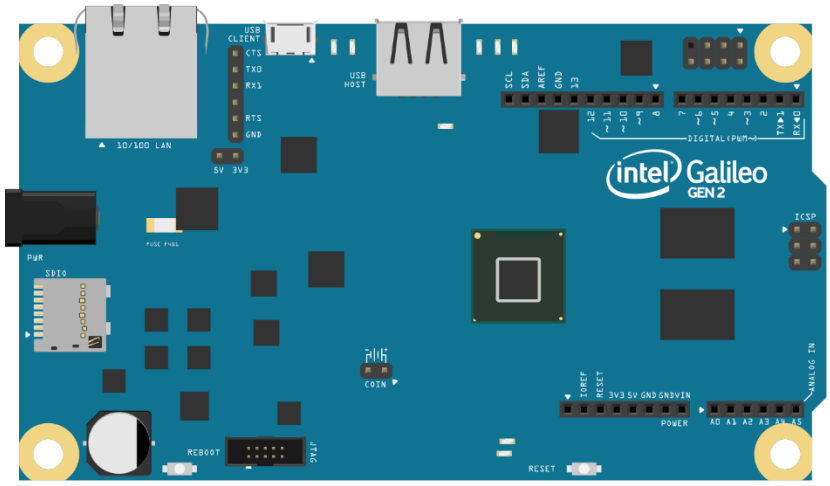
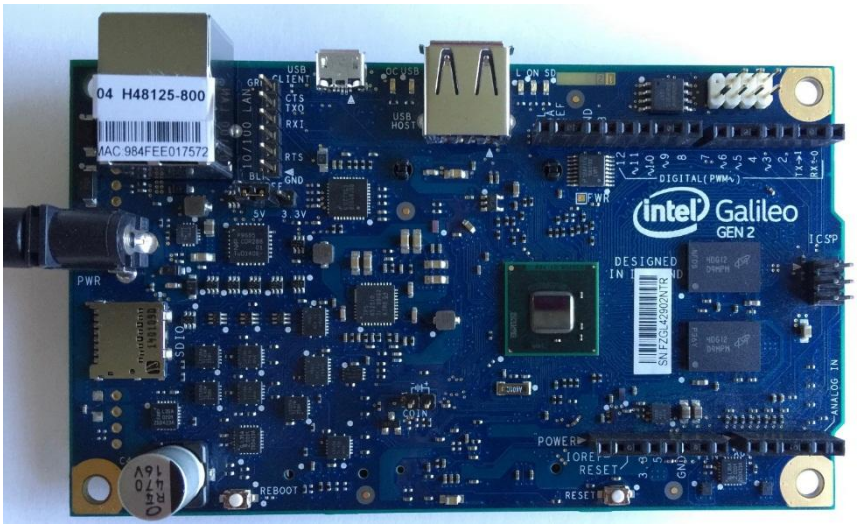
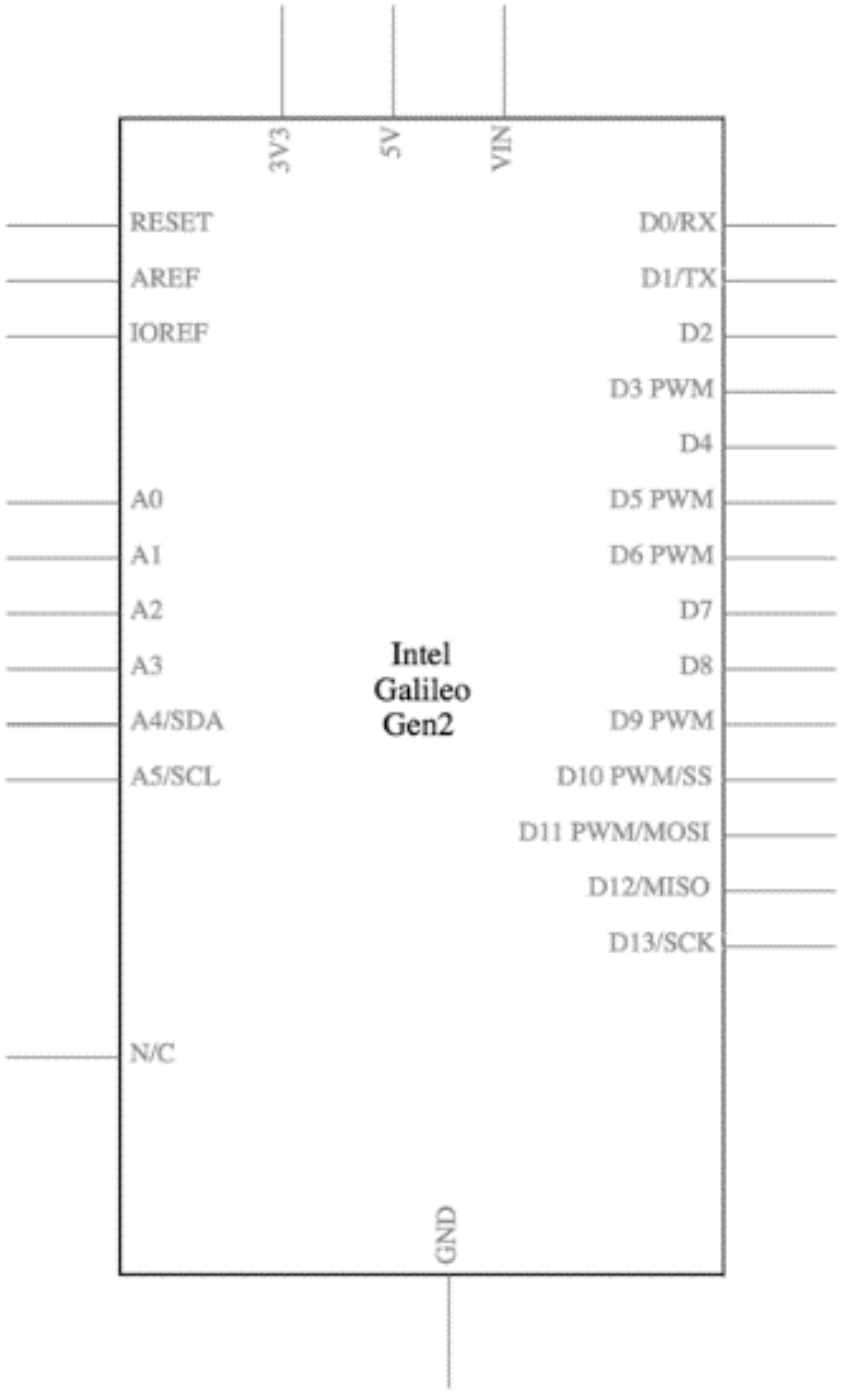
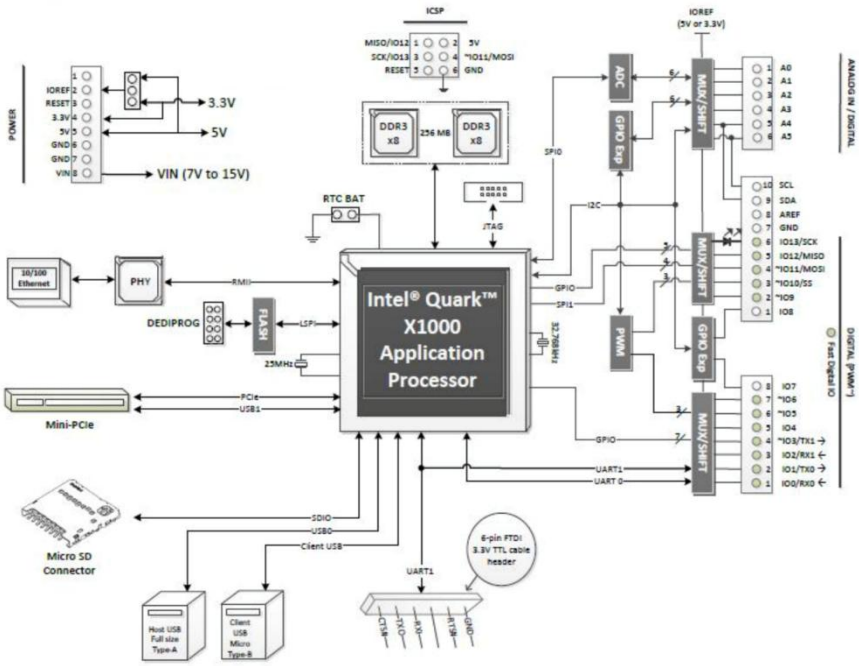
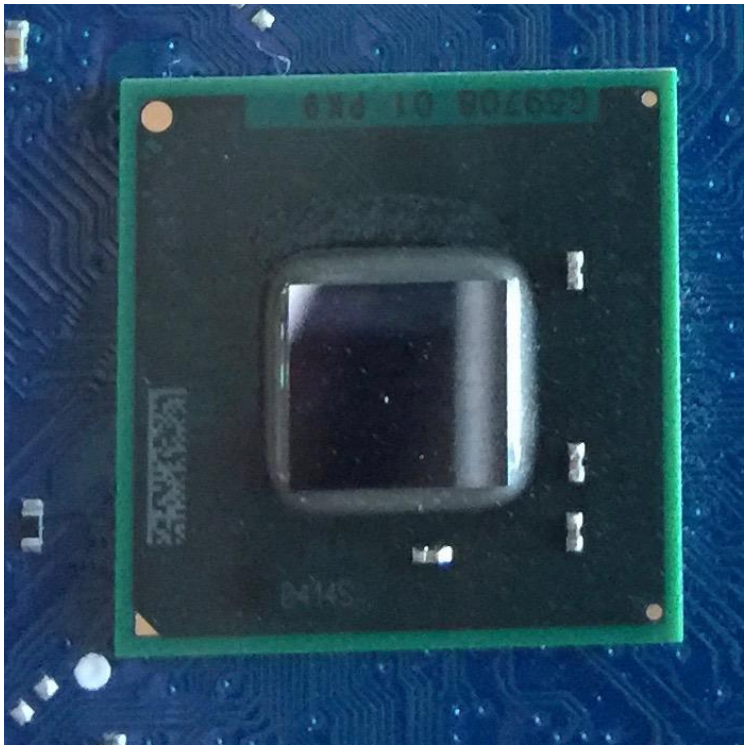
Chapter 1: Understanding and Setting up the Base IoT Hardware



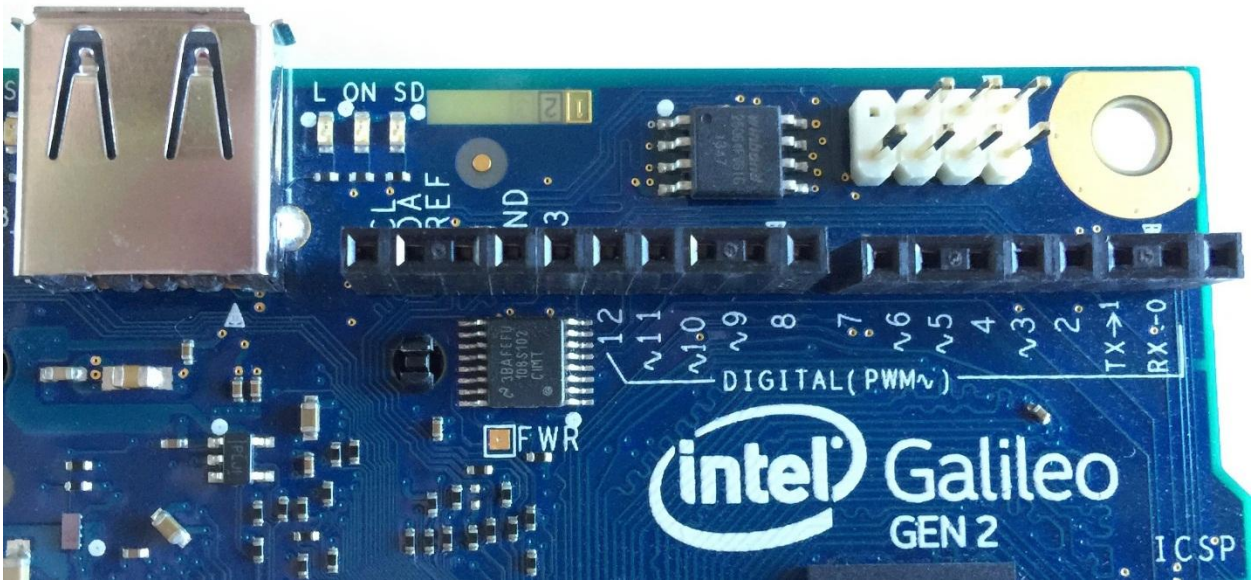


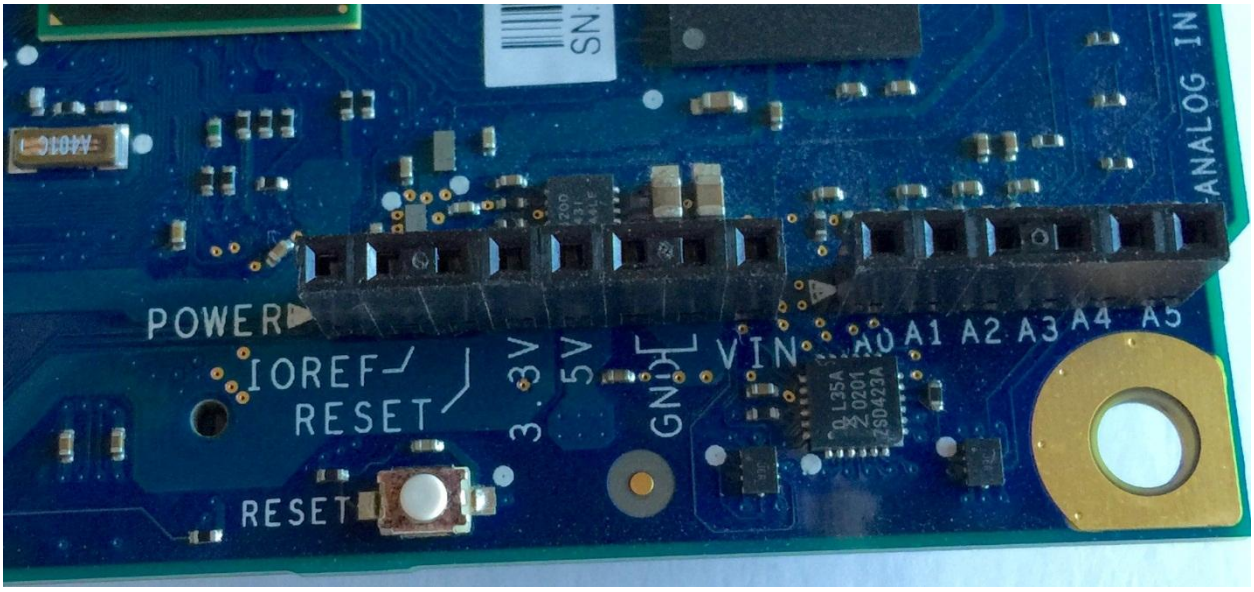

3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
Intel
Galileo
Gen2
GND

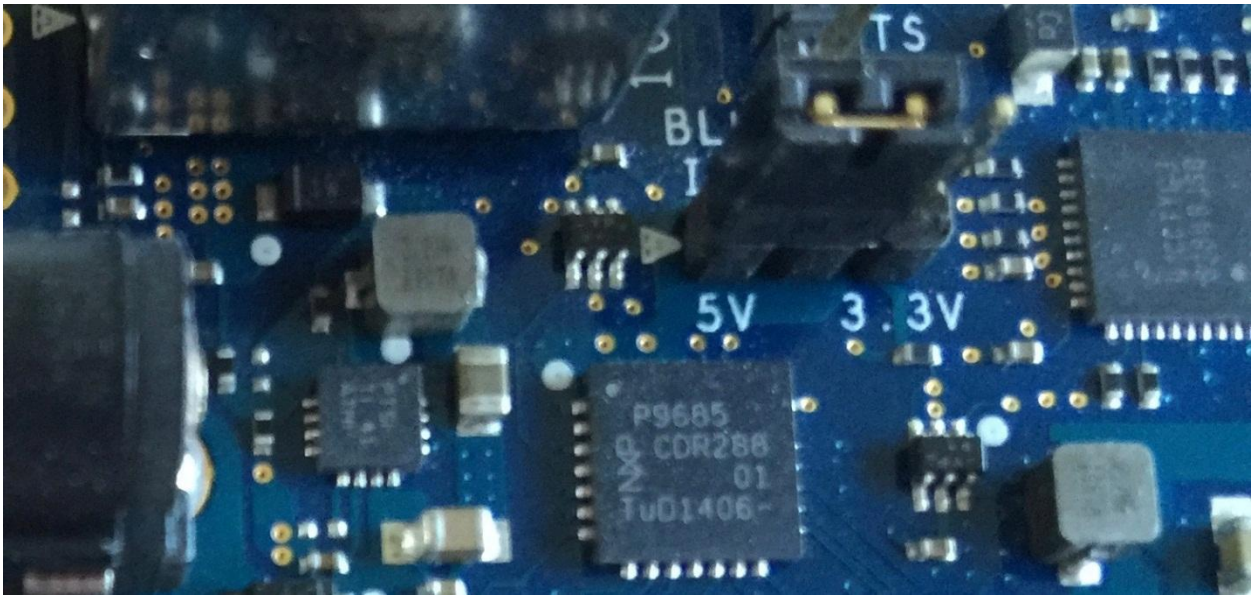

ICSP
IOREF
(5V or 3.3V)
POWER
3.3V
5V
VIN (7V to 15V)
DDR3
x8
256 MB
DDR3
x8
RTC BAT
JTAG
ADC
GPIO Exp
MUX/SHIFT
ANALOG IN / DIGITAL
SCL
SDA
AREF
GND
IO13/SCK
IO12/MISO
~IO11/MOSI
~IO10/SS
~IO9
IO8
IO7
~IO6
~IO5
IO4
~IO3/TX1
IO2/RX1
IO1/TX0
IO0/RX0
DIGITAL (PWM~)
Fast Digital IO
10/100
Ethernet
PHY
RMII
DEDIPROG
FLASH
LSPI
25MHz
32.768kHz
Intel® Quark™
X1000
Application
Processor
SPI0
I2C
GPIO
SPI1
PWM
Mini-PCIe
PCIe
USB1
UART1
UART 0
SDIO
USB0
Client USB
Micro SD
Connector
6-pin FTDI
3.3V TTL cable
header
Host USB
Full size
Type-A
Client
USB
Micro
Type-B
CTS
TXO
3V3
RTS
GND

