothing under \$100

Routers to the Rescue

- Linksys WRT54G + hackers + GPL = custom firmwares
- Sveasoft, Tomato, DD-WRT, OpenWRT
- Lots of compatible devices
... many have serial ports

Hola, Fonera

- The cheapest compatible router:
Fonera
- Others can do more!
(Ipkg; NSLU2)
- Yes, I am a bad person



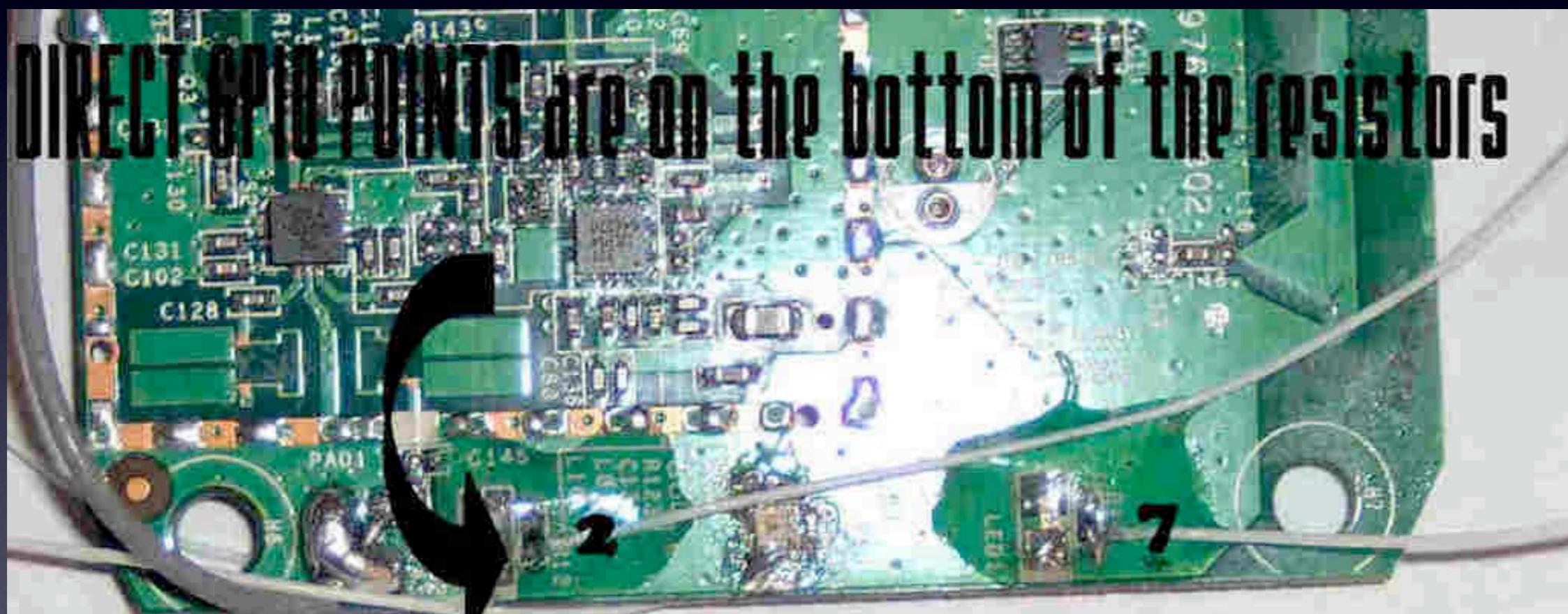
My Punishment

- Flashing is a PITA
- Basic instructions for the latest (2100/2200)
- Kolofonium RADIUS DNS hack enables SSH
- These are the files you're looking for
- copy files via SSH / telnet into redboot /
overwrite existing firmware via tftp
- Expect “load -r -v -b 0x80041000 root.fs” to
fail the first time (without brickling)