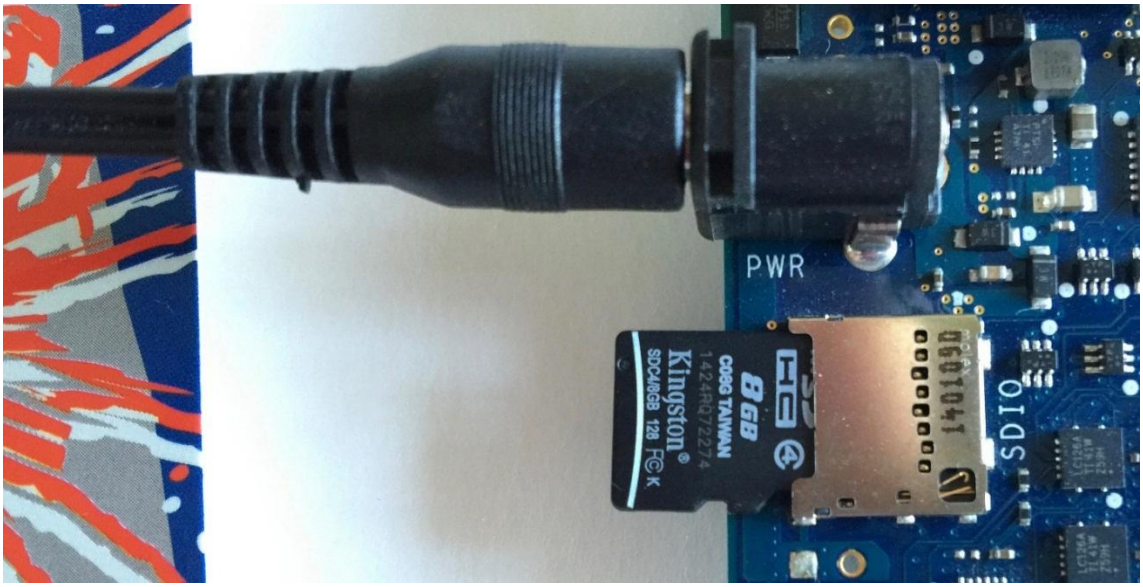


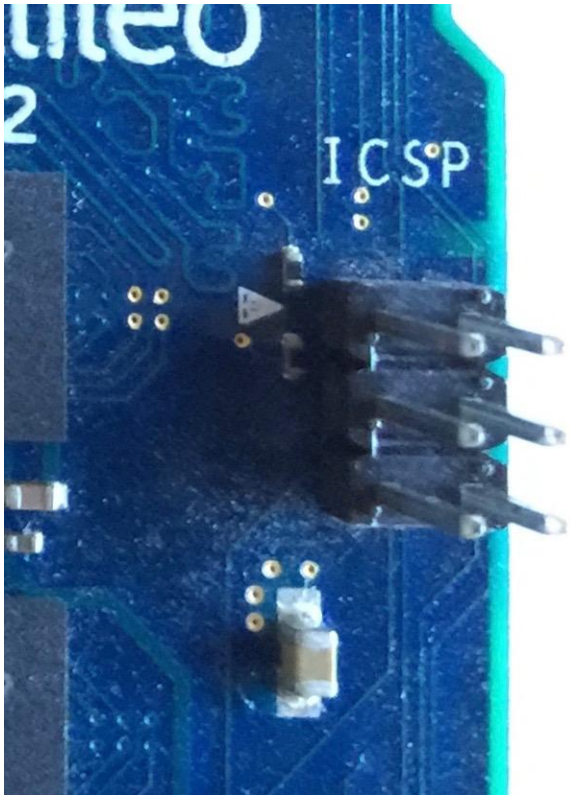

intel Galileo
GEN 2
ICSP
DESIGNED
SN:FZGL42902NTR
4DG12
D9MPM
4DG12
D9MPM


ON
DIGITAL(PWM~)
TX→1
RX←0
intel Galileo
GEN 2
ICSP

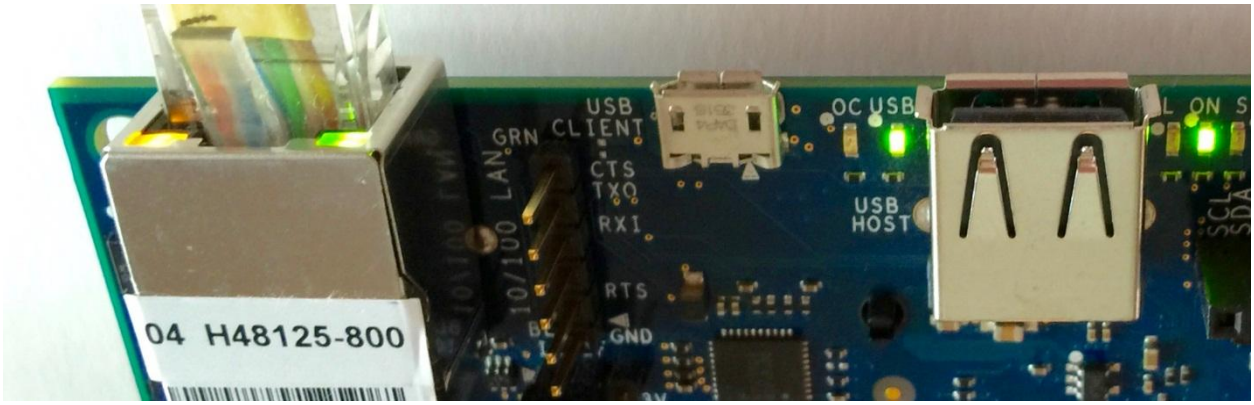

POWER
IOREF
RESET
3.3V
5V
GND
VIN
A0 A1 A2 A3 A4 A5
RESET
ANALOG IN

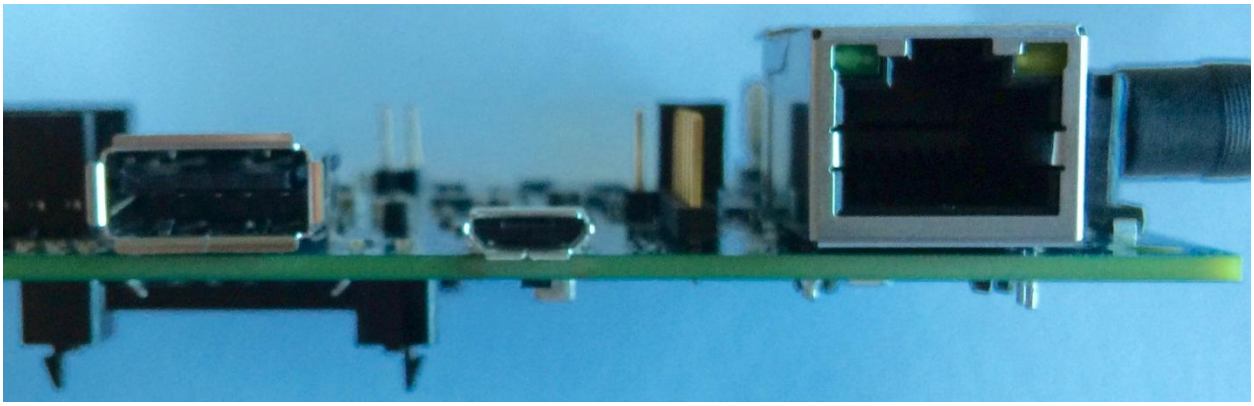

TS
5V
3.3V
P9685
CDR288
01


PWR
Kingston
8GB
SDC4/8GB
SDIO

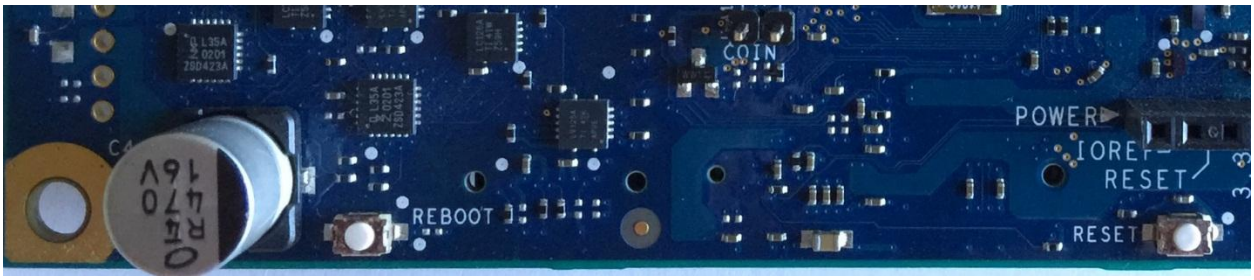

ICSP

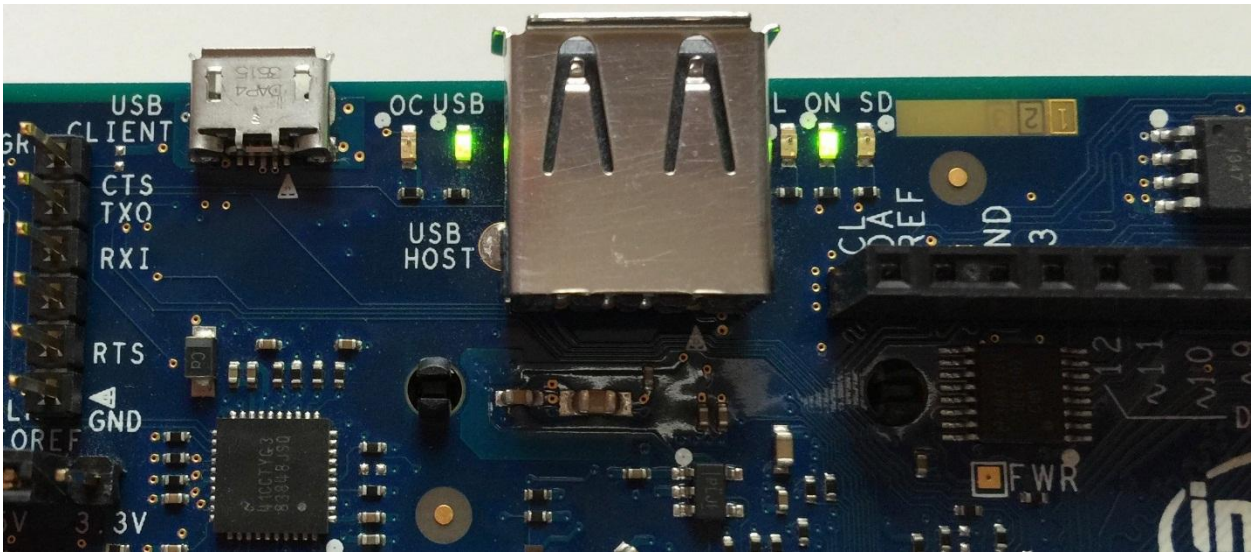

USB
GRN CLIENT
LAN
10/100
CTS
TXO
RXI
RTS
GND
04 H48125-800
MAC 984FEE017572

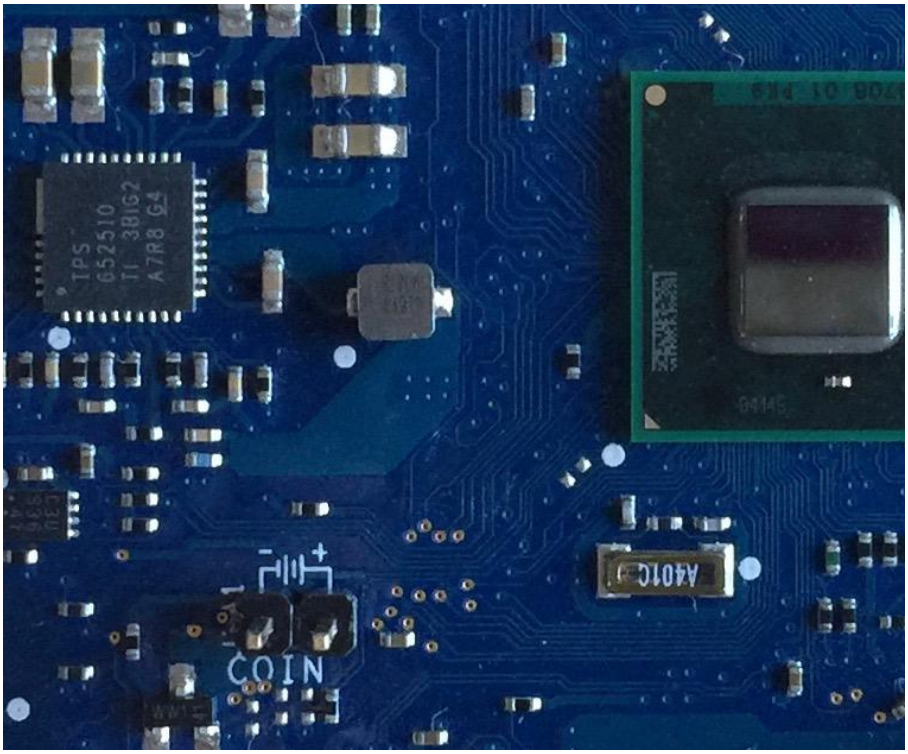

USB
GRN CLIENT
LAN
10/100
CTS
TXO
RXI
RTS
GND
OC USB
USB
HOST
04 H48125-800




JTAG
TMS
TCK
TDO
TDI
TRST
LB1
PCIE
LB3
MAC ADDRESS
POWER 0V


COIN
POWER
RESET
REBOOT
RESET


USB
CLIENT
OC USB
CTS
TXO
RXI
USB
HOST
RTS
GND
3.3V
FWR


COIN

Intel® Galileo Firmware and Drivers 1.0.4

Version: 1.0.4 (Latest) Date: 5/4/2015

Available Downloads

OS Independent

Language: English
Size: 0 MB

checksums.txt

OS Independent

Language: English
Size: 9.42 MB

IntelGalileoFirmwareUpdater-1.0.4.jar

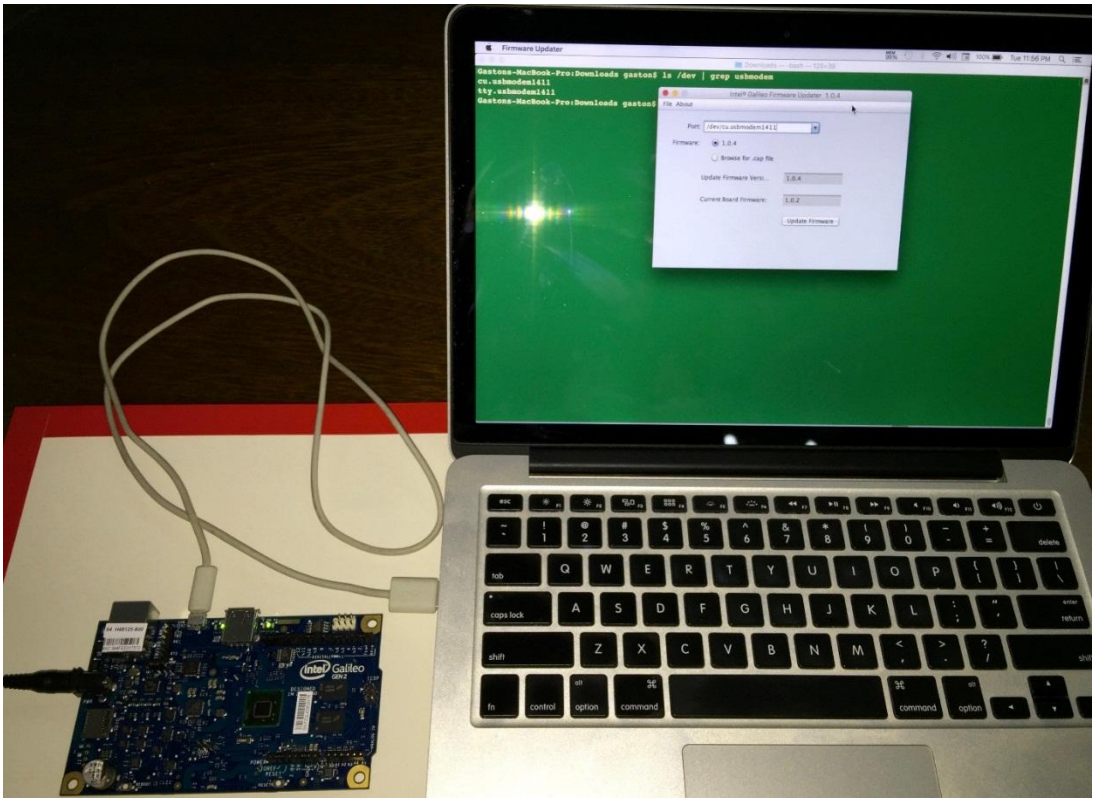
Detailed Description

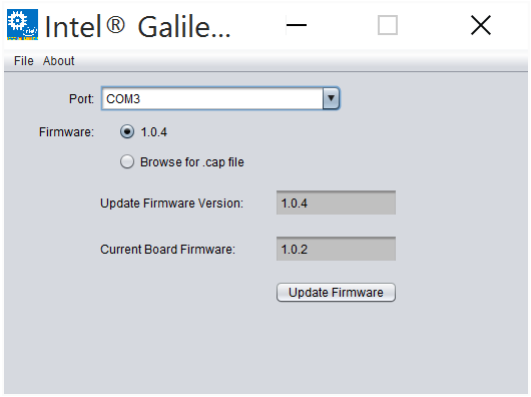
The Intel® Galileo Firmware Updater tool is a standalone application used to update Intel Galileo's firmware on Windows*, Linux* and Mac OS X*. This software tool can be used to update Intel® Galileo Boards and Intel® Galileo Gen 2 Boards with the official Intel firmware that comes embedded in the application or with your own custom firmware.

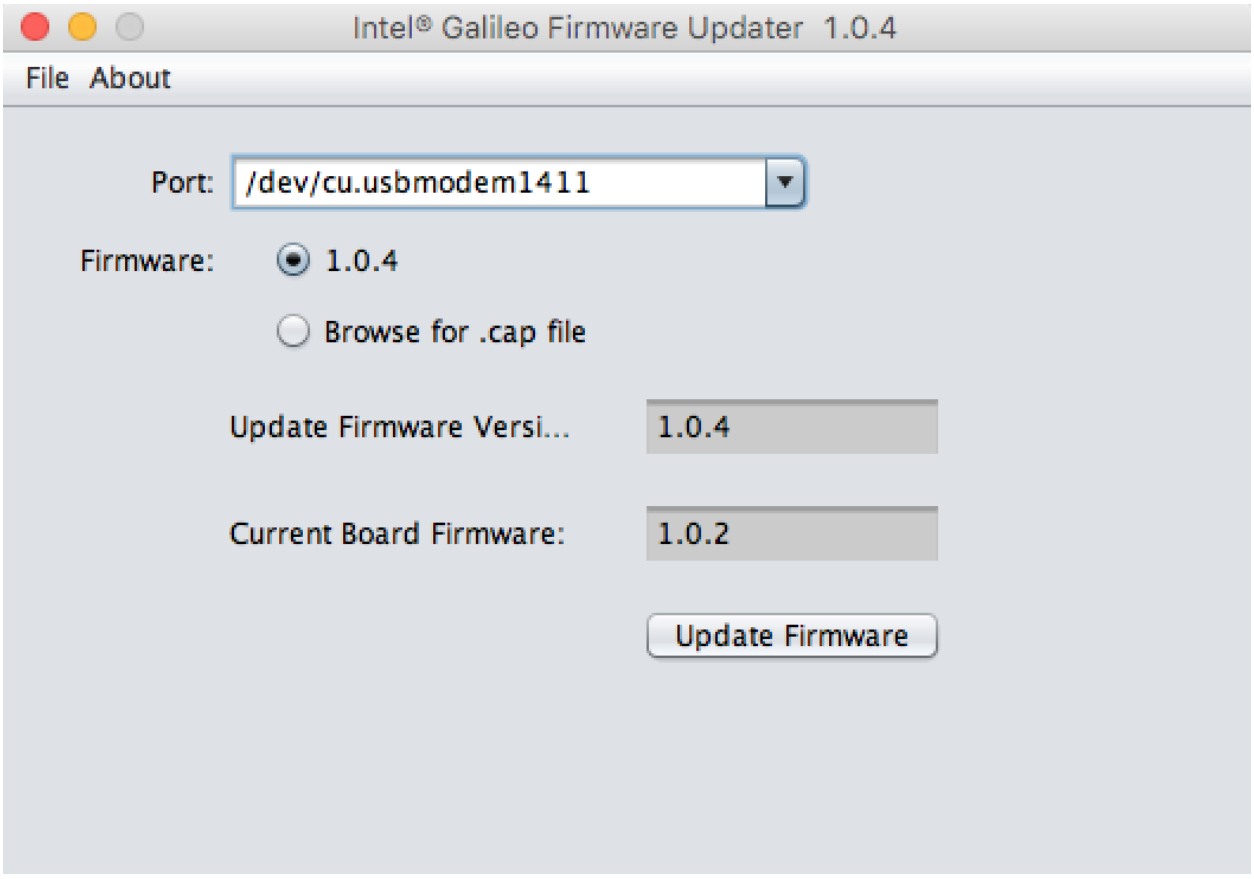
Windows drivers for Intel Galileo and Intel Galileo Gen2 that contains the linux-cdc-acm.inf and linux-cdc-acm.cat used for the correct enumeration of Intel Galileo Boards and Intel Galileo Gen 2 Boards.

This download is valid for the product(s) listed below.

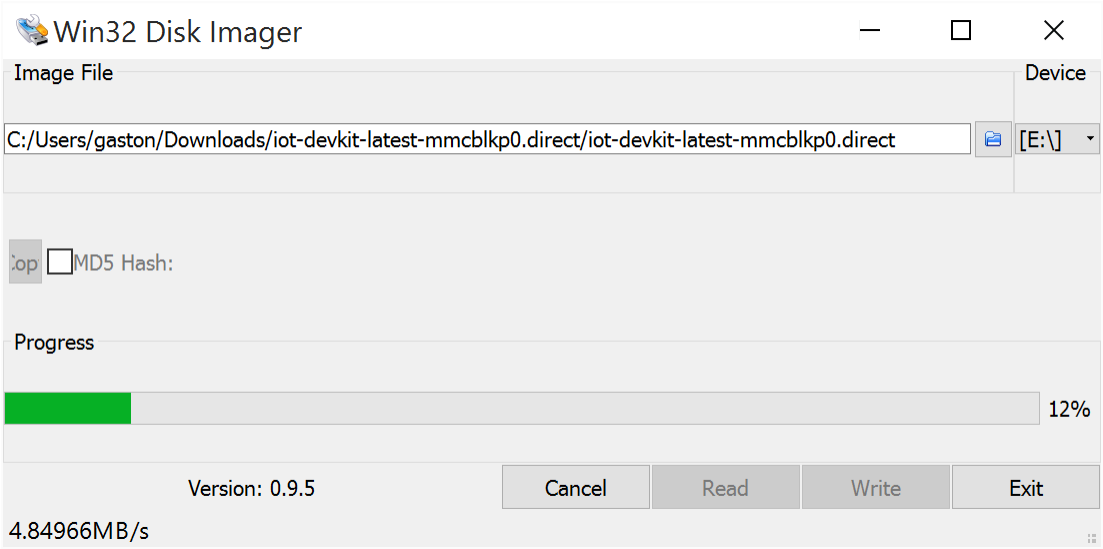
Intel® Galileo Board
Intel® Galileo Gen 2 Board

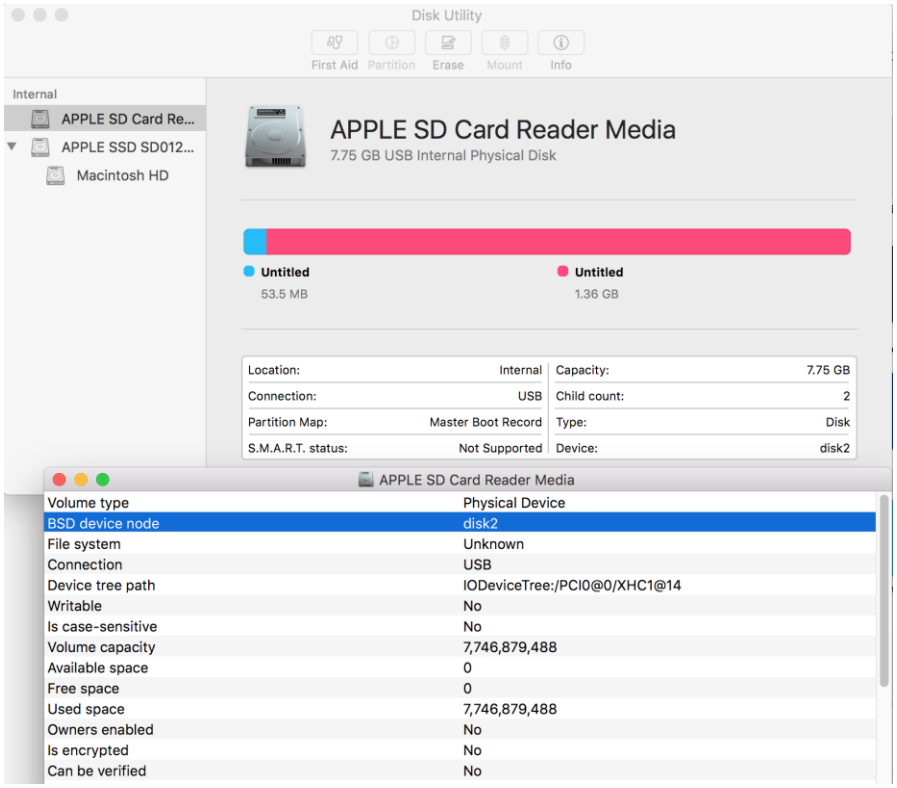

Firmware Updater
Gastons-MacBook-Pro:Downloads gaston$ ls /dev | grep usbmodem
cu.usbmodem1411
tty.usbmodem1411
Gastons-MacBook-Pro:Downloads gaston$
Intel Galileo

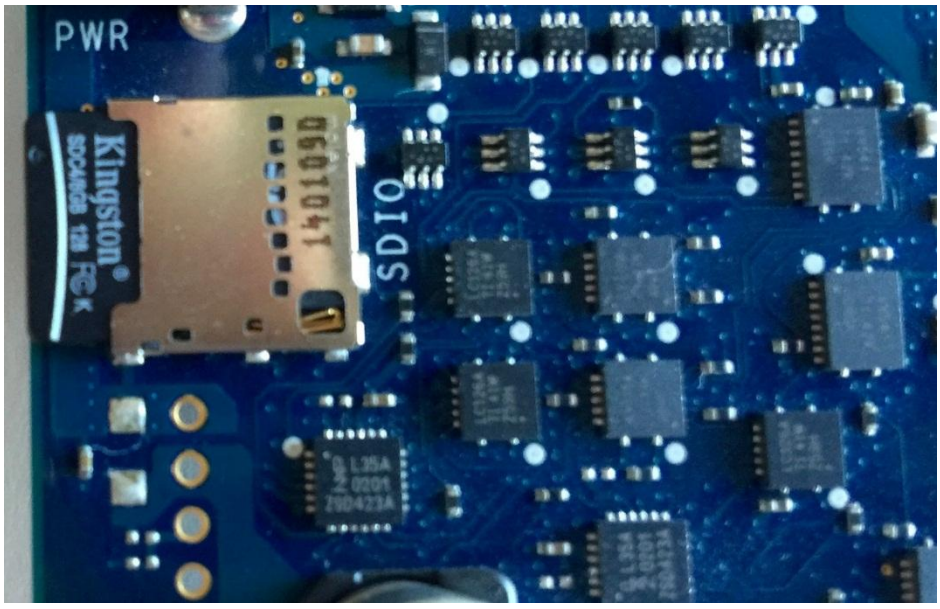

Intel® Galile...
File About
Port: COM3
Firmware: 1.0.4
Browse for .cap file
Update Firmware Version: 1.0.4
Current Board Firmware: 1.0.2
Update Firmware

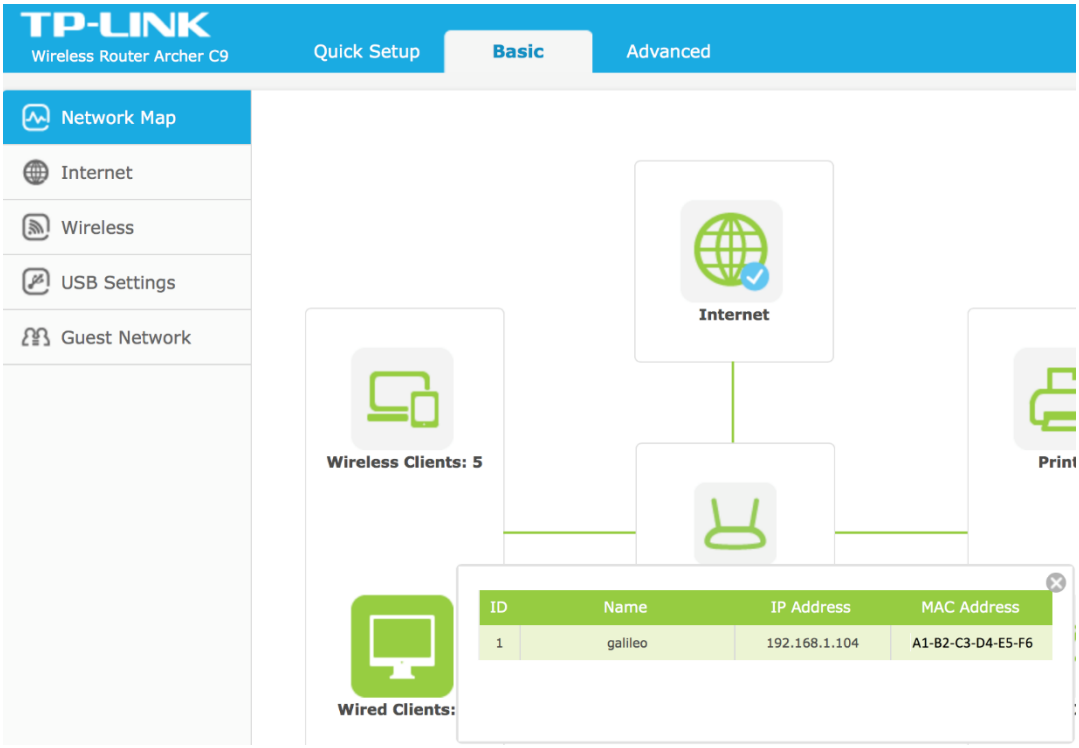

Intel® Galileo Firmware Updater 1.0.4
File About
Port:
/dev/cu.usbmodem1411
Firmware:
1.0.4
Browse for .cap file
Update Firmware Versi...
1.0.4
Current Board Firmware:
1.0.2
Update Firmware

Chapter 2: Working with Python on Intel Galileo Gen 2




Disk Utility
First Aid
Partition
Erase
Mount
Info
Internal
APPLE SD Card Re...
APPLE SSD SD012...
Macintosh HD
APPLE SD Card Reader Media
7.75 GB USB Internal Physical Disk
Untitled
53.5 MB
Untitled
1.36 GB
Location: Internal
Capacity: 7.75 GB
Connection: USB
Child count: 2
Partition Map: Master Boot Record
Type: Disk
S.M.A.R.T. status: Not Supported
Device: disk2
APPLE SD Card Reader Media
Volume type Physical Device
BSD device node disk2
File system Unknown
Connection USB
Device tree path IODeviceTree:/PCI0@0/XHC1@14
Writable No
Is case-sensitive No
Volume capacity 7,746,879,488
Available space 0
Free space 0
Used space 7,746,879,488
Owners enabled No
Is encrypted No
Can be verified No

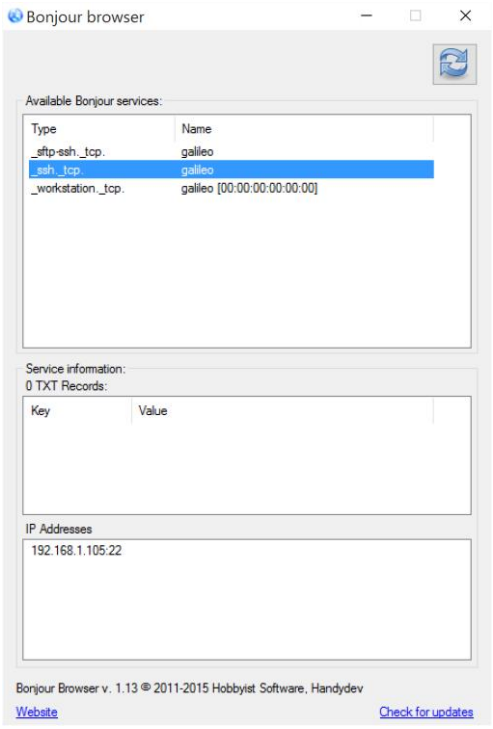

PWR
Kingston
SDIO

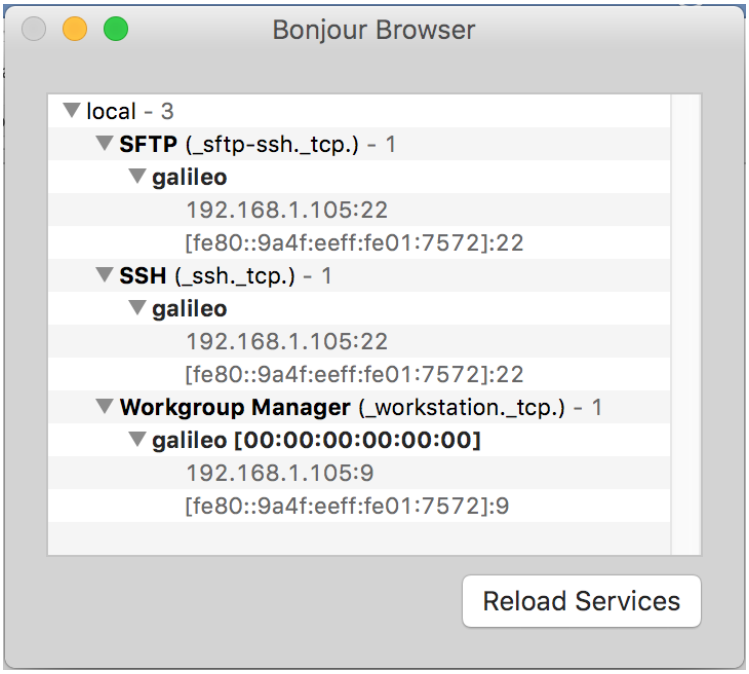


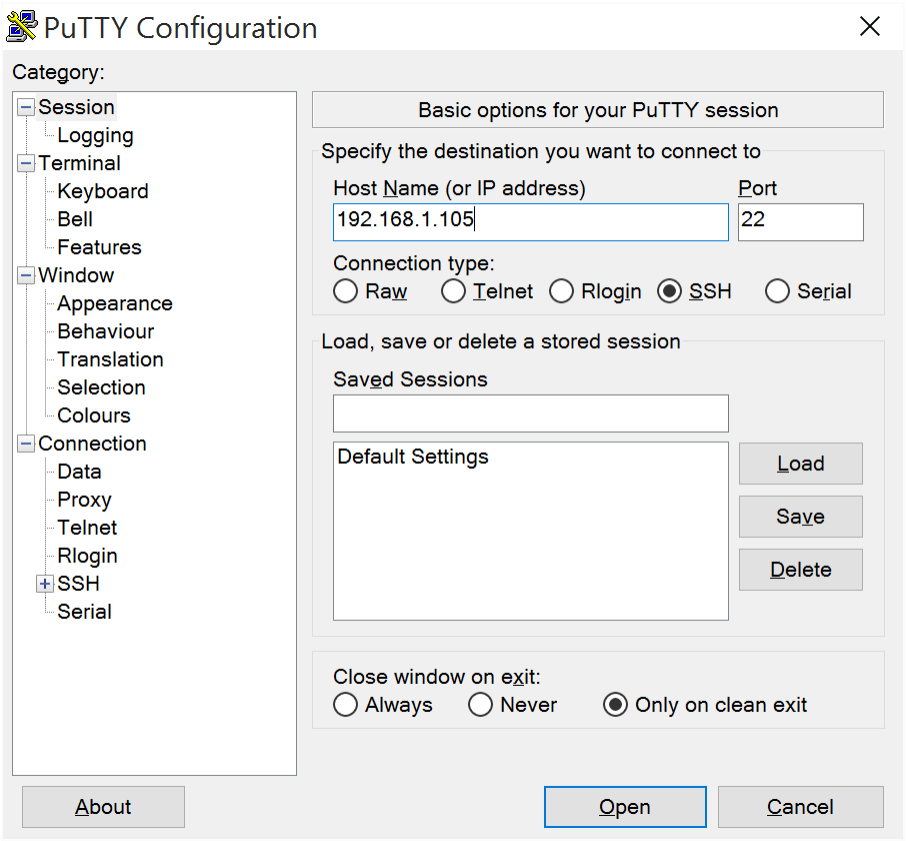
DHCP Client List

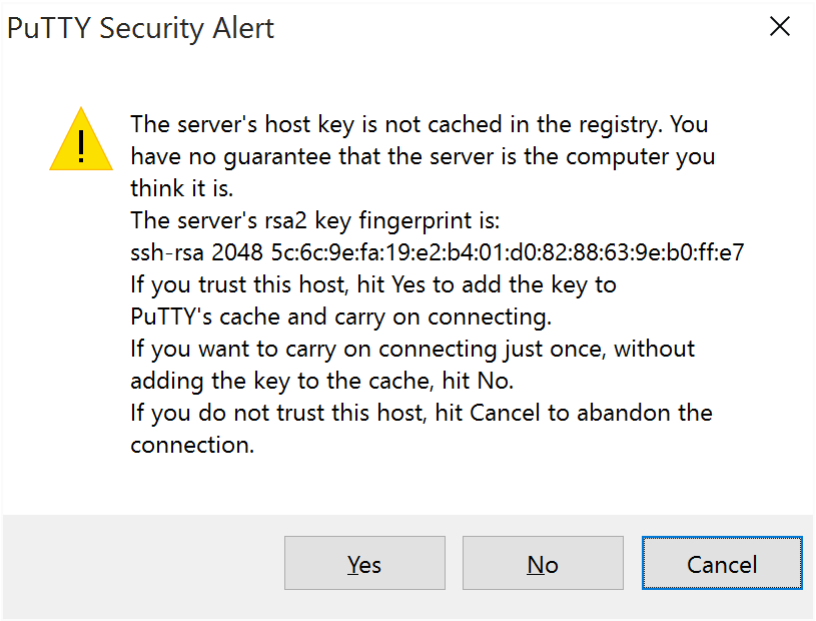
ID	Client Name	MAC Address	Assigned IP	Lease Time
1	Unknown	94-[illegible]-3D	192.168.1.100	01:48:48
2	Gastons-iPhone	A0-[illegible]-DD	192.168.1.101	01:54:57
3	iPad	E4-[illegible]-5E	192.168.1.102	01:49:11
4	Gastons-MBP	80-[illegible]	192.168.1.103	01:49:38
5	galileo	A1-B2-C3-D4-E5-F6	192.168.1.104	01:50:08
6	Gastons-iPad	B0-[illegible]-17	192.168.1.105	01:55:39

Refresh

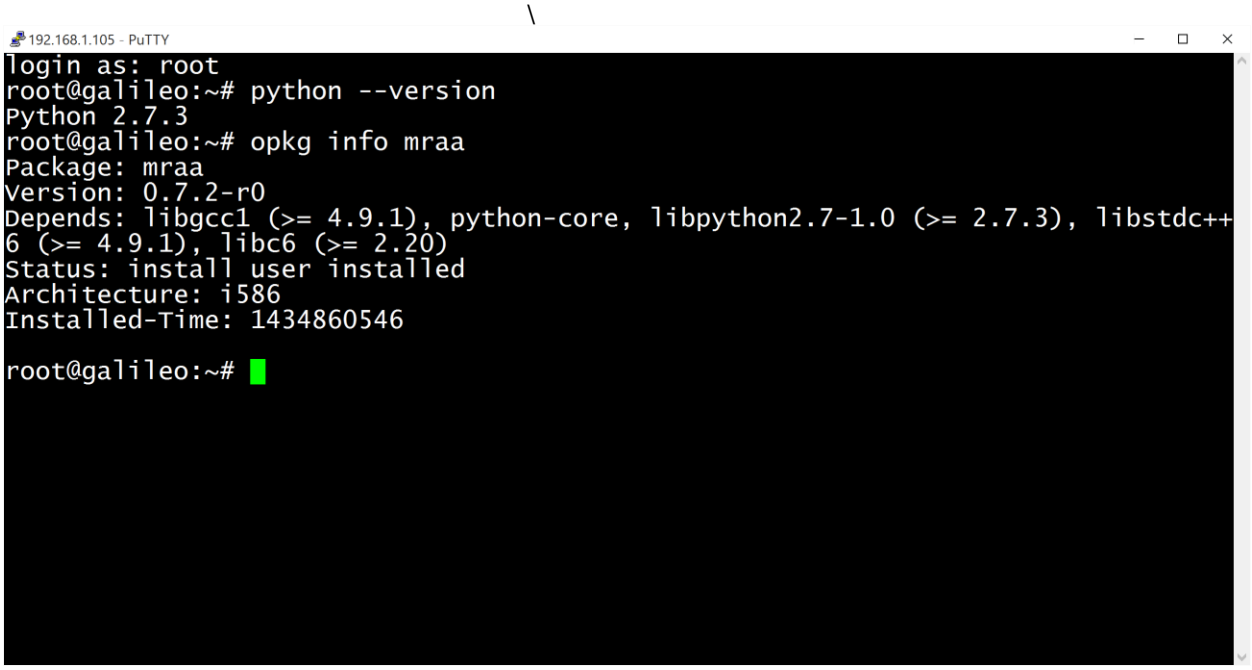

Bonjour browser
Available Bonjour services:
Type
Name
_sftp-ssh._tcp.
galileo
_ssh._tcp.
galileo
_workstation._tcp.
galileo [00:00:00:00:00:00]
Service information:
0 TXT Records:
Key
Value
IP Addresses
192.168.1.105:22
Bonjour Browser v. 1.13 © 2011-2015 Hobbyist Software, Handydev
Website
Check for updates

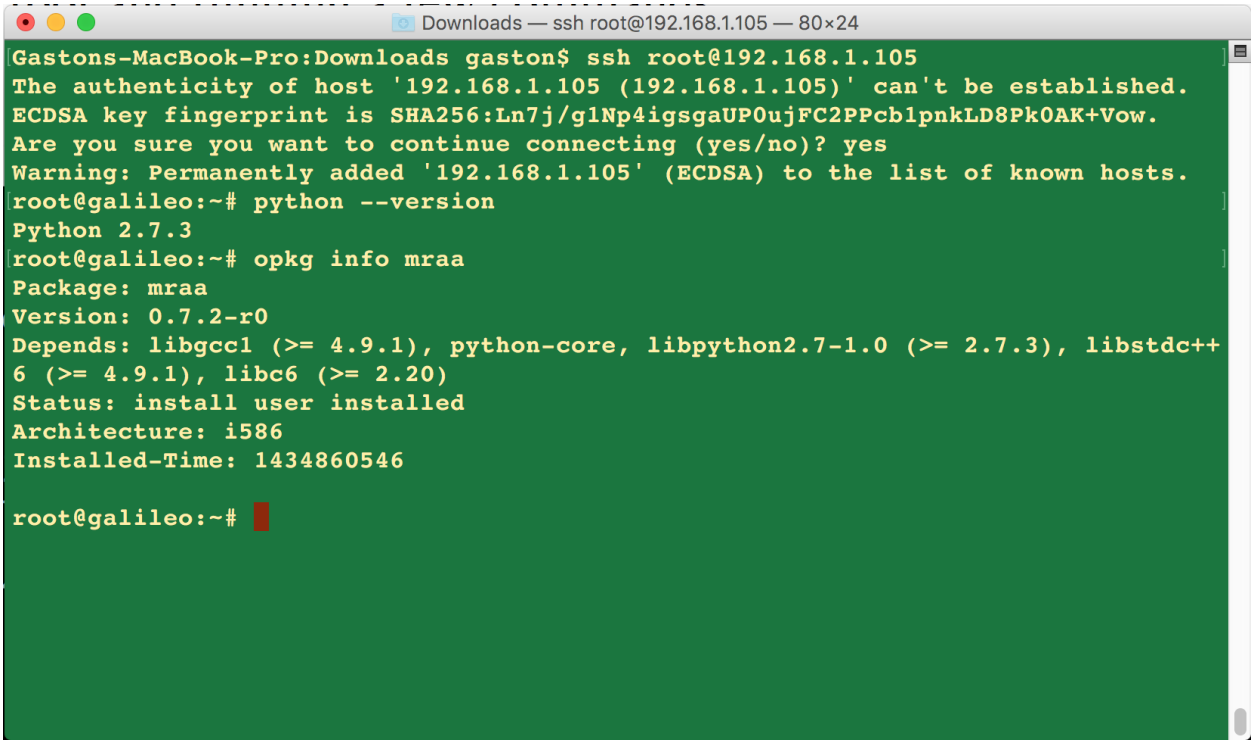

Bonjour Browser
local - 3
SFTP (_sftp-ssh._tcp.) - 1
galileo
192.168.1.105:22
[fe80::9a4f:eeff:fe01:7572]:22
SSH (_ssh._tcp.) - 1
galileo
192.168.1.105:22
[fe80::9a4f:eeff:fe01:7572]:22
Workgroup Manager (_workstation._tcp.) - 1
galileo [00:00:00:00:00:00]
192.168.1.105:9
[fe80::9a4f:eeff:fe01:7572]:9
Reload Services

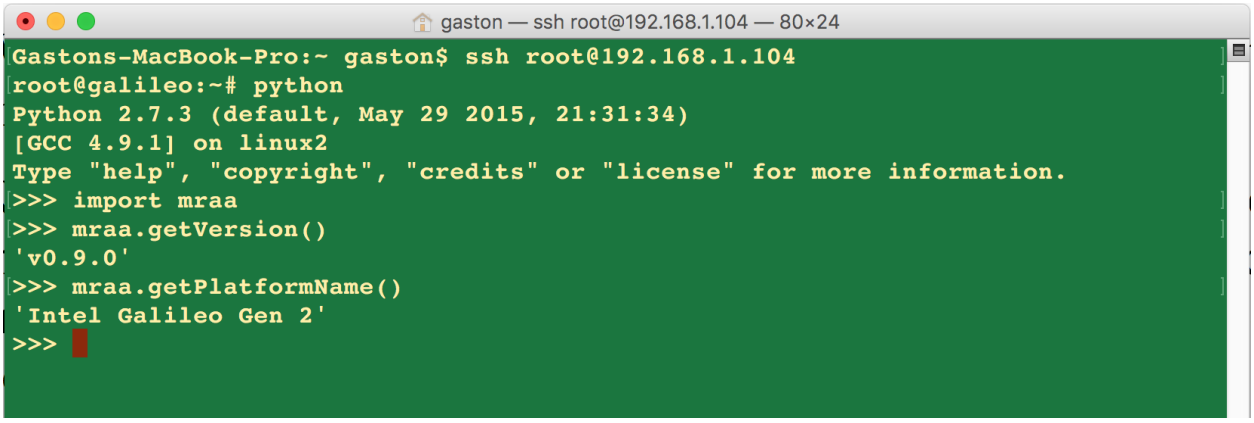

PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Serial
Basic options for your PuTTY session
Specify the destination you want to connect to
Host Name (or IP address)
Port
192.168.1.105
22
Connection type:
Raw
Telnet
Rlogin
SSH
Serial
Load, save or delete a stored session
Saved Sessions
Default Settings
Load
Save
Delete
Close window on exit:
Always
Never
Only on clean exit
About
Open
Cancel


PuTTY Security Alert
The server's host key is not cached in the registry. You have no guarantee that the server is the computer you think it is.
The server's rsa2 key fingerprint is:
ssh-rsa 2048 5c:6c:9e:fa:19:e2:b4:01:d0:82:88:63:9e:b0:ff:e7
If you trust this host, hit Yes to add the key to PuTTY's cache and carry on connecting.
If you want to carry on connecting just once, without adding the key to the cache, hit No.
If you do not trust this host, hit Cancel to abandon the connection.
Yes
No
Cancel

\

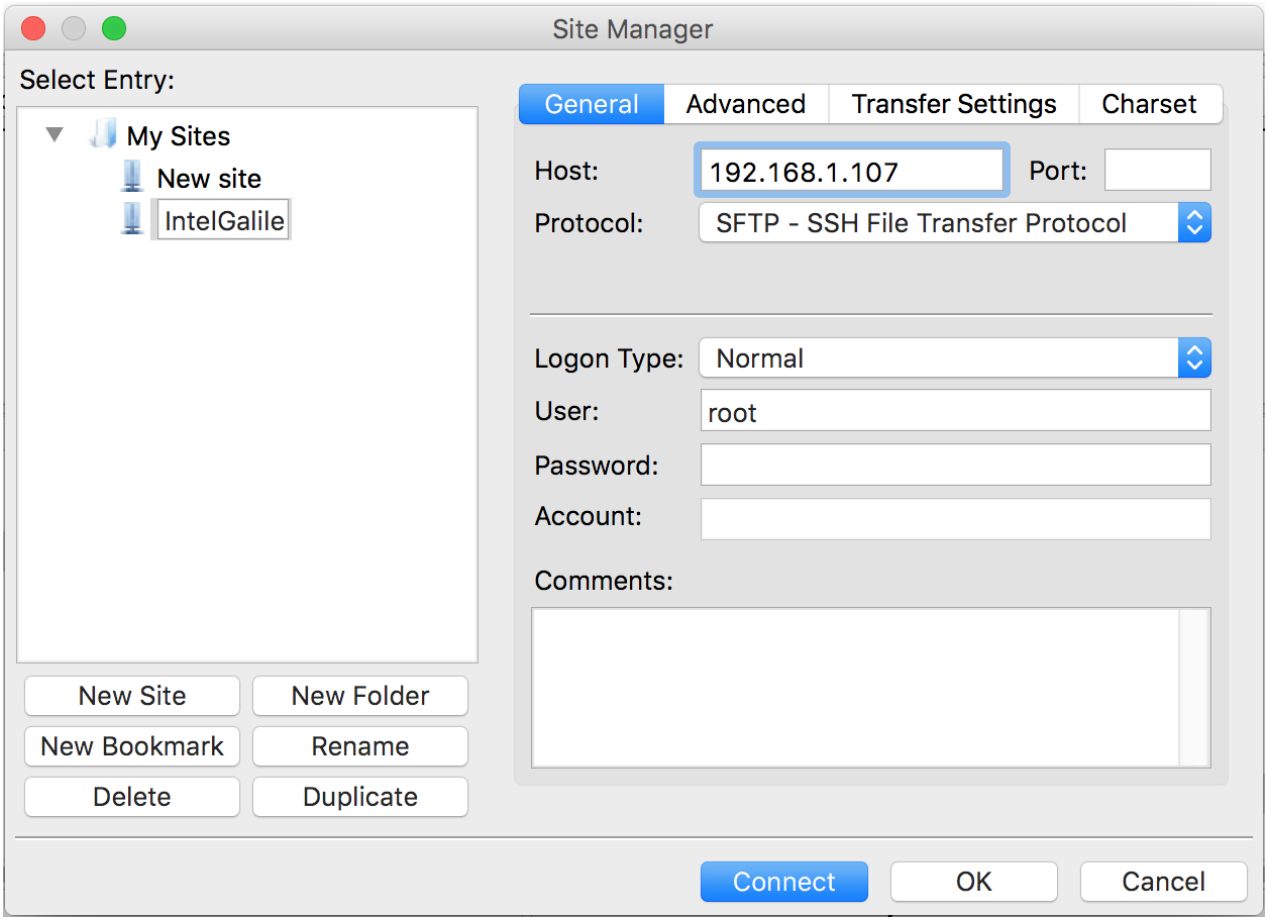

192.168.1.105 - PuTTY
login as: root
root@galileo:~# python --version
Python 2.7.3
root@galileo:~# opkg info mraa
Package: mraa
Version: 0.7.2-r0
Depends: libgcc1 (>= 4.9.1), python-core, libpython2.7-1.0 (>= 2.7.3), libstdc++6 (>= 4.9.1), libc6 (>= 2.20)
Status: install user installed
Architecture: i586
Installed-Time: 1434860546
root@galileo:~#

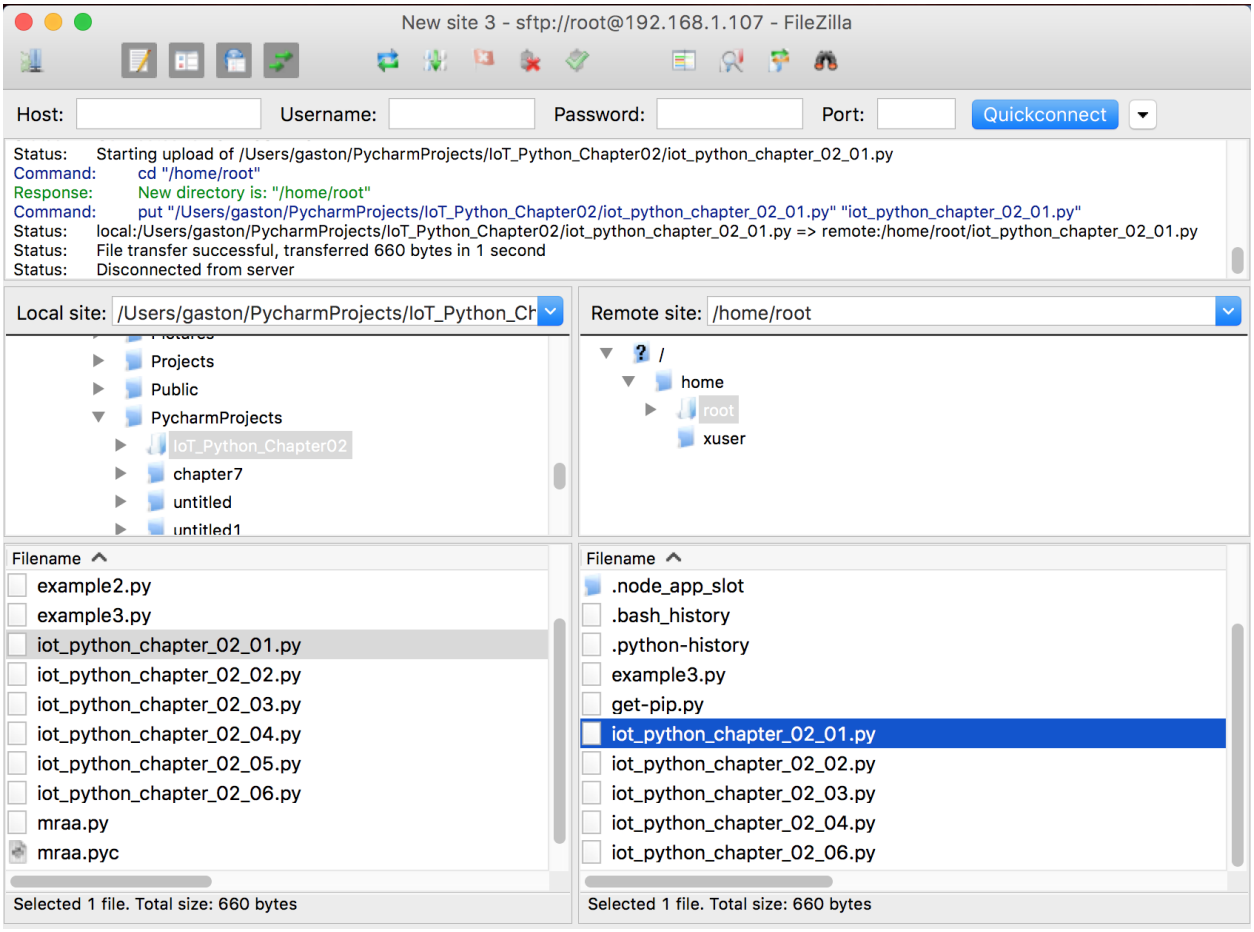

Downloads — ssh root@192.168.1.105 — 80×24
Gastons-MacBook-Pro:Downloads gaston$ ssh root@192.168.1.105
The authenticity of host '192.168.1.105 (192.168.1.105)' can't be established.
ECDSA key fingerprint is SHA256:Ln7j/g1Np4igsgaUPOujFC2PPcb1pnkLD8PkOAK+Vow.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.1.105' (ECDSA) to the list of known hosts.
root@galileo:~# python --version
Python 2.7.3
root@galileo:~# opkg info mraa
Package: mraa
Version: 0.7.2-r0
Depends: libgcc1 (>= 4.9.1), python-core, libpython2.7-1.0 (>= 2.7.3), libstdc++
6 (>= 4.9.1), libc6 (>= 2.20)
Status: install user installed
Architecture: i586
Installed-Time: 1434860546
root@galileo:~#

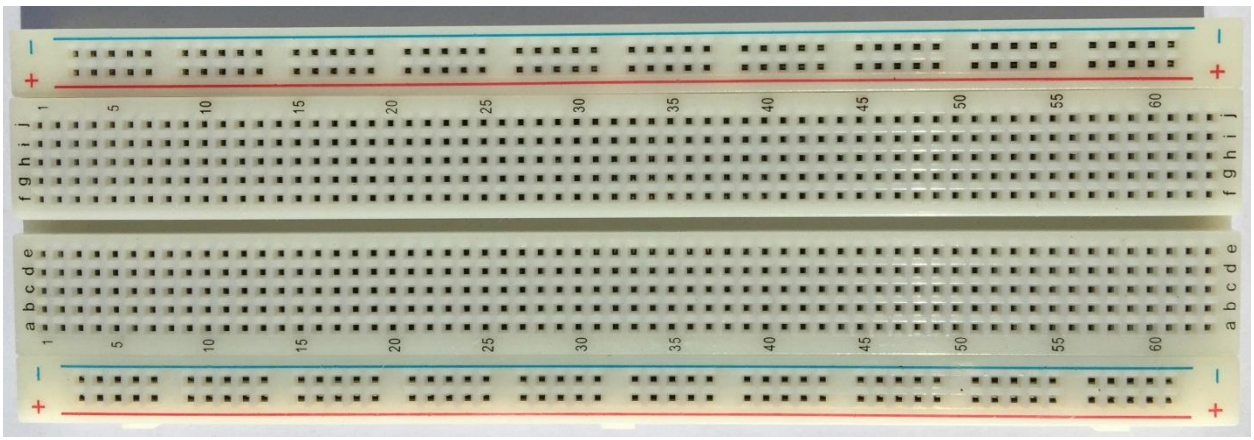

gaston — ssh root@192.168.1.104 — 80×24
Gastons-MacBook-Pro:~ gaston$ ssh root@192.168.1.104
root@galileo:~# python
Python 2.7.3 (default, May 29 2015, 21:31:34)
[GCC 4.9.1] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>> import mraa
>>> mraa.getVersion()
'v0.9.0'
>>> mraa.getPlatformName()
'Intel Galileo Gen 2'
>>>

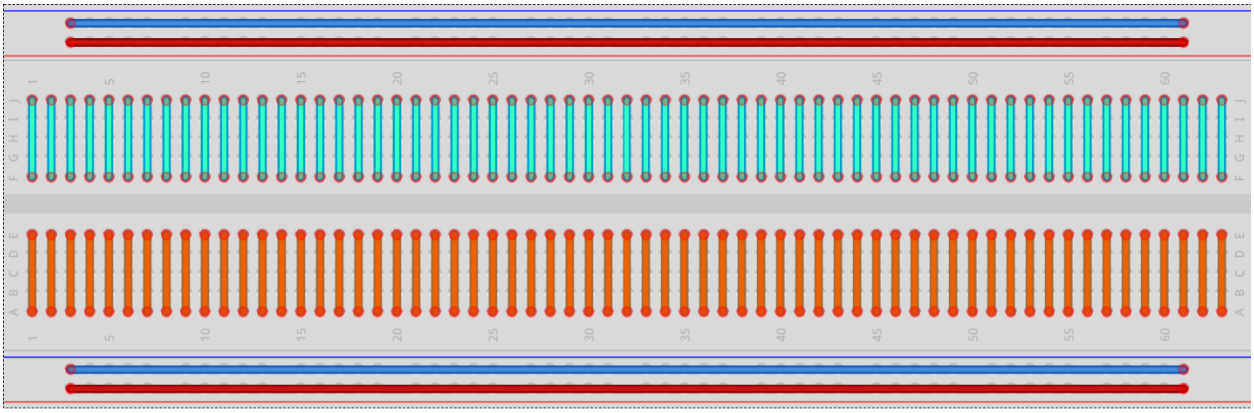

192.168.1.104
It works!

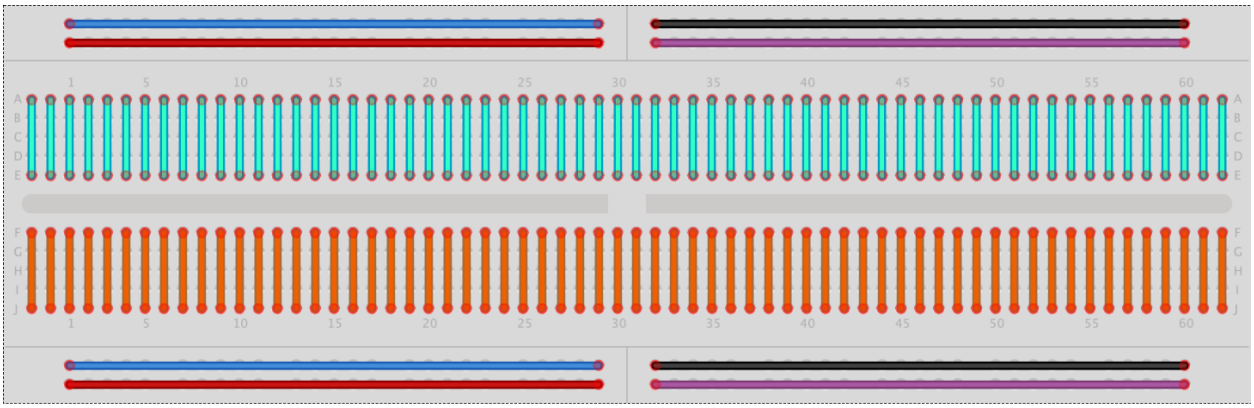
Chapter 3: Interacting with Digital Outputs with Python