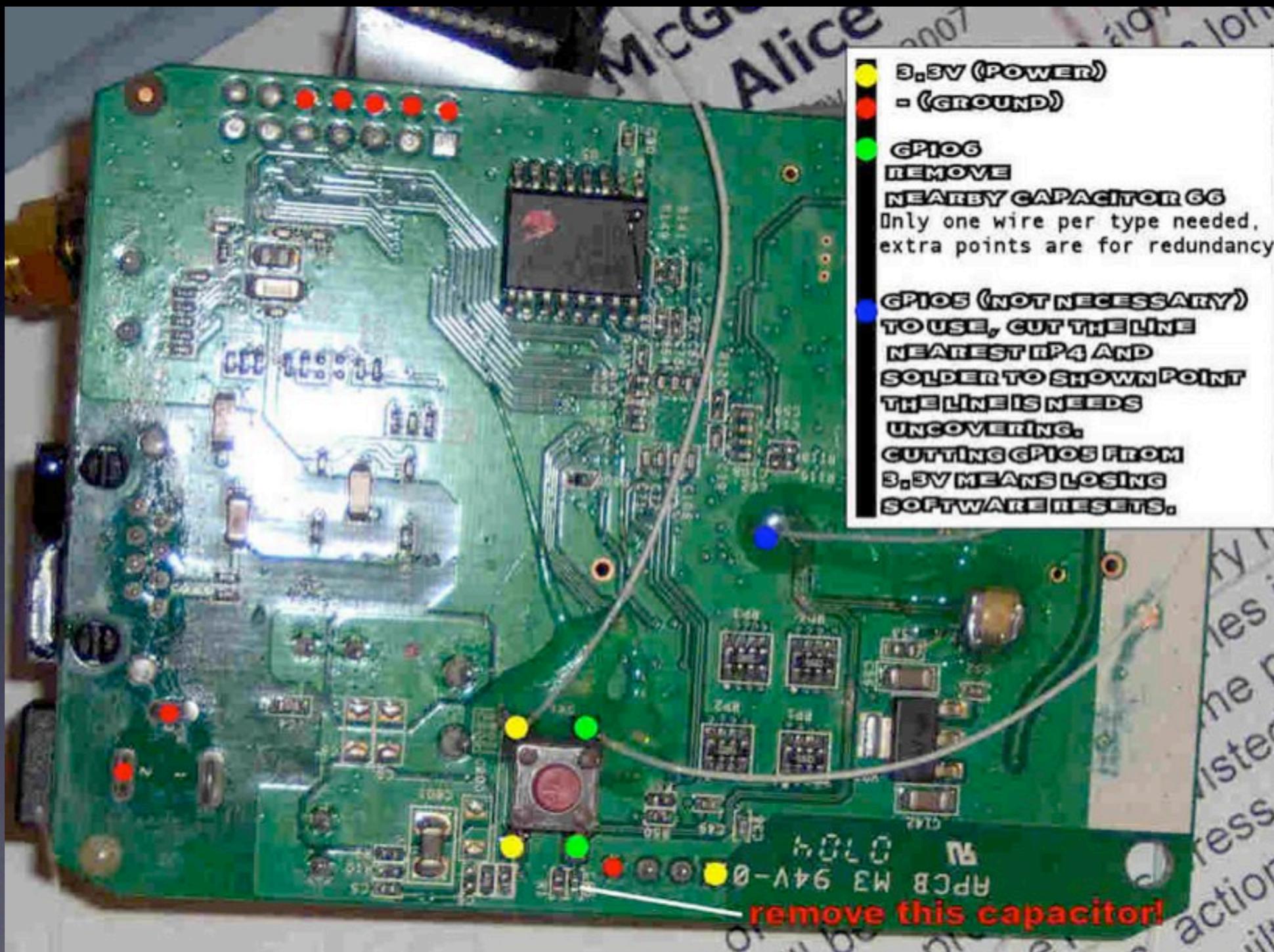
Congratulations!

- Client mode in “Wireless” tab
- Cron & Startup scripts (Admin|Command)
- JFFS2 Partition
- You can now hook it up to your Arduino!
- ... But do you need to?