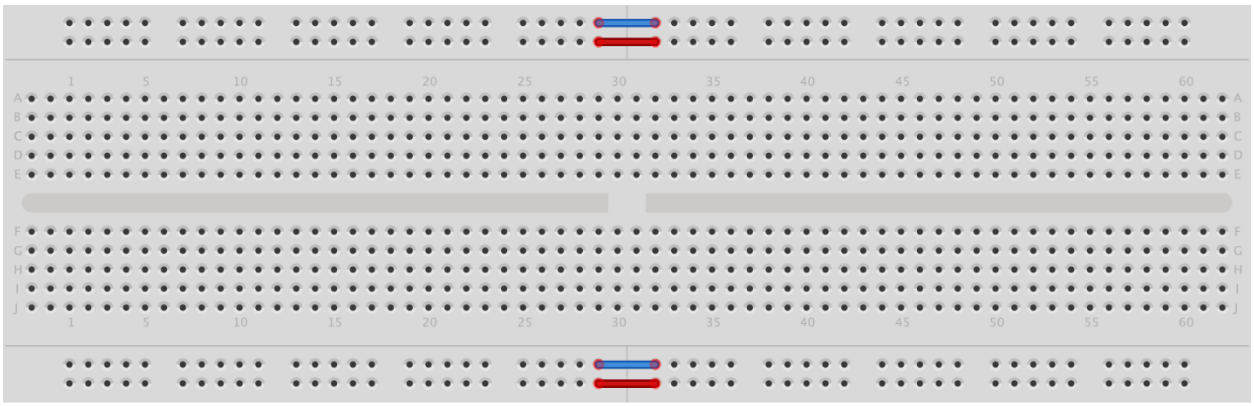


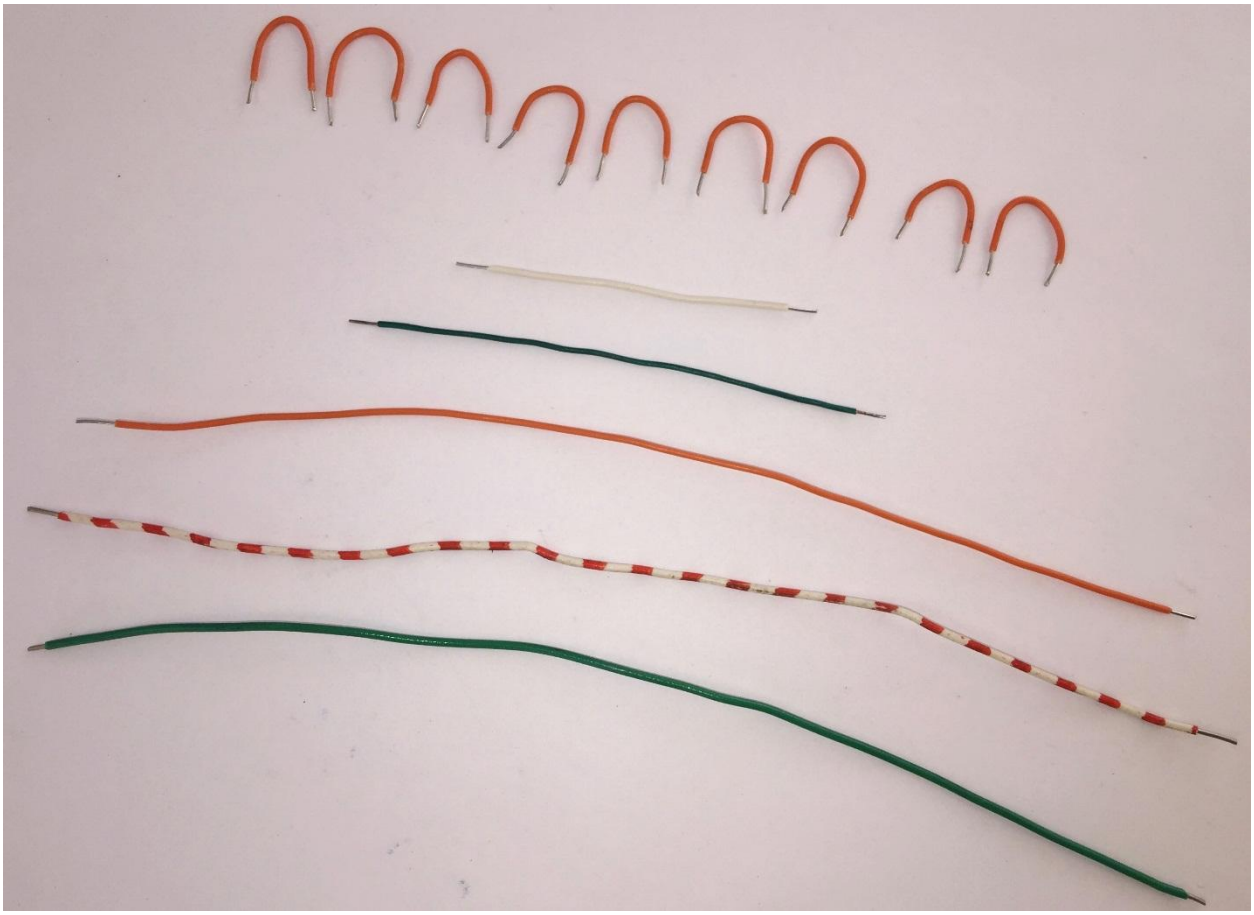

New site 3 - sftp://root@192.168.1.107 - FileZilla
Host:
Username:
Password:
Port:
Quickconnect
Status: Starting upload of /Users/gaston/PycharmProjects/IoT_Python_Chapter02/iot_python_chapter_02_01.py
Command: cd "/home/root"
Response: New directory is: "/home/root"
Command: put "/Users/gaston/PycharmProjects/IoT_Python_Chapter02/iot_python_chapter_02_01.py" "iot_python_chapter_02_01.py"
Status: local:/Users/gaston/PycharmProjects/IoT_Python_Chapter02/iot_python_chapter_02_01.py => remote:/home/root/iot_python_chapter_02_01.py
Status: File transfer successful, transferred 660 bytes in 1 second
Status: Disconnected from server
Local site: /Users/gaston/PycharmProjects/IoT_Python_Ch
Projects
Public
PycharmProjects
IoT_Python_Chapter02
chapter7
untitled
untitled1
Remote site: /home/root
/
home
root
xuser
Filename
example2.py
example3.py
iot_python_chapter_02_01.py
iot_python_chapter_02_02.py
iot_python_chapter_02_03.py
iot_python_chapter_02_04.py
iot_python_chapter_02_05.py
iot_python_chapter_02_06.py
mraa.py
mraa.pyc
Selected 1 file. Total size: 660 bytes
Filename
.node_app_slot
.bash_history
.python-history
example3.py
get-pip.py
iot_python_chapter_02_01.py
iot_python_chapter_02_02.py
iot_python_chapter_02_03.py
iot_python_chapter_02_04.py
iot_python_chapter_02_06.py
Selected 1 file. Total size: 660 bytes

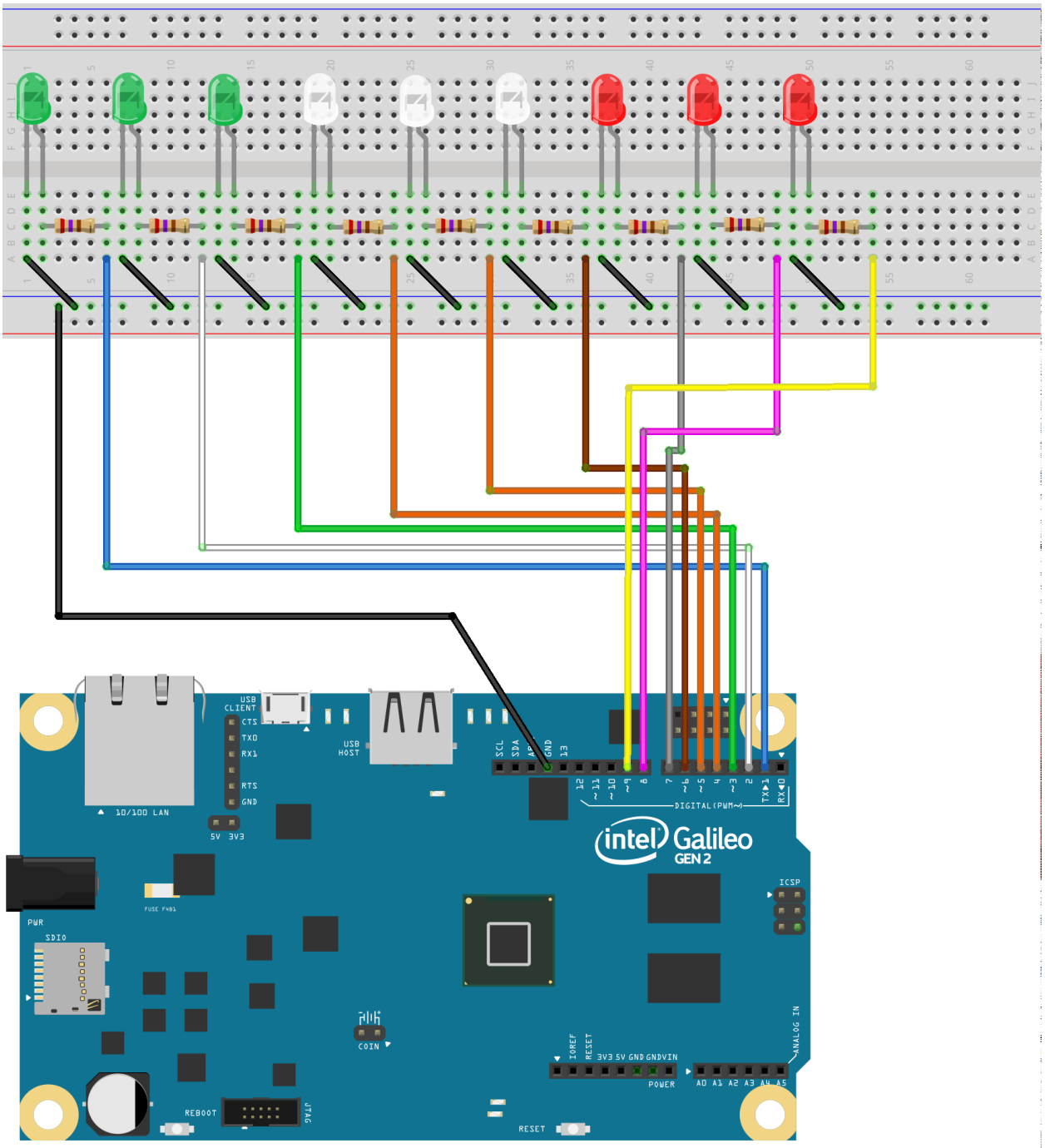


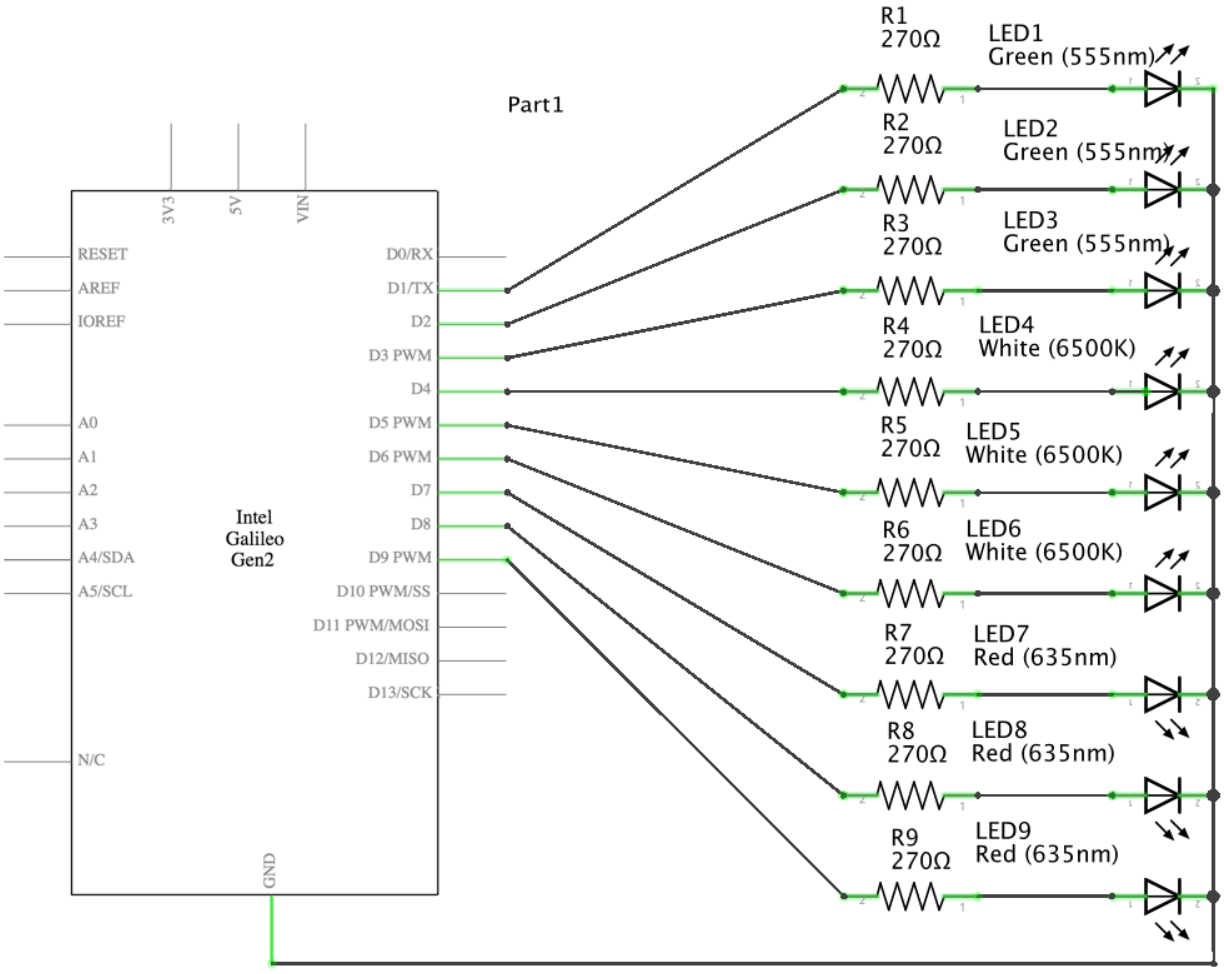


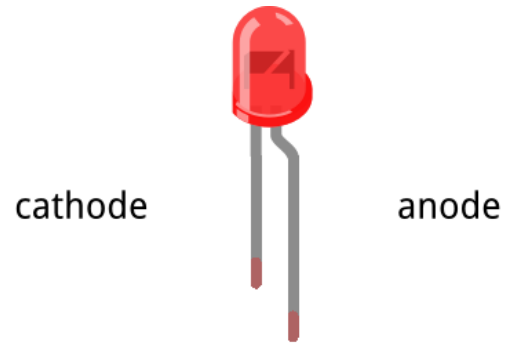




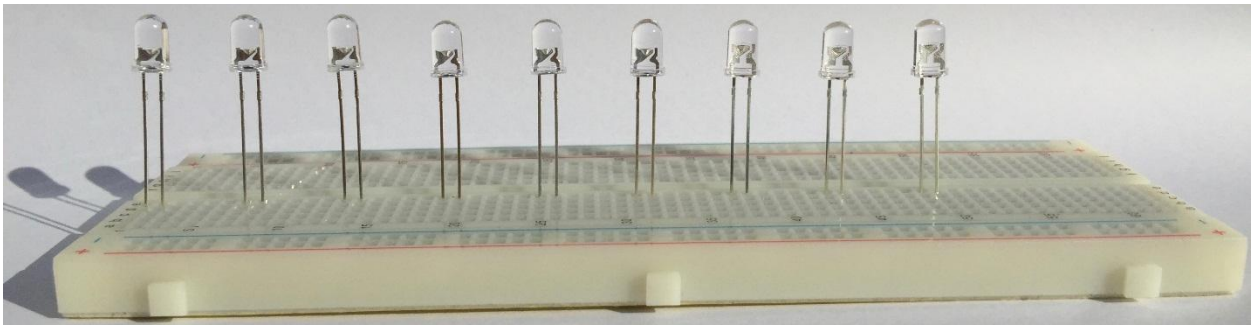


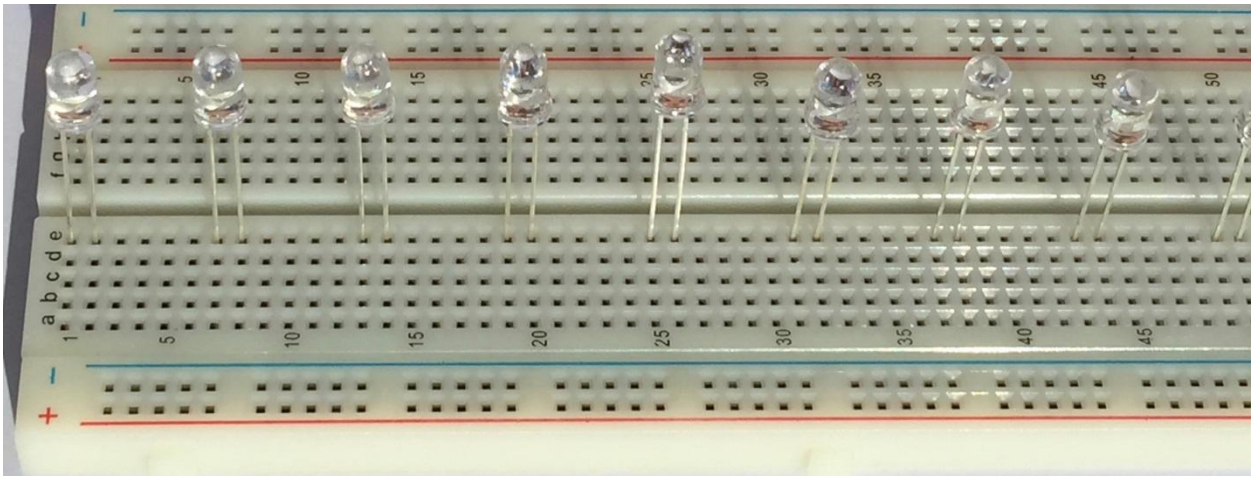

USB CLIENT
CTS
TXO
RX1
RTS
GND
USB HOST
10/100 LAN
5V 3V3
SCL
SDA
AREF
GND
13
DIGITAL(PWM~)
TX→1
RX←0
intel Galileo
GEN 2
ICSP
PWR
SDIO
COIN
IOREF
RESET
3V3 5V GND GNDVIN
POWER
ANALOG IN
A0 A1 A2 A3 A4 A5
REBOOT
JTAG
RESET
fritzing

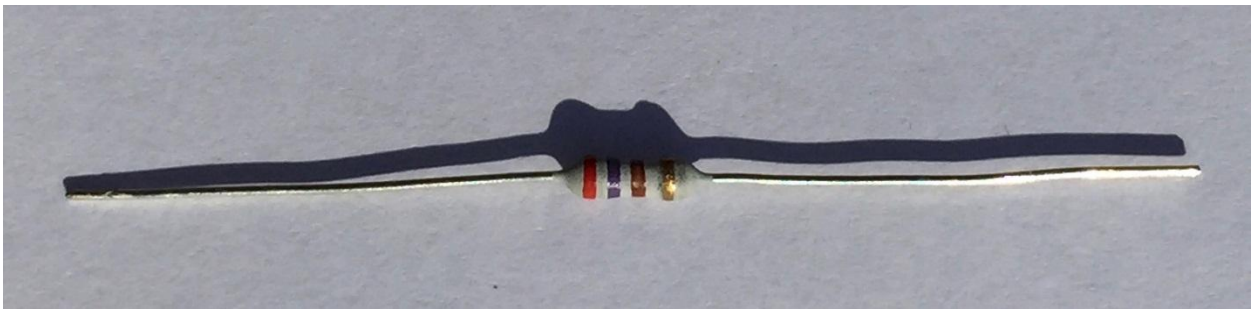

Part1
Intel
Galileo
Gen2
3V3
5V
VIN
GND
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
R1
270Ω
LED1
Green (555nm)
R2
270Ω
LED2
Green (555nm)
R3
270Ω
LED3
Green (555nm)
R4
270Ω
LED4
White (6500K)
R5
270Ω
LED5
White (6500K)
R6
270Ω
LED6
White (6500K)
R7
270Ω
LED7
Red (635nm)
R8
270Ω
LED8
Red (635nm)
R9
270Ω
LED9
Red (635nm)

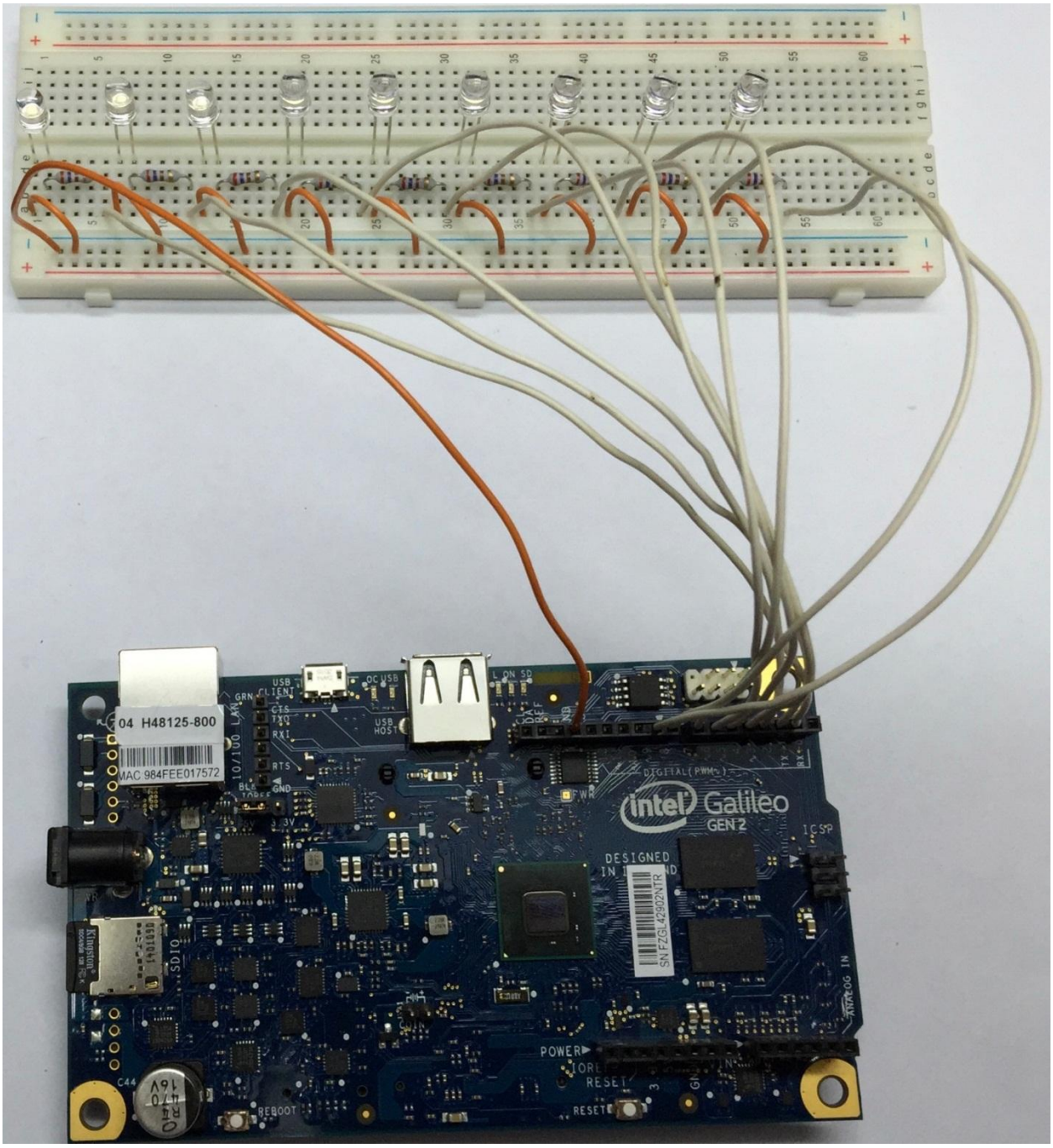

cathode
anode

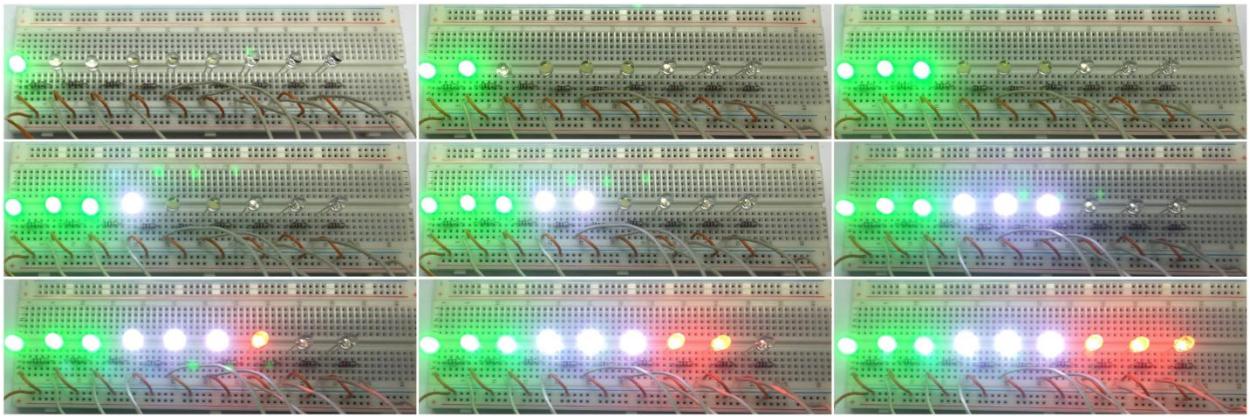

cathode
anode

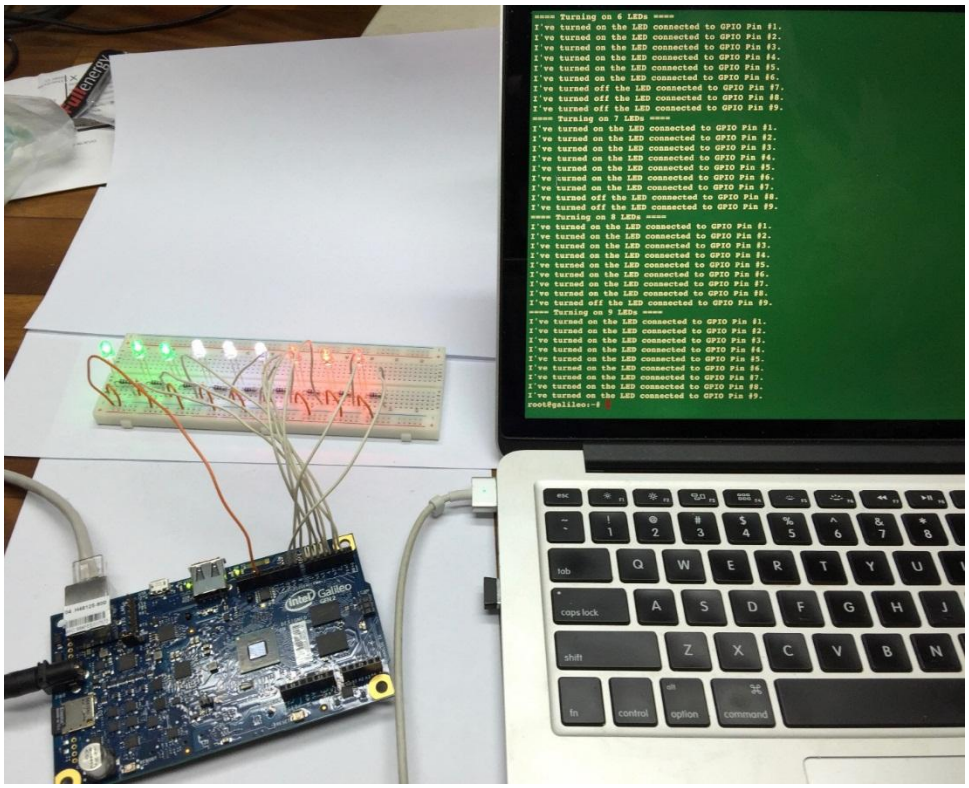


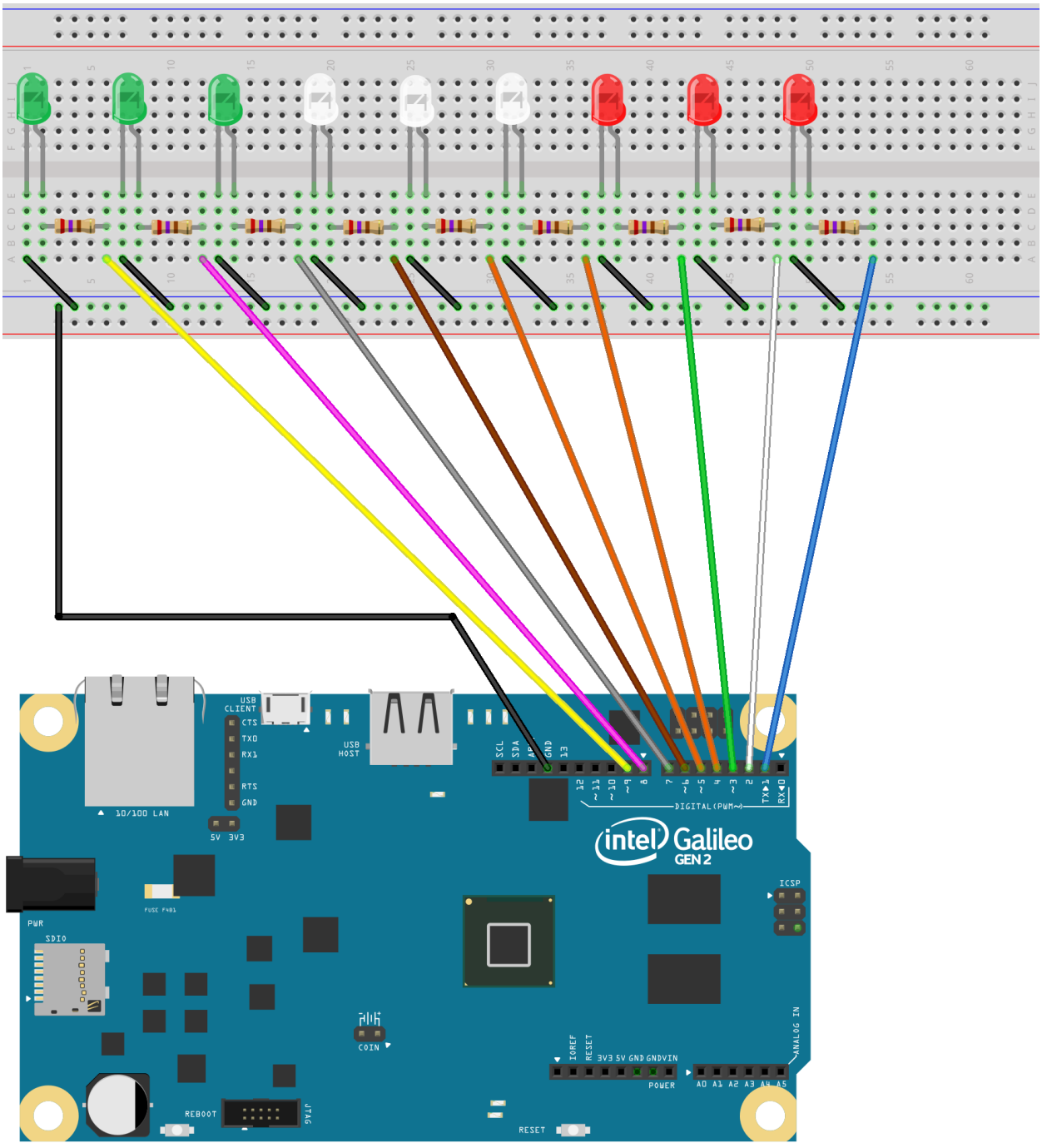

a b c d e
1
5
10
15
20
25
30
35
40
45
50

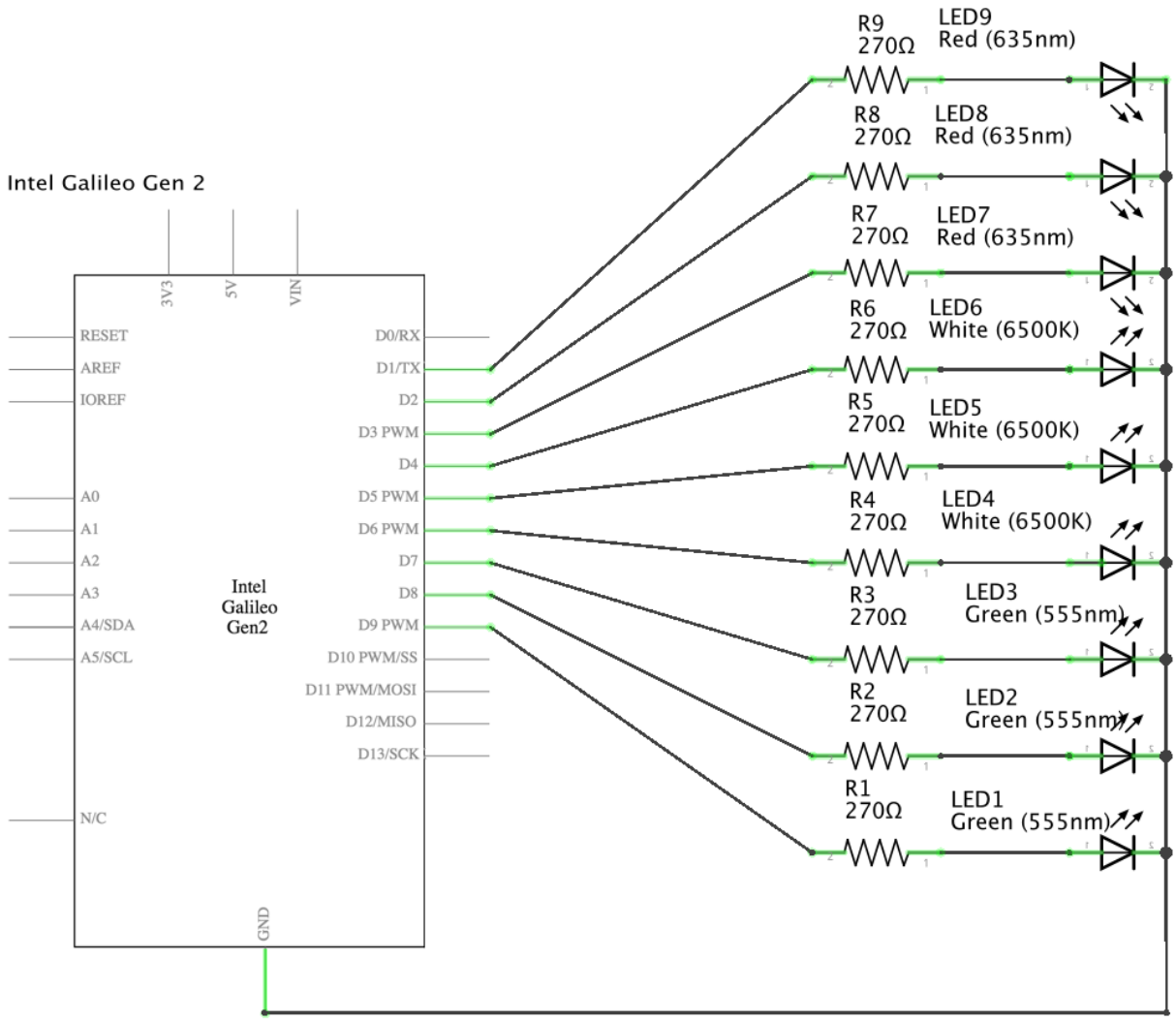


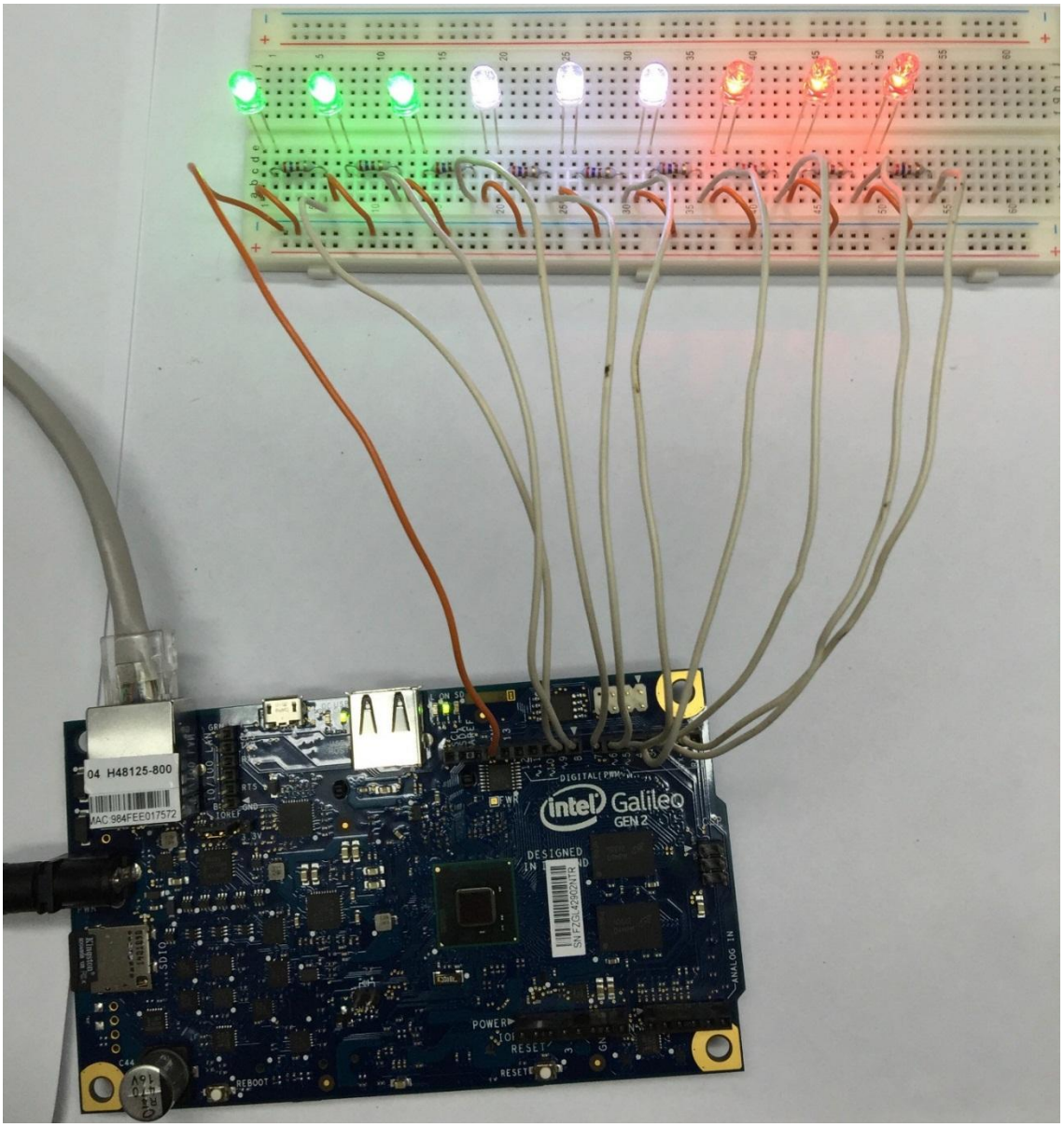

04 H48125-800
MAC 984FEE017572
intel Galileo
GEN 2
DESIGNED
SN FZGL42902NTR
POWER
RESET
REBOOT



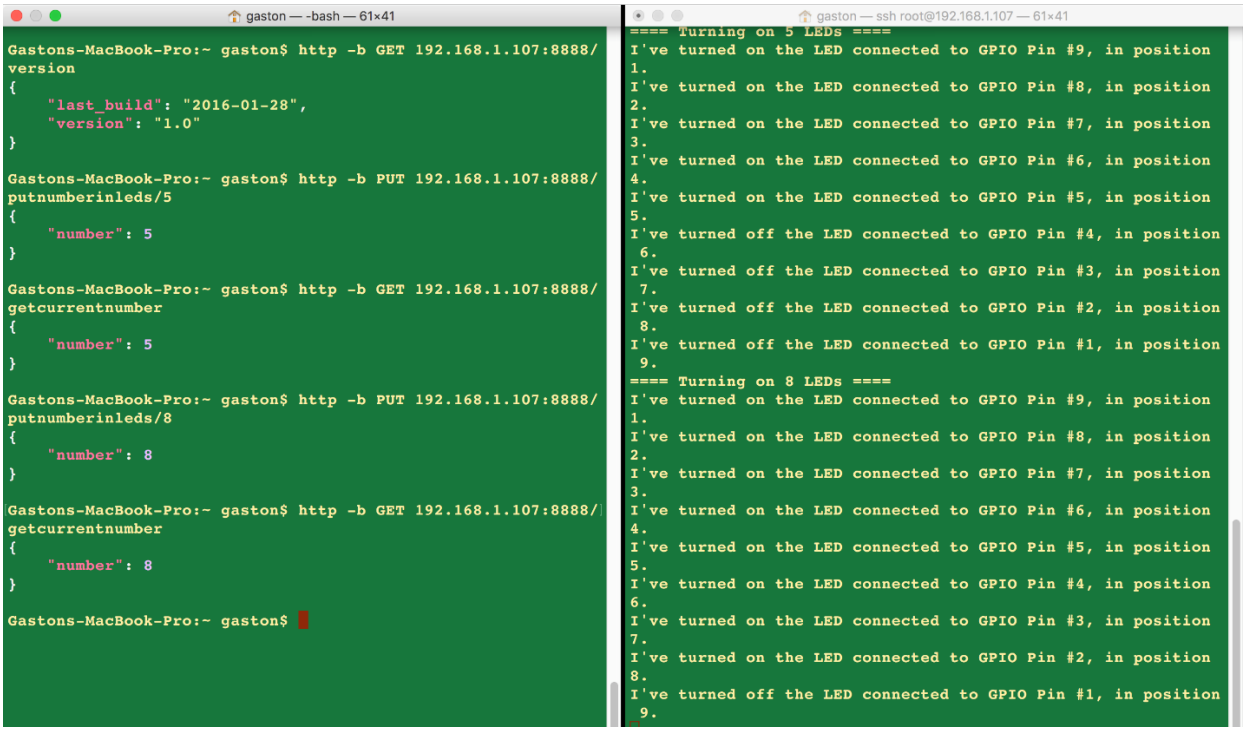

==== Turning on 6 LEDs ====
I've turned on the LED connected to GPIO Pin #1.
I've turned on the LED connected to GPIO Pin #2.
I've turned on the LED connected to GPIO Pin #3.
I've turned on the LED connected to GPIO Pin #4.
I've turned on the LED connected to GPIO Pin #5.
I've turned on the LED connected to GPIO Pin #6.
I've turned off the LED connected to GPIO Pin #7.
I've turned off the LED connected to GPIO Pin #8.
I've turned off the LED connected to GPIO Pin #9.
==== Turning on 7 LEDs ====
I've turned on the LED connected to GPIO Pin #1.
I've turned on the LED connected to GPIO Pin #2.
I've turned on the LED connected to GPIO Pin #3.
I've turned on the LED connected to GPIO Pin #4.
I've turned on the LED connected to GPIO Pin #5.
I've turned on the LED connected to GPIO Pin #6.
I've turned on the LED connected to GPIO Pin #7.
I've turned off the LED connected to GPIO Pin #8.
I've turned off the LED connected to GPIO Pin #9.
==== Turning on 8 LEDs ====
I've turned on the LED connected to GPIO Pin #1.
I've turned on the LED connected to GPIO Pin #2.
I've turned on the LED connected to GPIO Pin #3.
I've turned on the LED connected to GPIO Pin #4.
I've turned on the LED connected to GPIO Pin #5.
I've turned on the LED connected to GPIO Pin #6.
I've turned on the LED connected to GPIO Pin #7.
I've turned on the LED connected to GPIO Pin #8.
I've turned off the LED connected to GPIO Pin #9.
==== Turning on 9 LEDs ====
I've turned on the LED connected to GPIO Pin #1.
I've turned on the LED connected to GPIO Pin #2.
I've turned on the LED connected to GPIO Pin #3.
I've turned on the LED connected to GPIO Pin #4.
I've turned on the LED connected to GPIO Pin #5.
I've turned on the LED connected to GPIO Pin #6.
I've turned on the LED connected to GPIO Pin #7.
I've turned on the LED connected to GPIO Pin #8.
I've turned on the LED connected to GPIO Pin #9.
root@galileo:~#
Intel Galileo
tab
caps lock
shift
fn
control
option
command

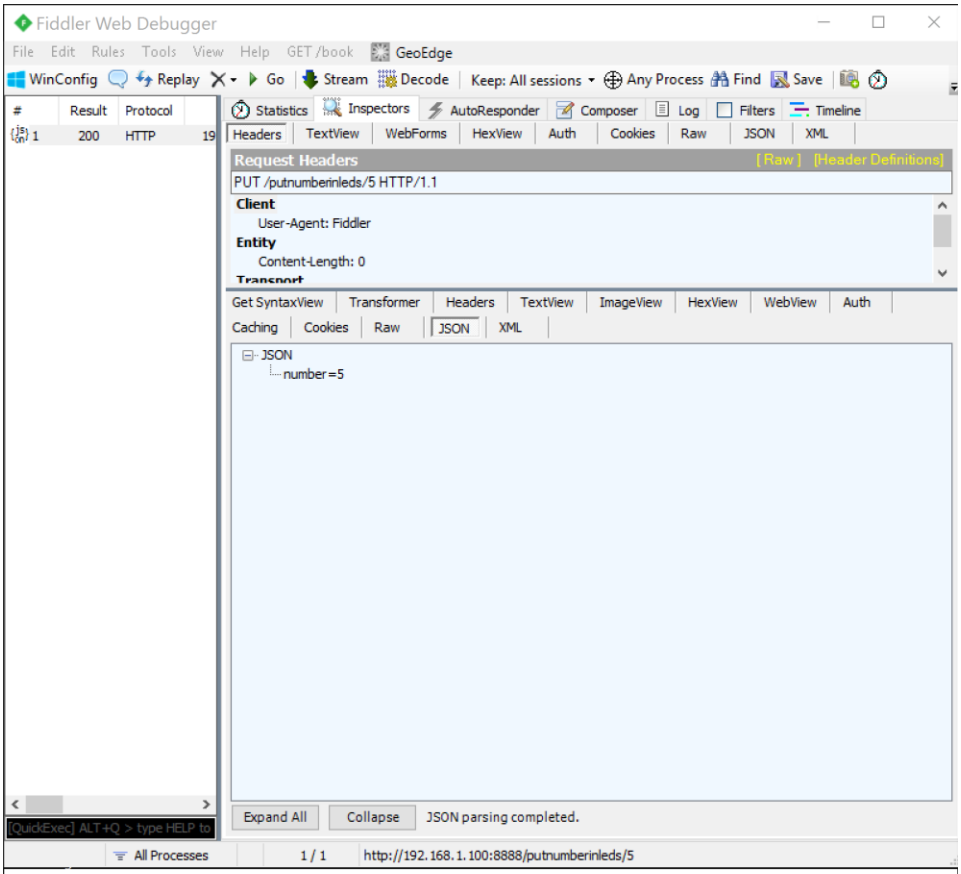

USB CLIENT
CTS
TXO
RX1
RTS
GND
USB HOST
10/100 LAN
5V 3V3
SCL
SDA
AREF
GND
13
12
~11
10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL(PWM~)
intel Galileo
GEN 2
ICSP
PWR
SDIO
COIN
IOREF
RESET
3V3 5V GND GNDVIN
POWER
A0 A1 A2 A3 A4 A5
ANALOG IN
REBOOT
JTAG
RESET


Intel Galileo Gen 2
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
Intel
Galileo
Gen2
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
R9
270Ω
LED9
Red (635nm)
R8
270Ω
LED8
Red (635nm)
R7
270Ω
LED7
Red (635nm)
R6
270Ω
LED6
White (6500K)
R5
270Ω
LED5
White (6500K)
R4
270Ω
LED4
White (6500K)
R3
270Ω
LED3
Green (555nm)
R2
270Ω
LED2
Green (555nm)
R1
270Ω
LED1
Green (555nm)


04 H48125-800
MAC 984FEE017572
intel Galileo
GEN 2
DESIGNED
POWER
RESET
REBOOT
ANALOG IN

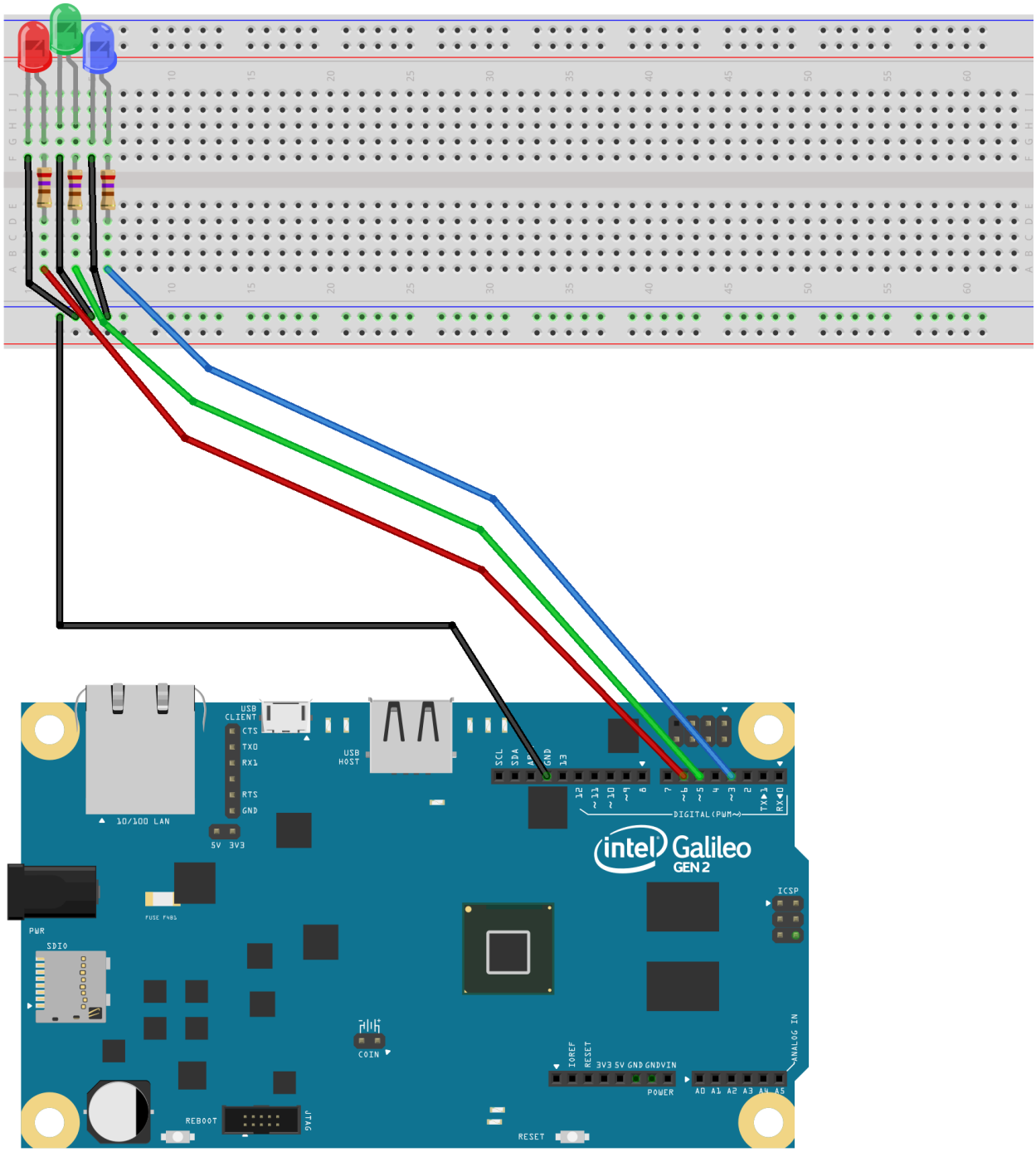
Chapter 4: Working with a RESTful API and Pulse Width Modulation



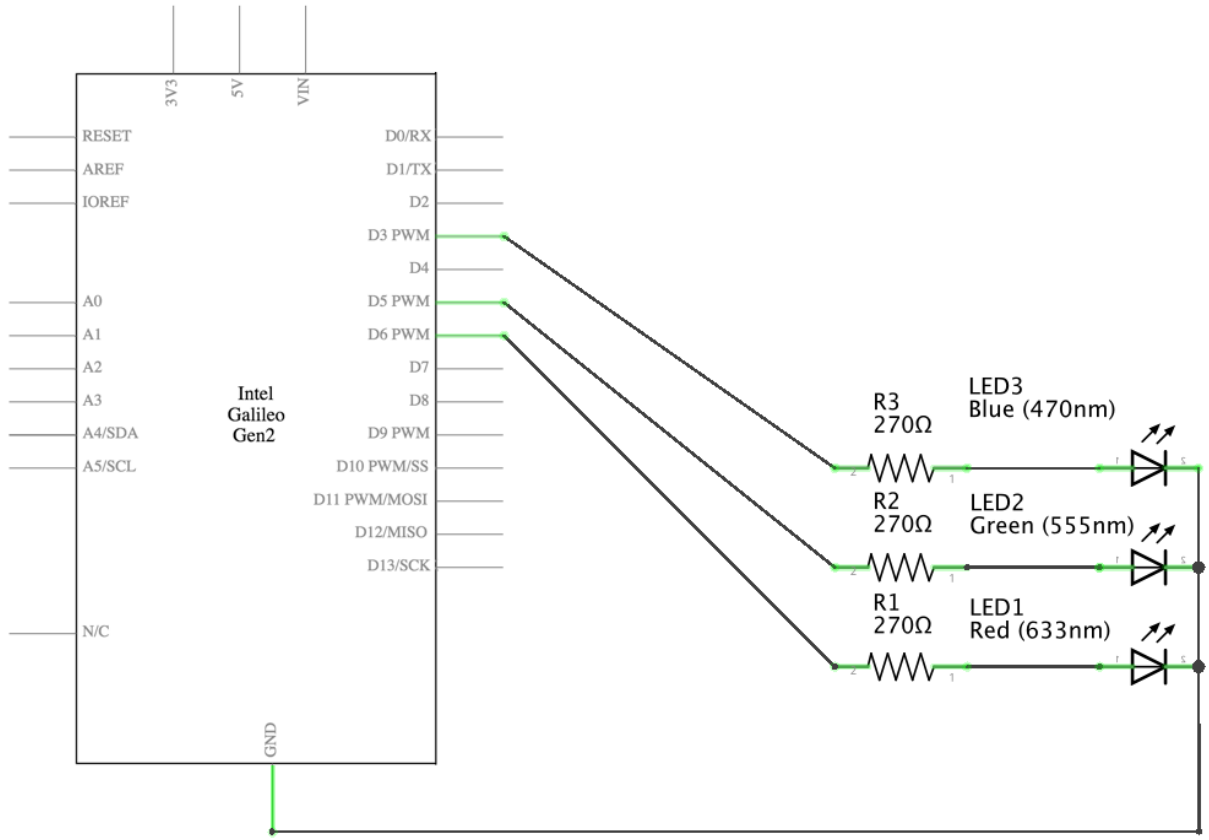


192.168.1.100 - PuTTY

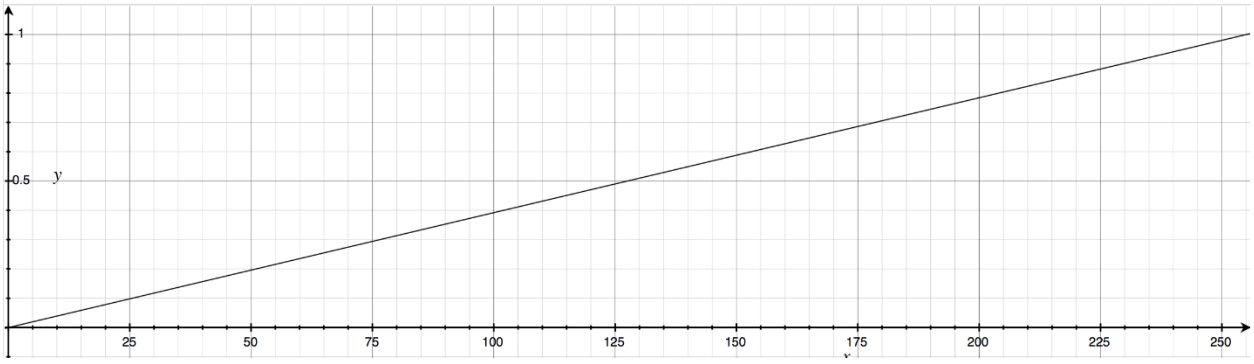
```
root@galileo:~# python iot_python_chapter_03_01.py
Listening at port 8888
==== Turning on 0 LEDs ====
I've turned off the LED connected to GPIO Pin #9, in position 1.
I've turned off the LED connected to GPIO Pin #8, in position 2.
I've turned off the LED connected to GPIO Pin #7, in position 3.
I've turned off the LED connected to GPIO Pin #6, in position 4.
I've turned off the LED connected to GPIO Pin #5, in position 5.
I've turned off the LED connected to GPIO Pin #4, in position 6.
I've turned off the LED connected to GPIO Pin #3, in position 7.
I've turned off the LED connected to GPIO Pin #2, in position 8.
I've turned off the LED connected to GPIO Pin #1, in position 9.
==== Turning on 5 LEDs ====
I've turned on the LED connected to GPIO Pin #9, in position 1.
I've turned on the LED connected to GPIO Pin #8, in position 2.
I've turned on the LED connected to GPIO Pin #7, in position 3.
I've turned on the LED connected to GPIO Pin #6, in position 4.
I've turned on the LED connected to GPIO Pin #5, in position 5.
I've turned off the LED connected to GPIO Pin #4, in position 6.
I've turned off the LED connected to GPIO Pin #3, in position 7.
I've turned off the LED connected to GPIO Pin #2, in position 8.
I've turned off the LED connected to GPIO Pin #1, in position 9.
```