8 GPIO Pins



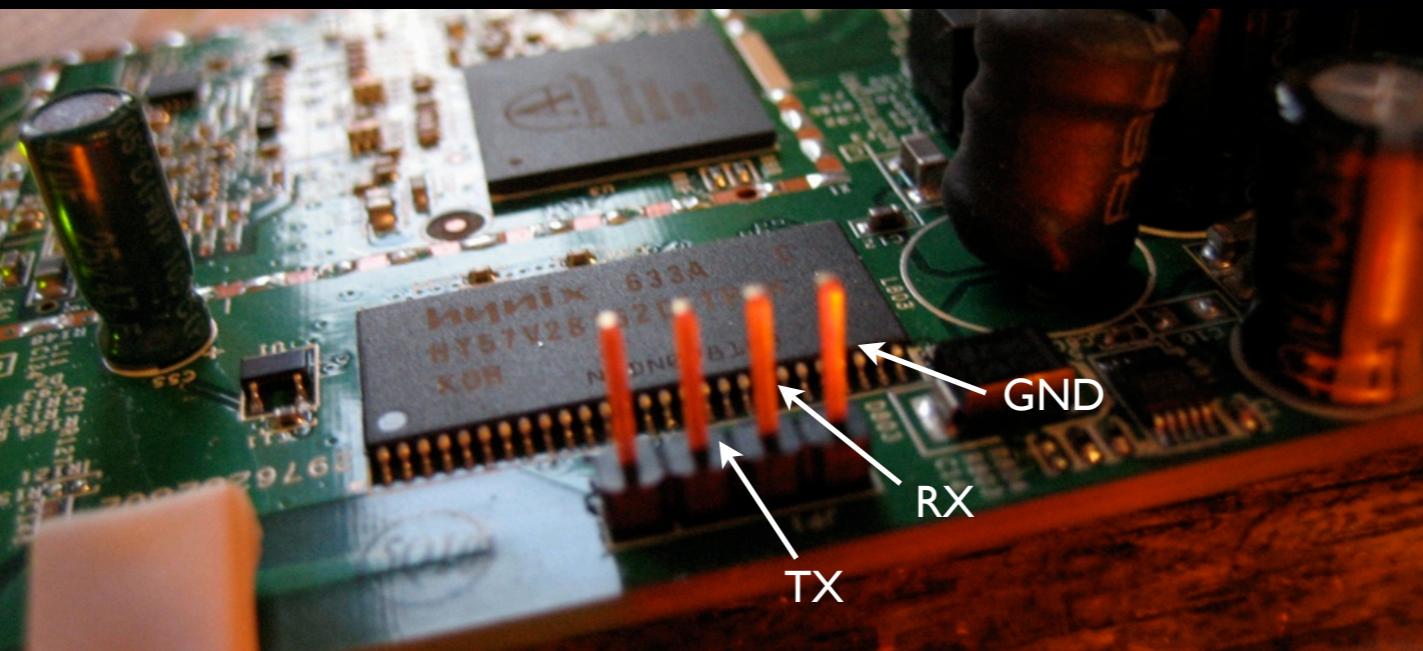
8 GPIO Pins



Controlling GPIO

- echo 1 > /proc/gpio/2_out
- SD/MMC expansion
- Audio

Serial Communication



- Unify ground & lower the serial rate
- Can use the Fonera's +7.5V if you want
- echo “whatever” > /dev/tts/0

What'd I Use It For?

- WMATA Rideguide Ambient Display



Startup Script

```
stty -F /dev/tts/0 9600
LINECOUNT=`ping -c1 myserver.com|wc -l`
while [ $LINECOUNT -ne 6 ]
do
    echo "waiting for network to come up..."
    sleep 5
    LINECOUNT=`ping -c1 myserver.com|wc -l`
done
/jffs/etc/bus-o-meter/launch.sh&
```

Launcher

(also called by cron)

```
killall bus-o-meter.sh  
/jffs/etc/bus-o-meter/bus-o-meter.sh&
```

Main Fonera Script

```
#!/bin/sh
echo "starting bus-o-meter..." > /dev/tts/0
while [ 1 ]
do
WMATATIMES=`wget -q -O - http://myserver.com/pub/bus-o-meter/wrapper.php`
MINTIME=0
LASTLINE=""
for line in $WMATATIMES
do
# ensure that we do not print the last line
if [ $LASTLINE ]
then
echo "#$LASTLINE" > /dev/tts/0
fi
LASTLINE=`printf "%06d" $line`
# store the value of the last line -- we use this to sleep
MINTIME=$line
done
SLEEPTIME=`expr $MINTIME \+ 15`
echo "sleeping for $SLEEPTIME"
sleep $SLEEPTIME
done
```

Server-side Script

```
#!/usr/bin/ruby

require 'wmatarideguide.rb'

queries = [
    ['Foggy Bottom Metro', 'Vienna Metro', :rail, 300],
    ['Foggy Bottom Metro', 'Metro Center', :rail, 300]
]

w = WMATARideGuide.new
queries.each do |origin, destination, mode, walking_time|
    next_ride = w.get_next_time(origin, destination, mode)
    if ((next_ride==:ambiguous)|| (next_ride==:not_found))
        next_ride = (Time.now + 4*60*60)
    end
    next_ride_in_seconds = (next_ride - Time.now).floor.abs
    results.push(next_ride_in_seconds)
    puts next_ride_in_seconds, walking_time
end

puts results.min # tells fonera to sleep until next train
```

Arduino as Multiplexer

- Parse incoming serial data into numbers
- Countdown timer
- LED control

Hardest Parts?

- Bezel
- Printing decent meters
- Networking issues

Podcast, Photos & Code

http://www.manifestdensity.net/2008/03/26/dorkbot_arduino_and_fonera/