USB CLIENT
CTS
TXD
RXI
RTS
GND
USB HOST
10/100 LAN
5V 3V3
SCL
SDA
AREF
GND
13
12
~11
~10
~9
8
7
~6
5
4
~3
2
TX→1
RX←0
DIGITAL(PWM~)
intel Galileo
GEN 2
ICSP
PWR
SDIO
FUSE FWBS
COIN
IOREF
RESET
3V3 5V GND GNDVIN
POWER
A0 A1 A2 A3 A4 A5
ANALOG IN
REBOOT
JTAG
RESET

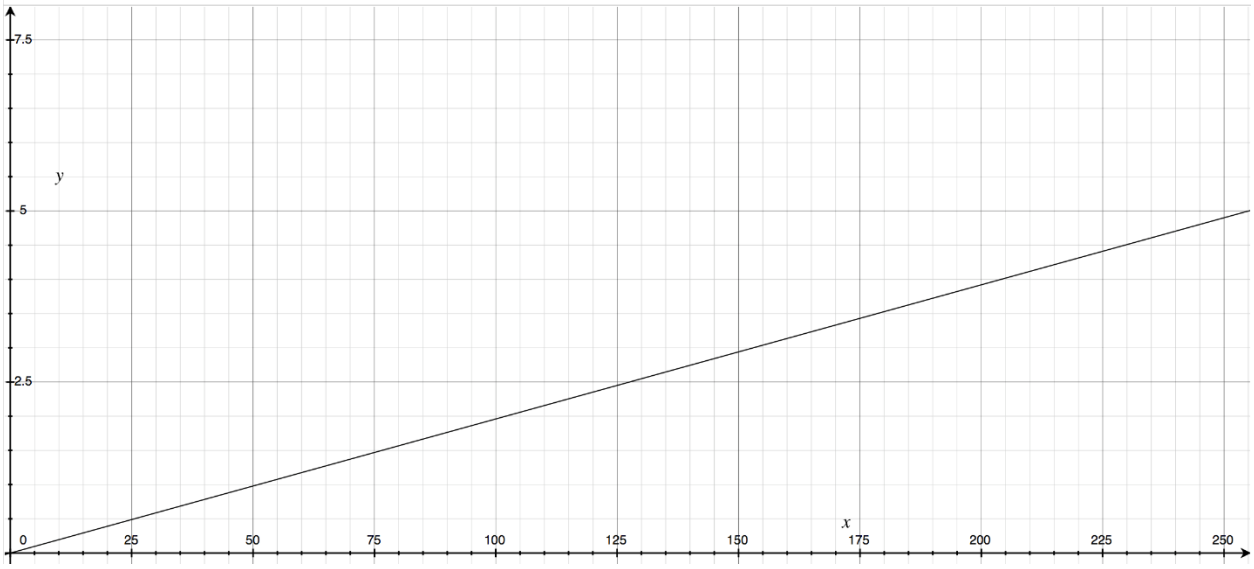
Intel Galileo Gen 2

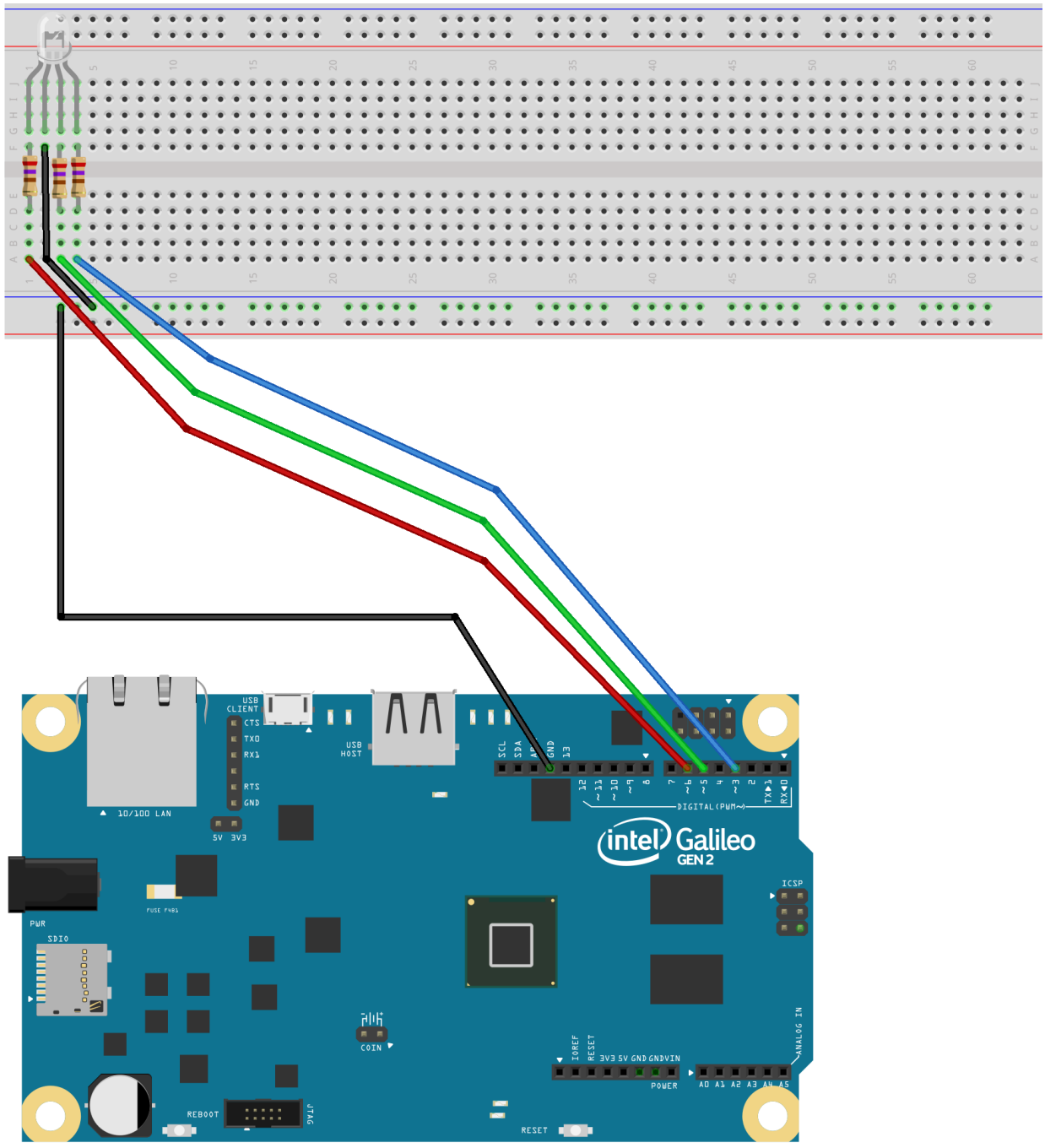


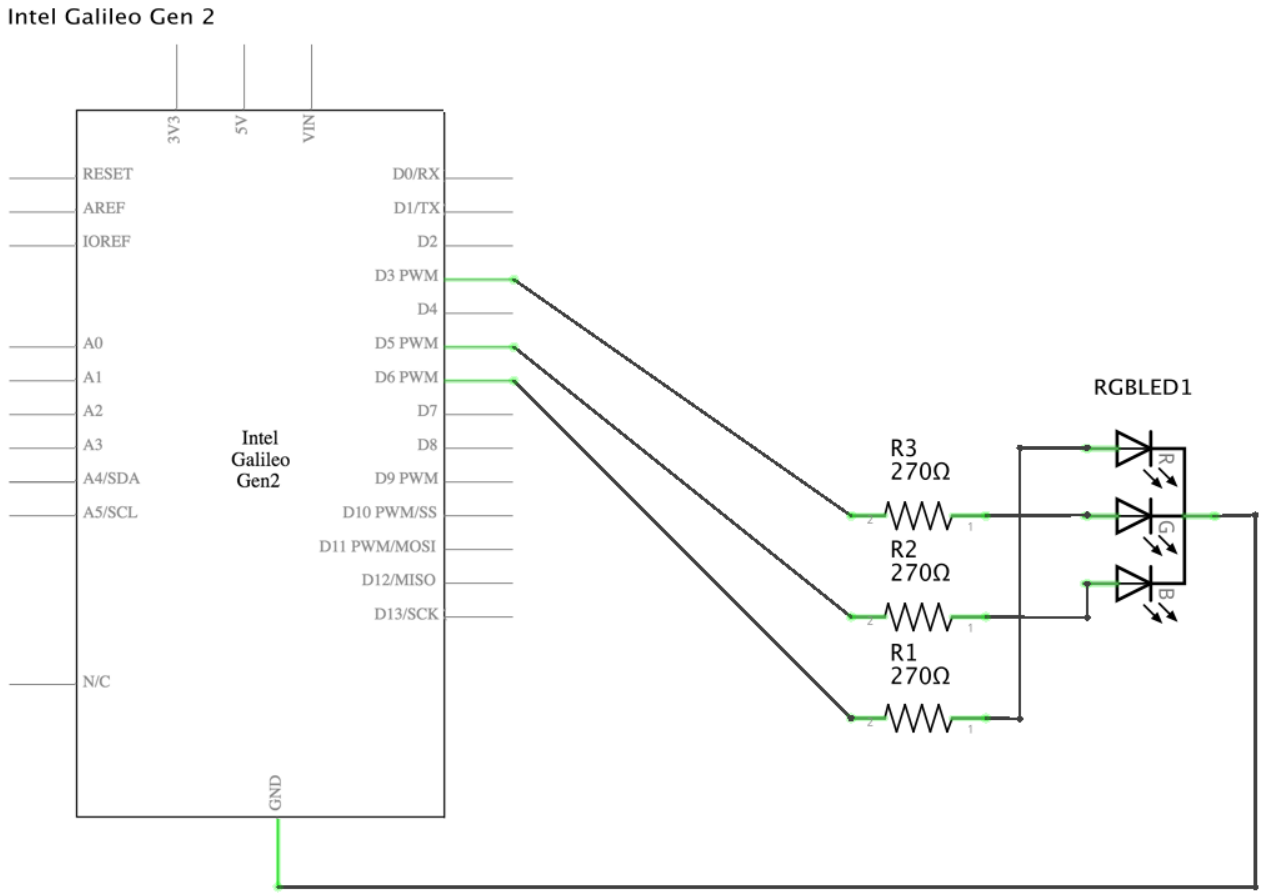
$y=\frac{x}{255}$



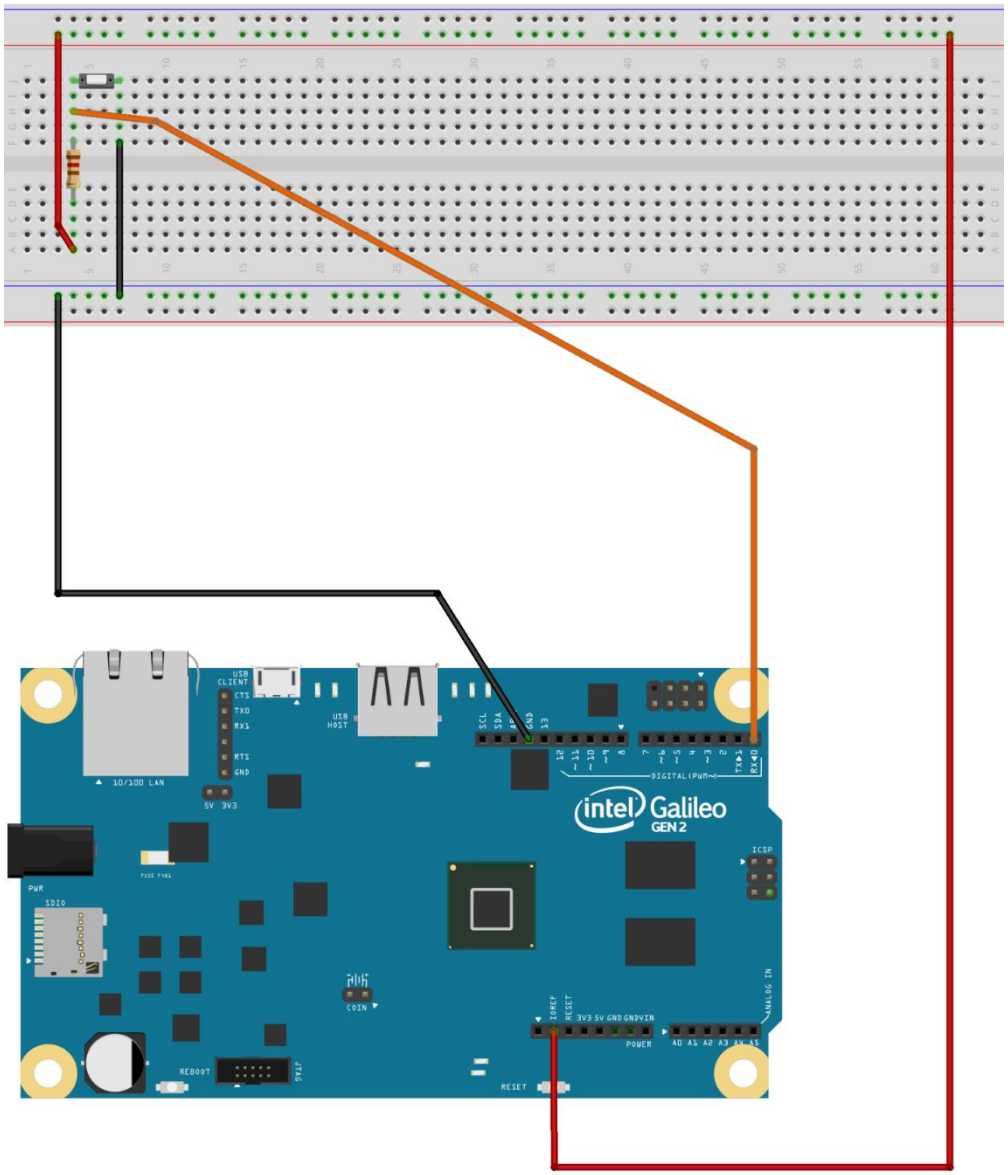
$y = \frac{x}{255} \cdot 5$

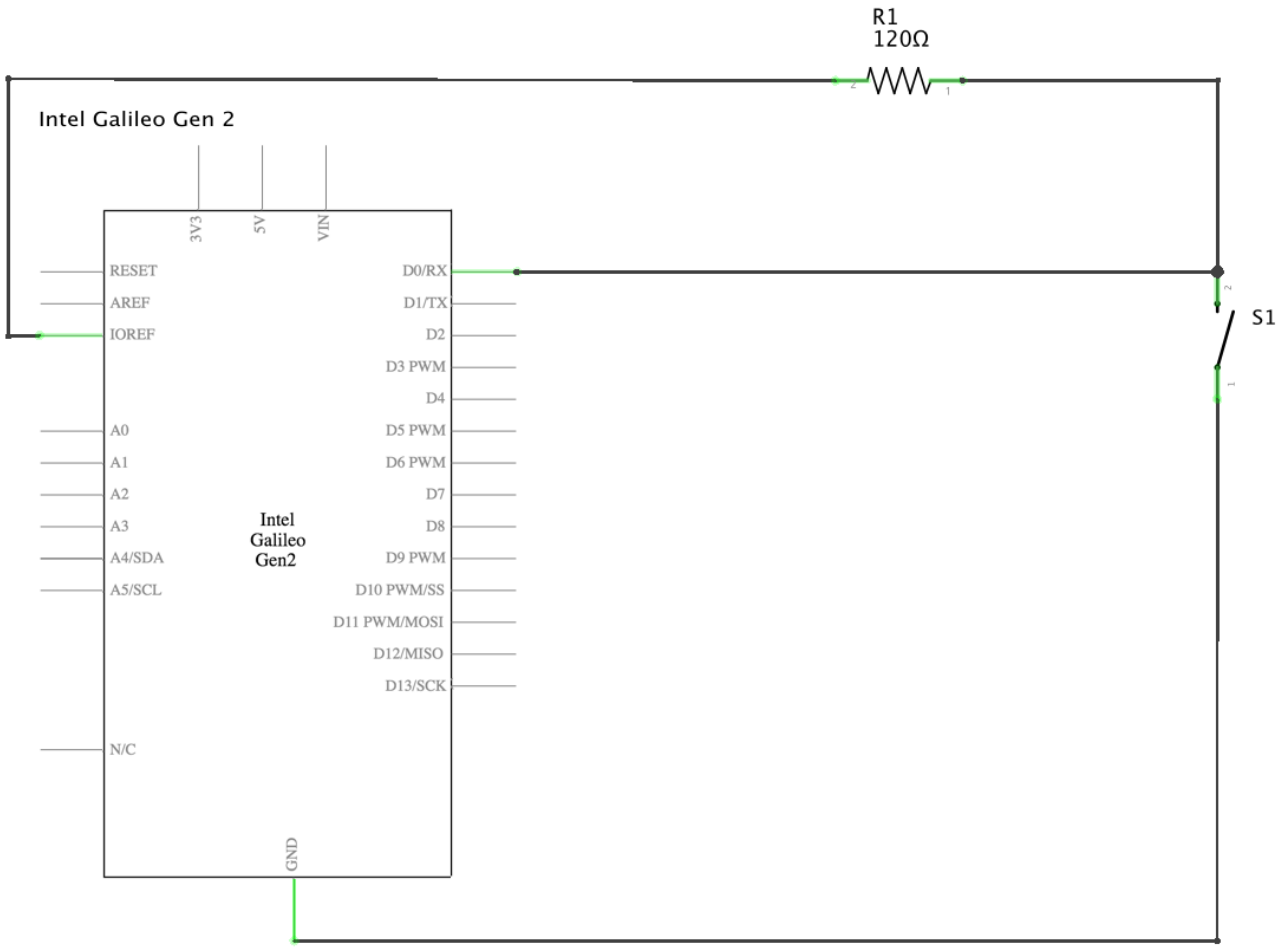


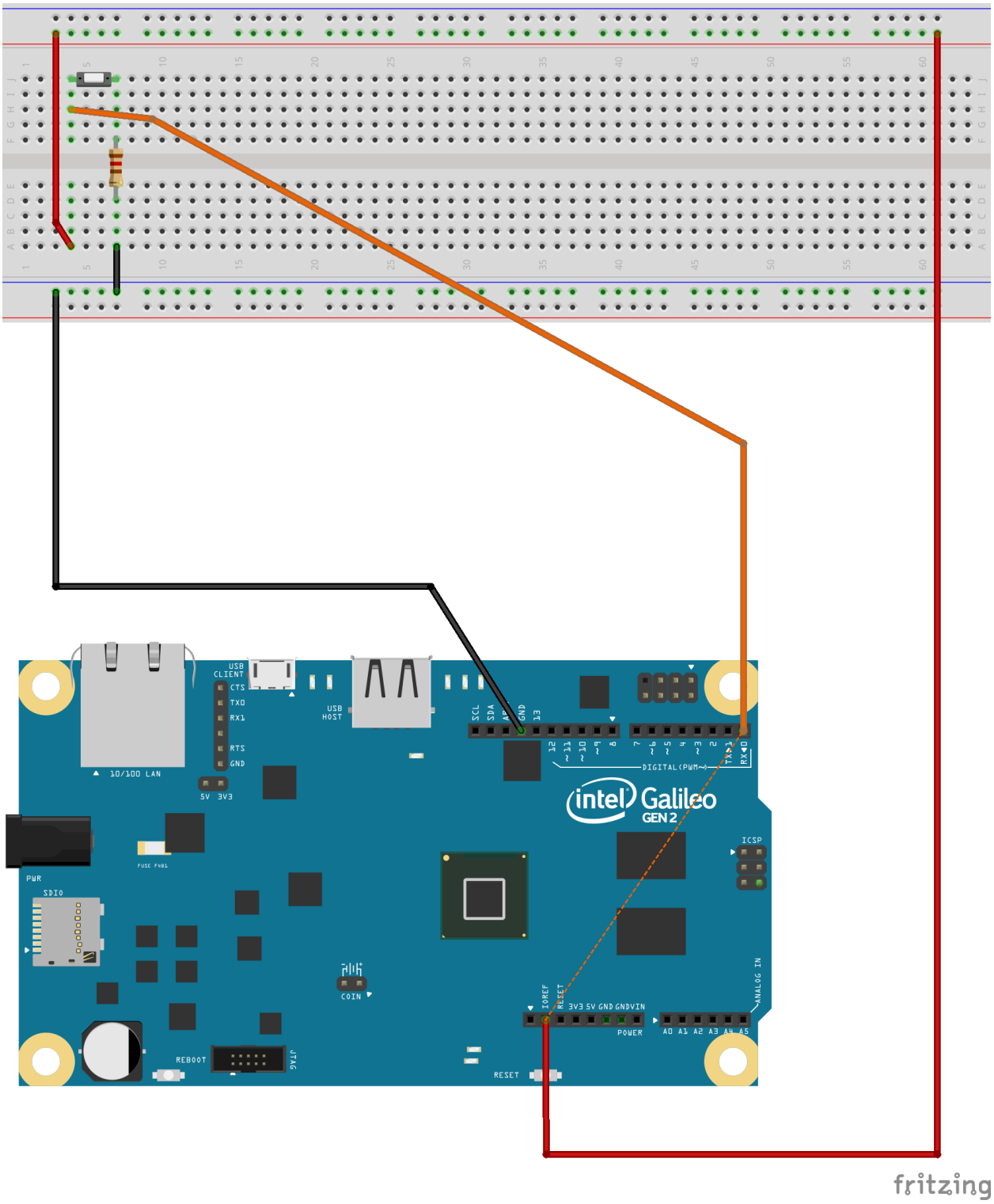

USB CLIENT
CTS
TXO
RX1
RTS
GND
10/100 LAN
5V 3V3
USB HOST
SCL
SDA
GND
13
DIGITAL(PWM~)
TX→1
RX←0
intel Galileo GEN 2
ICSP
PWR
SDIO
COIN
IOREF
RESET
3V3 5V GND GNDVIN
POWER
ANALOG IN
A0 A1 A2 A3 A4 A5
REBOOT
JTAG
RESET

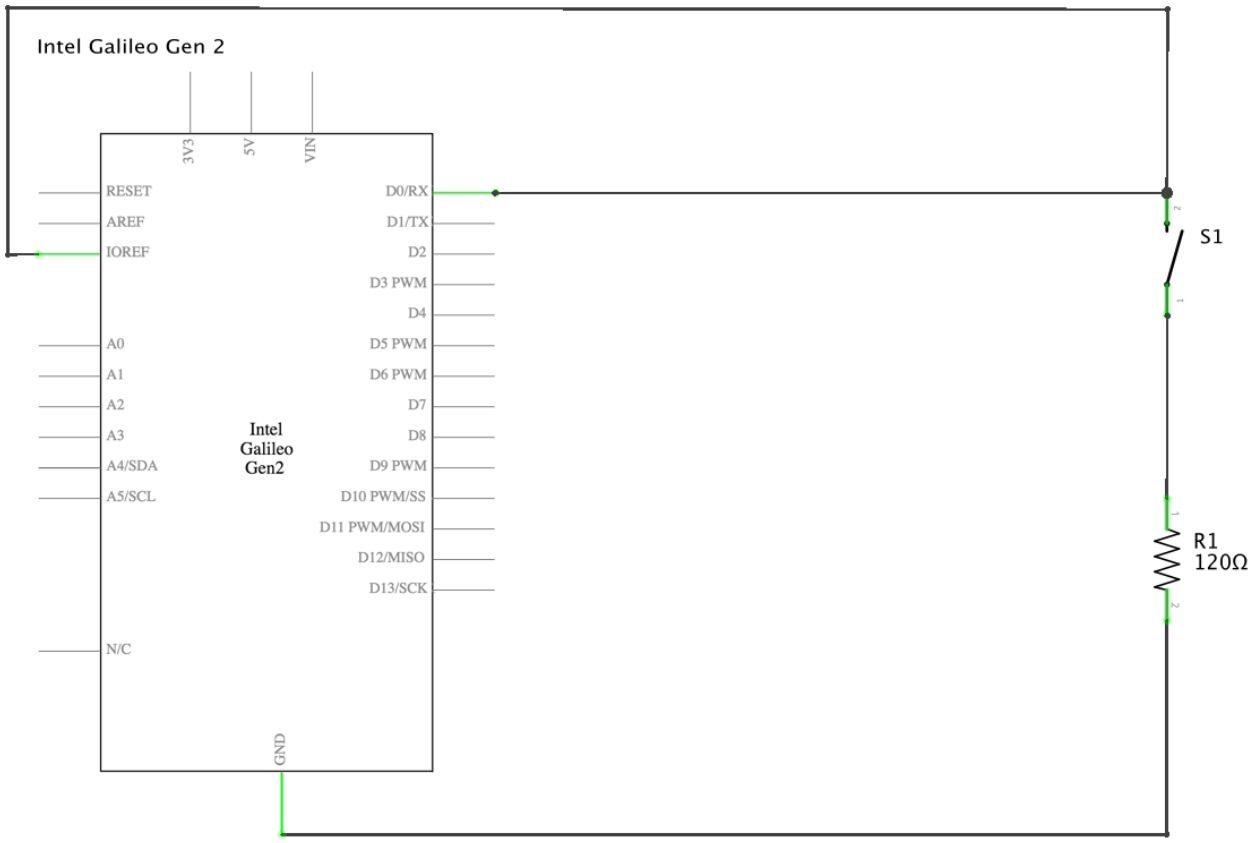

Intel Galileo Gen 2
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
GND
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
Intel
Galileo
Gen2
R3
270Ω
R2
270Ω
R1
270Ω
RGBLED1
R
G
B

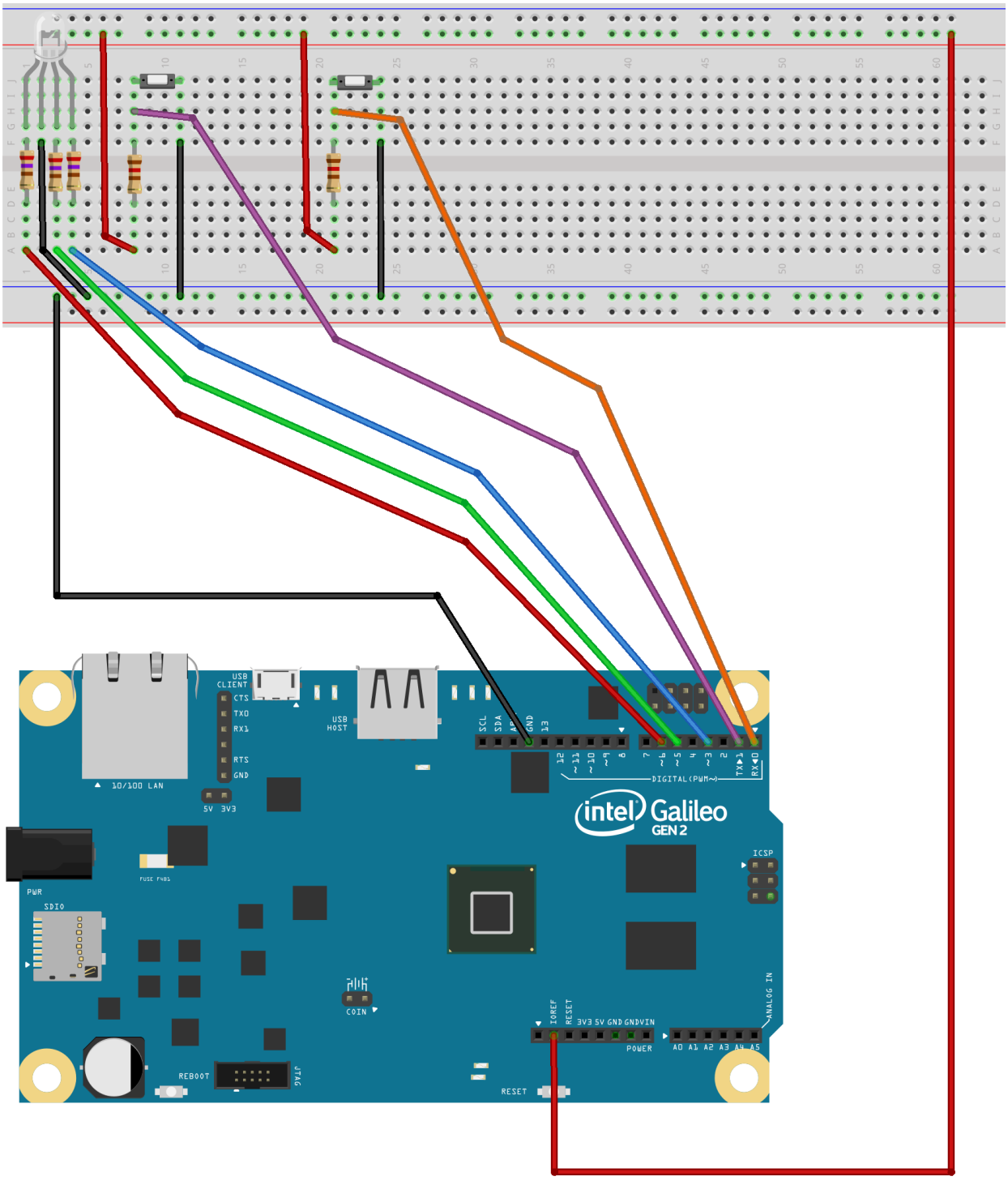
Chapter 5: Working with Digital Inputs: Polling and Interrupts

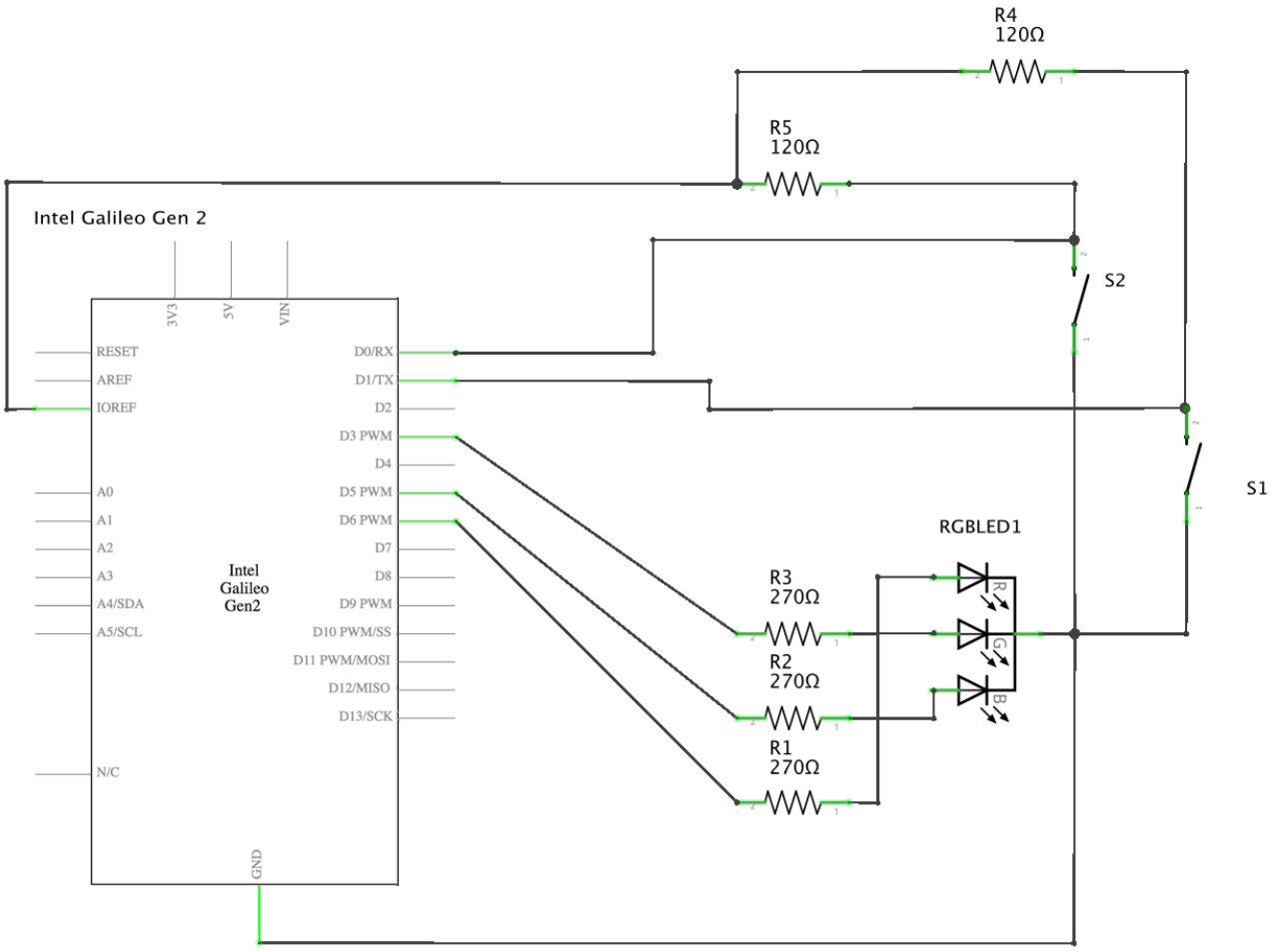


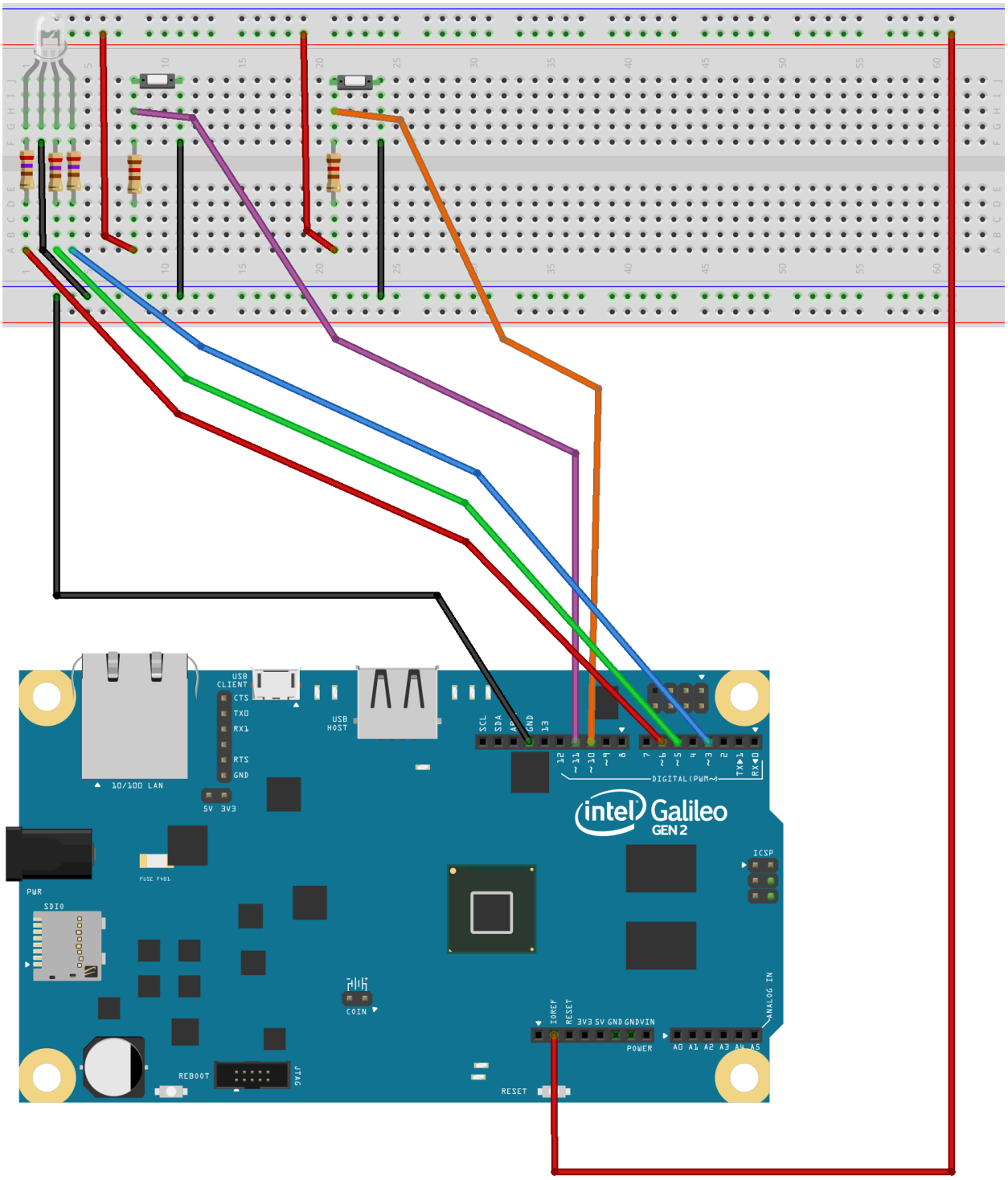

R1
120Ω
Intel Galileo Gen 2
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
GND
Intel
Galileo
Gen2
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
S1

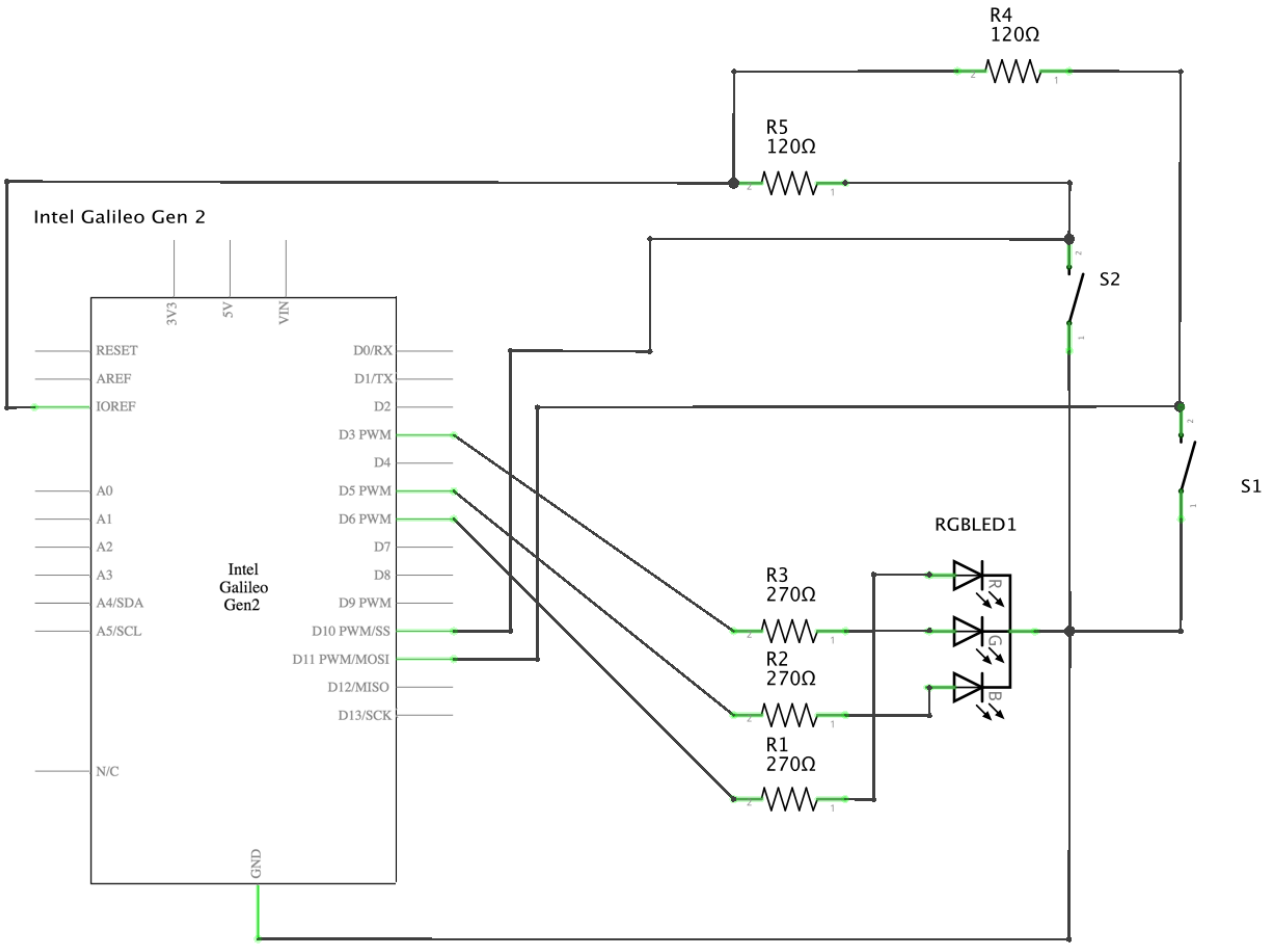

USB CLIENT
CTS
TXD
RX1
RTS
GND
USB HOST
10/100 LAN
5V 3V3
SCL
SDA
GND
13
DIGITAL(PWM~)
TX→1
RX←0
intel Galileo
GEN 2
ICSP
PWR
SDIO
COIN
REBOOT
JTAG
RESET
IOREF
RESET
3V3 5V GND GNDVIN
POWER
A0 A1 A2 A3 A4 A5
ANALOG IN
fritzing


Intel Galileo Gen 2
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
GND
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
Intel
Galileo
Gen2
S1
R1
120Ω


USB CLIENT
CTS
TXO
RX1
RTS
GND
USB HOST
10/100 LAN
5V 3V3
SCL
SDA
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX▲1
RX▼0
DIGITAL (PWM~)
intel Galileo
GEN 2
ICSP
PWR
SDIO
FUSE FWB1
COIN
IOREF
RESET
3V3 5V GND GNDVIN
POWER
A0 A1 A2 A3 A4 A5
ANALOG IN
REBOOT
JTAG
RESET

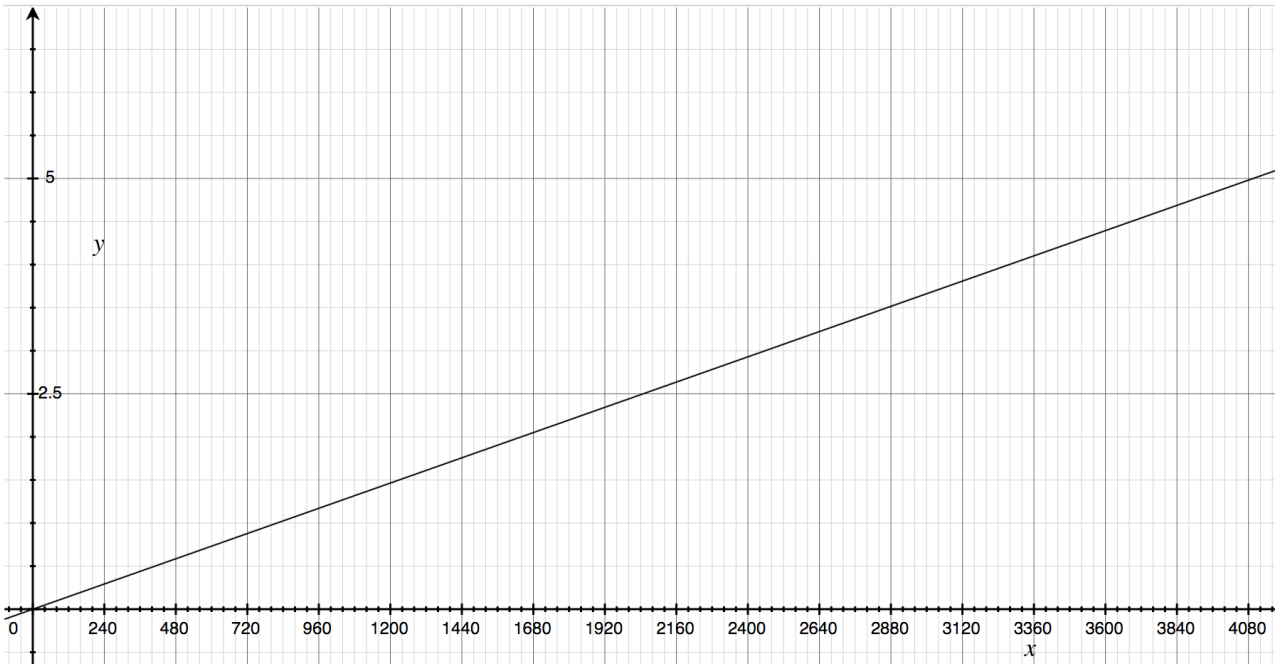

R4
120Ω
R5
120Ω
Intel Galileo Gen 2
S2
S1
RGBLED1
R3
270Ω
R2
270Ω
R1
270Ω
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
Intel
Galileo
Gen2
R
G
B

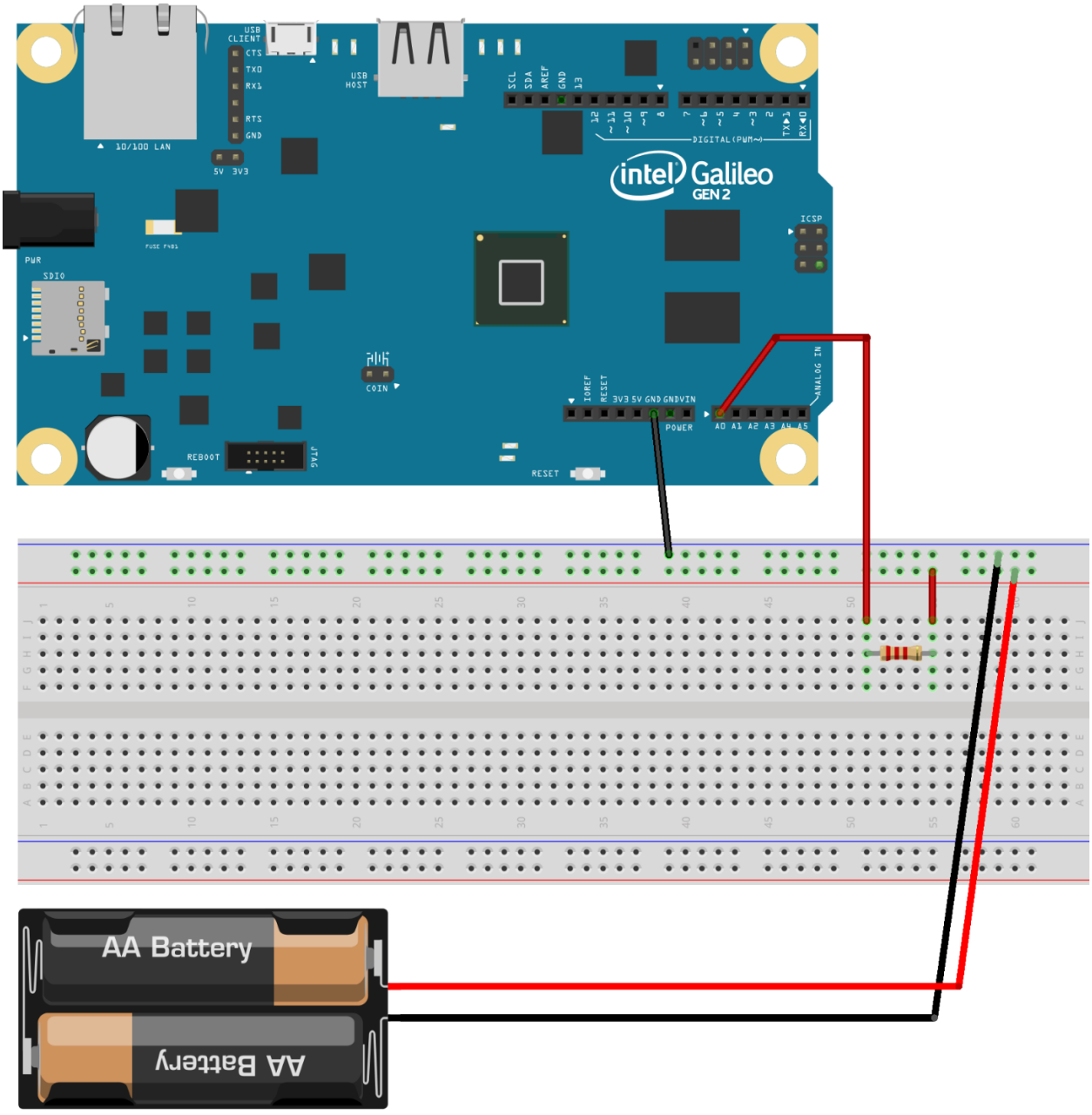

USB CLIENT
CTS
TXO
RX1
RTS
GND
USB HOST
10/100 LAN
5V 3V3
SCL
SDA
GND
13
DIGITAL(PWM~)
TX 1
RX 0
intel Galileo GEN 2
ICSP
PWR
SDIO
COIN
REBOOT
JTAG
RESET
IOREF
RESET
3V3 5V GND GNDVIN
POWER
A0 A1 A2 A3 A4 A5
ANALOG IN

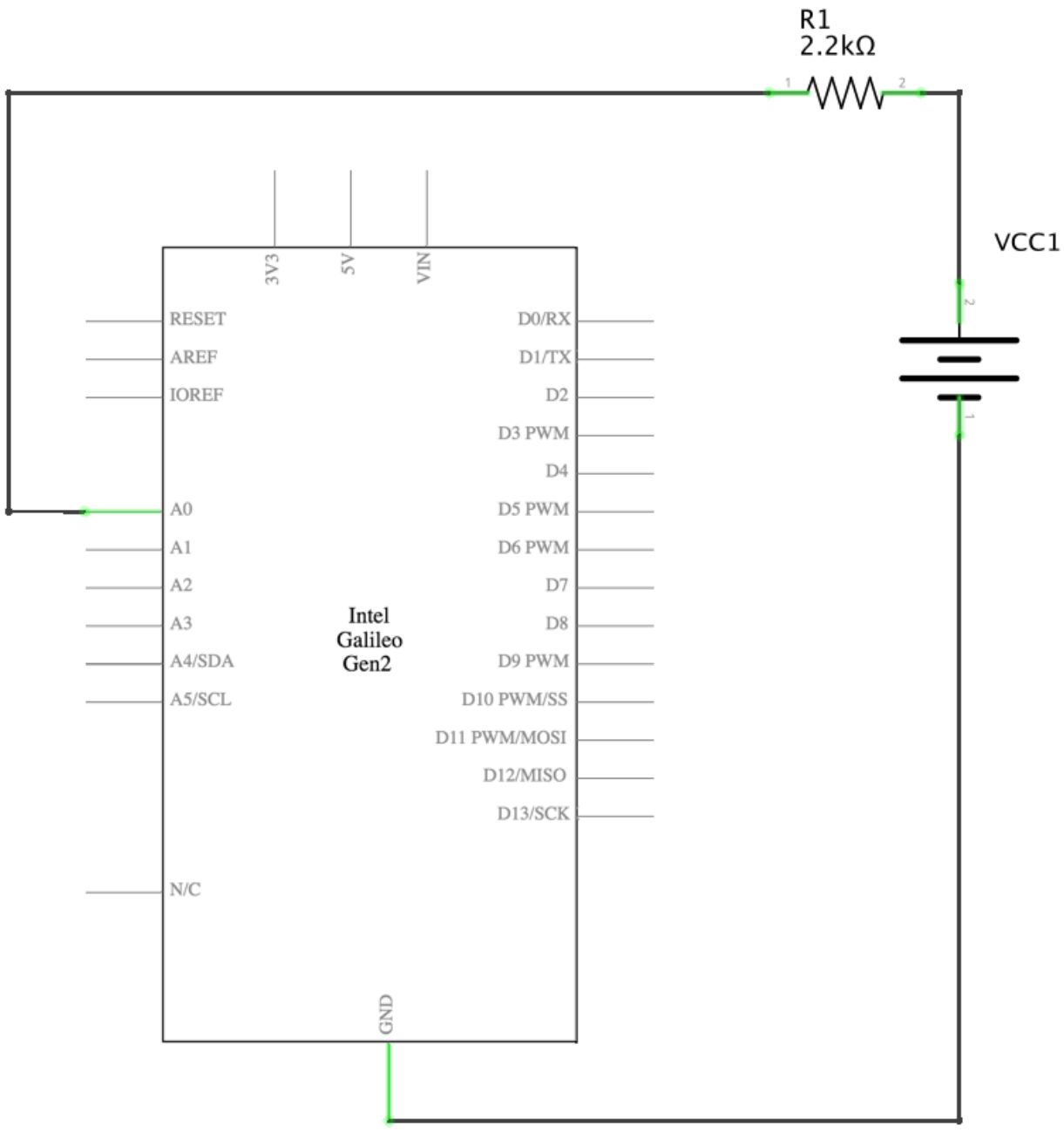

R4
120Ω
R5
120Ω
Intel Galileo Gen 2
S2
S1
RGBLED1
R3
270Ω
R2
270Ω
R1
270Ω
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
Intel
Galileo
Gen2
R
G
B

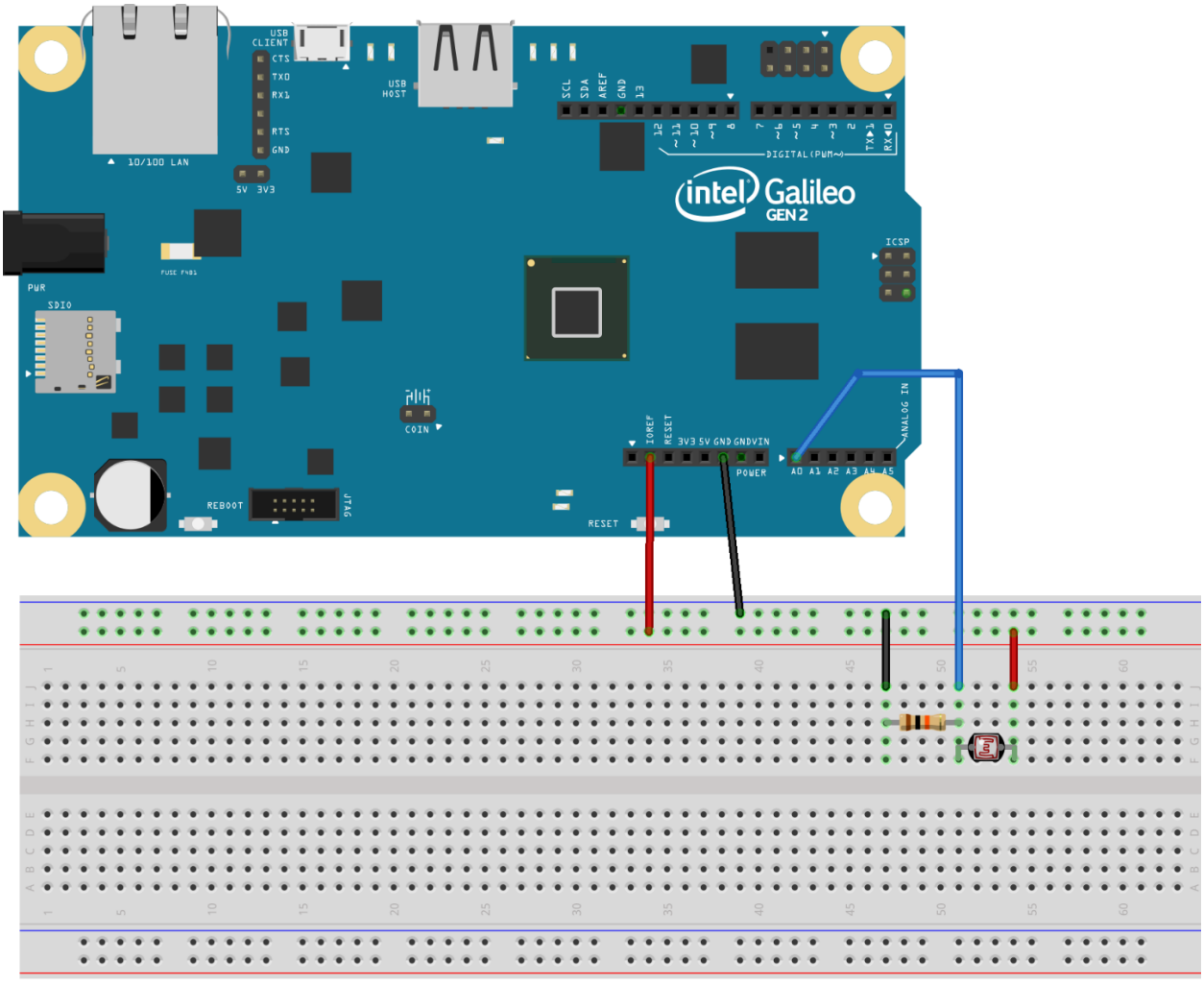
Chapter 6: Working with Analog Inputs and Local Storage

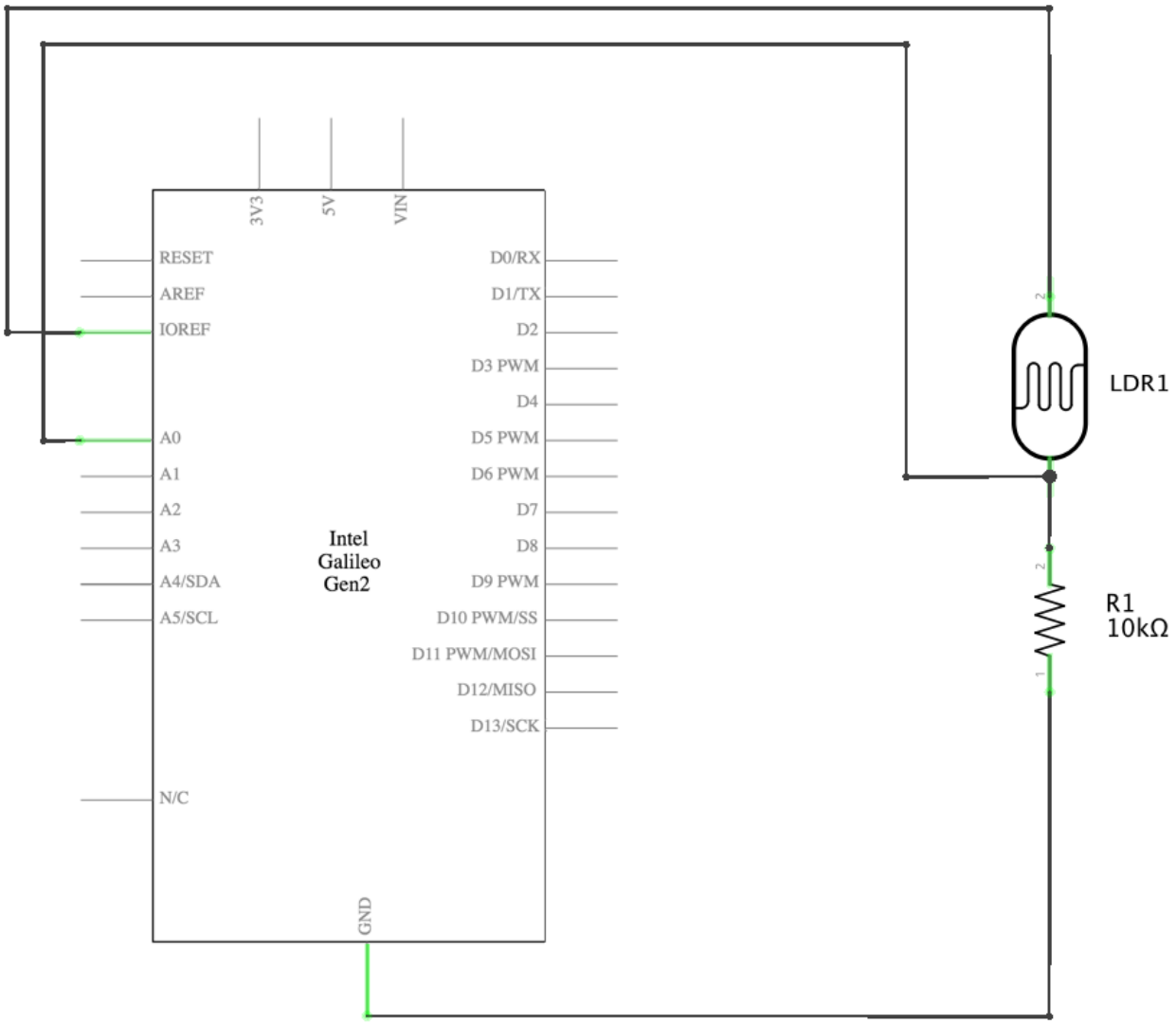
$y = \frac{x}{4095} \cdot 5$

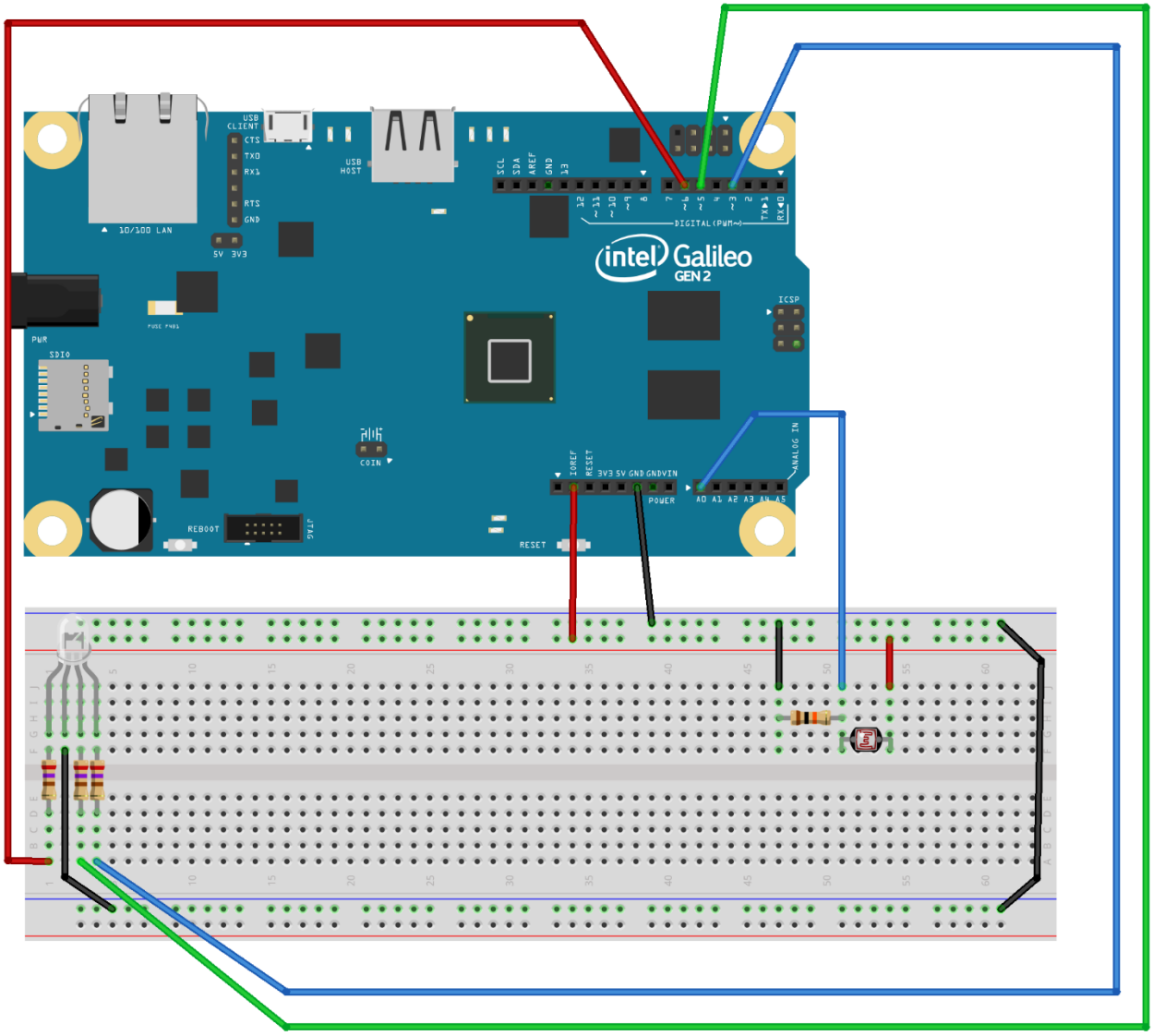


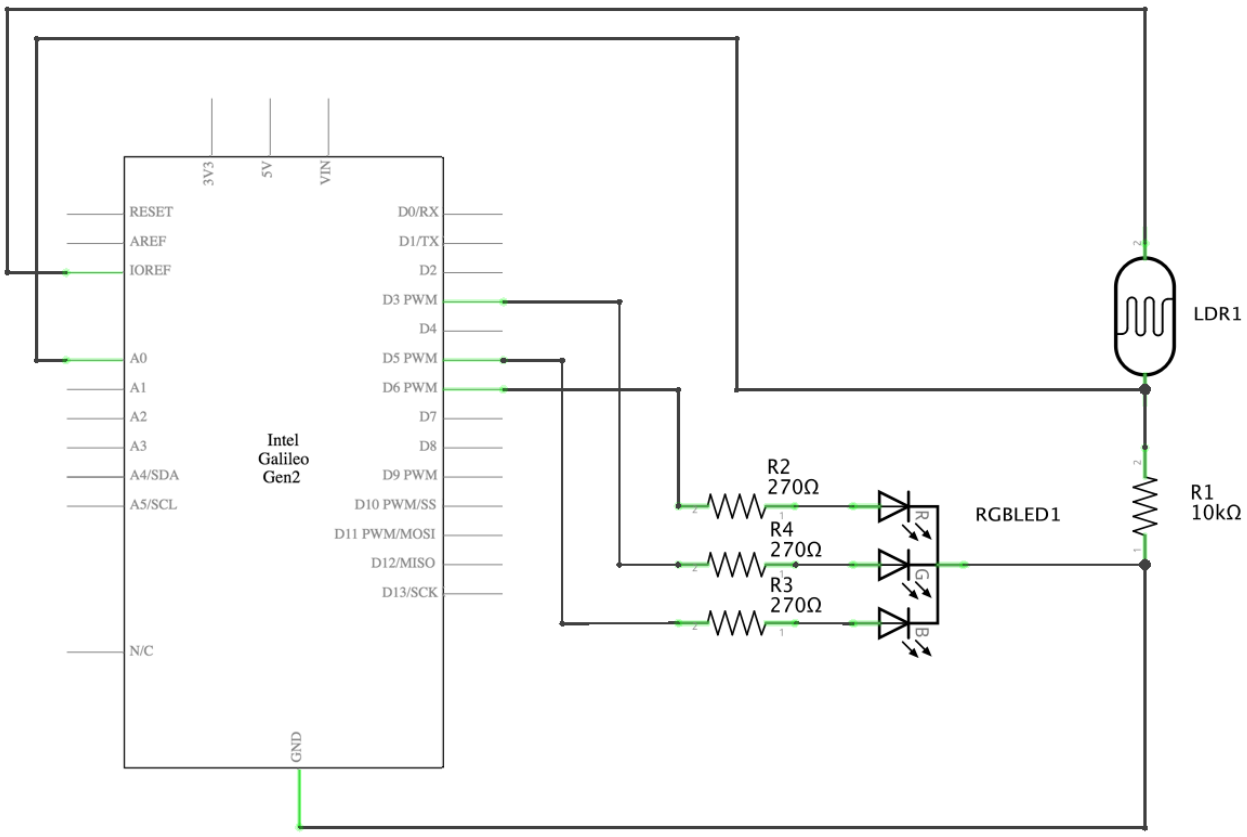

USB CLIENT
CTS
TXD
RXD
RTS
GND
10/100 LAN
USB HOST
SCL
SDA
AREF
GND
13
DIGITAL (PWM~)
TX→1
RX←0
5V
3V3
intel Galileo
GEN 2
ICSP
PWR
SDIO
COIN
IOREF
RESET
3V3
5V
GND
GND
VIN
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
REBOOT
JTAG
RESET
AA Battery
AA Battery

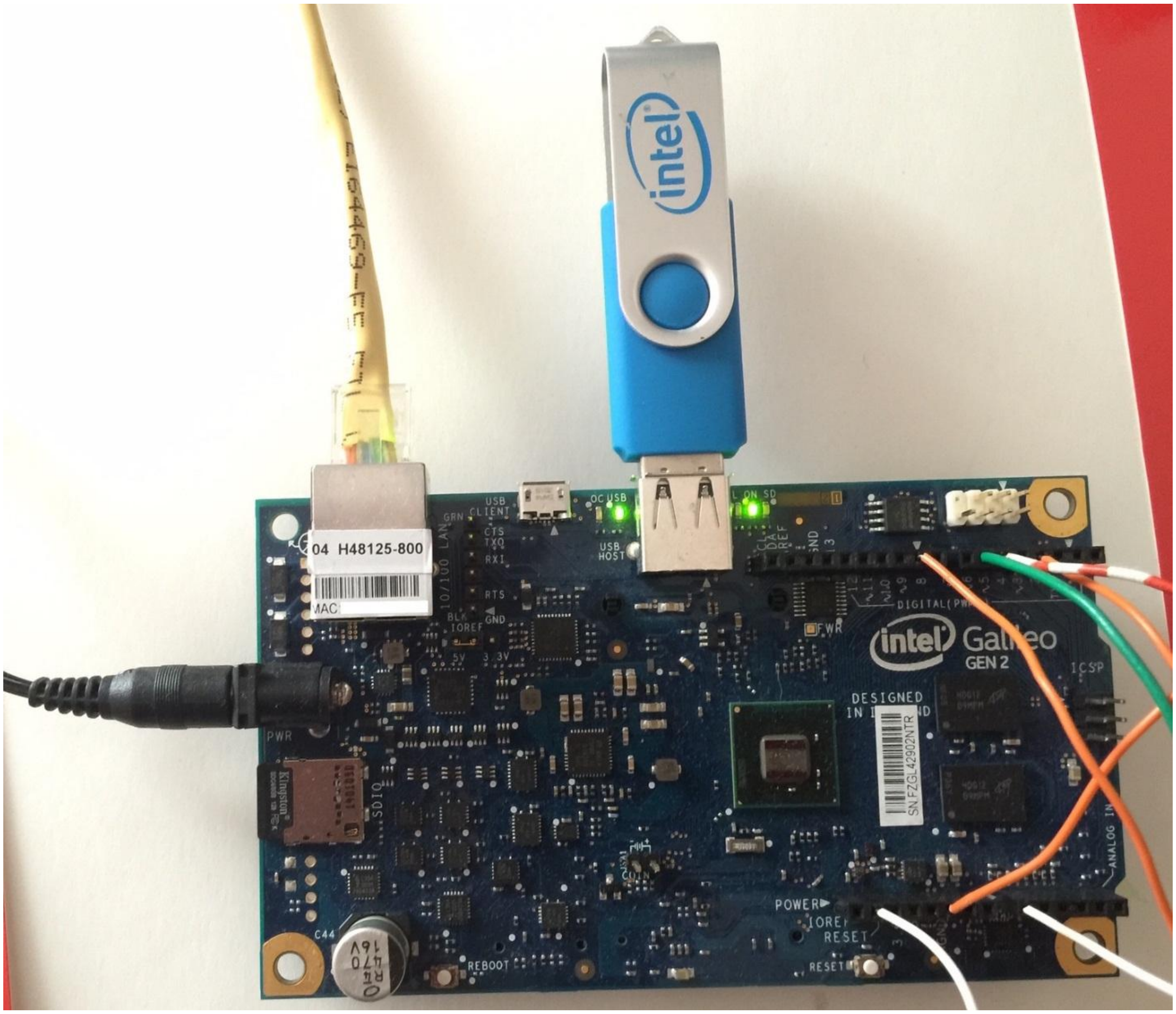

R1
2.2kΩ
1
2
VCC1
2
1
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
Intel
Galileo
Gen2
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND


USB CLIENT
CTS
TXD
RXI
RTS
GND
10/100 LAN
USB HOST
5V 3V3
SCL SDA AREF GND 13
DIGITAL (PWM~)
TX→1 RX←0
intel Galileo GEN 2
ICSP
PWR
SDIO
COIN
REBOOT
JTAG
IOREF RESET 3V3 5V GND GND VIN
POWER
ANALOG IN
A0 A1 A2 A3 A4 A5
RESET

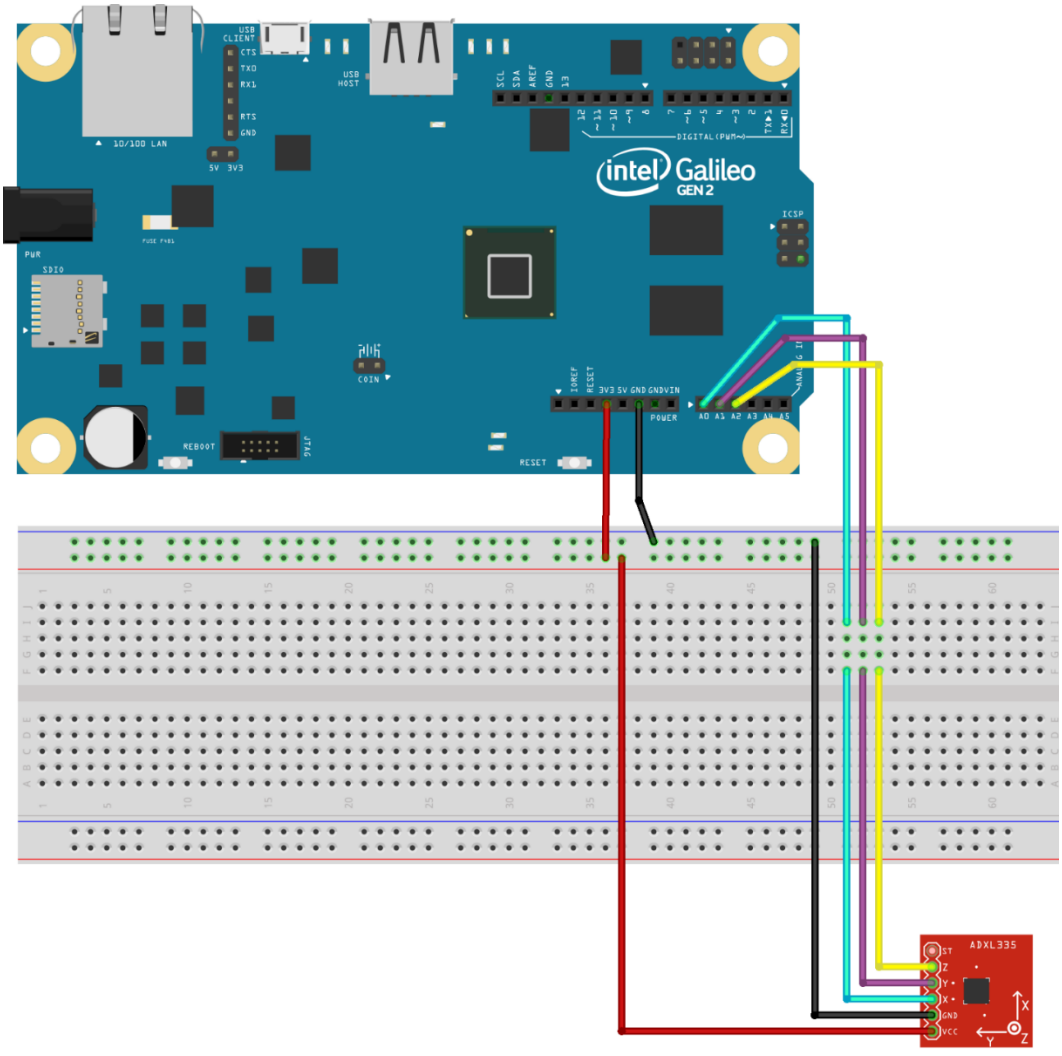

3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
GND
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
Intel
Galileo
Gen2
LDR1
R1
10kΩ

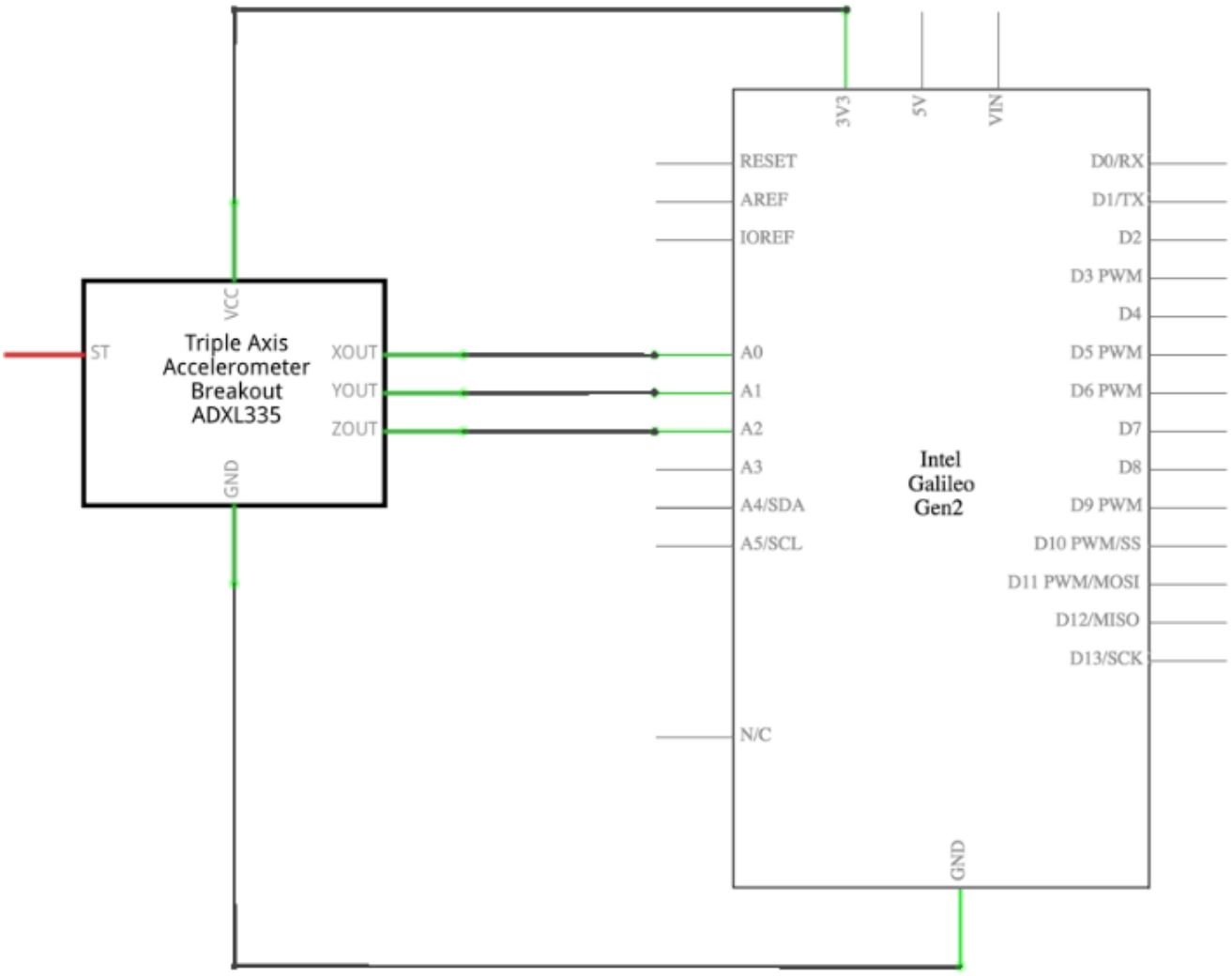

intel Galileo
GEN 2
10/100 LAN
USB CLIENT
USB HOST
DIGITAL (PWM~)
POWER
ANALOG IN
ICSP
SDIO
PWR
REBOOT
JTAG
RESET
COIN

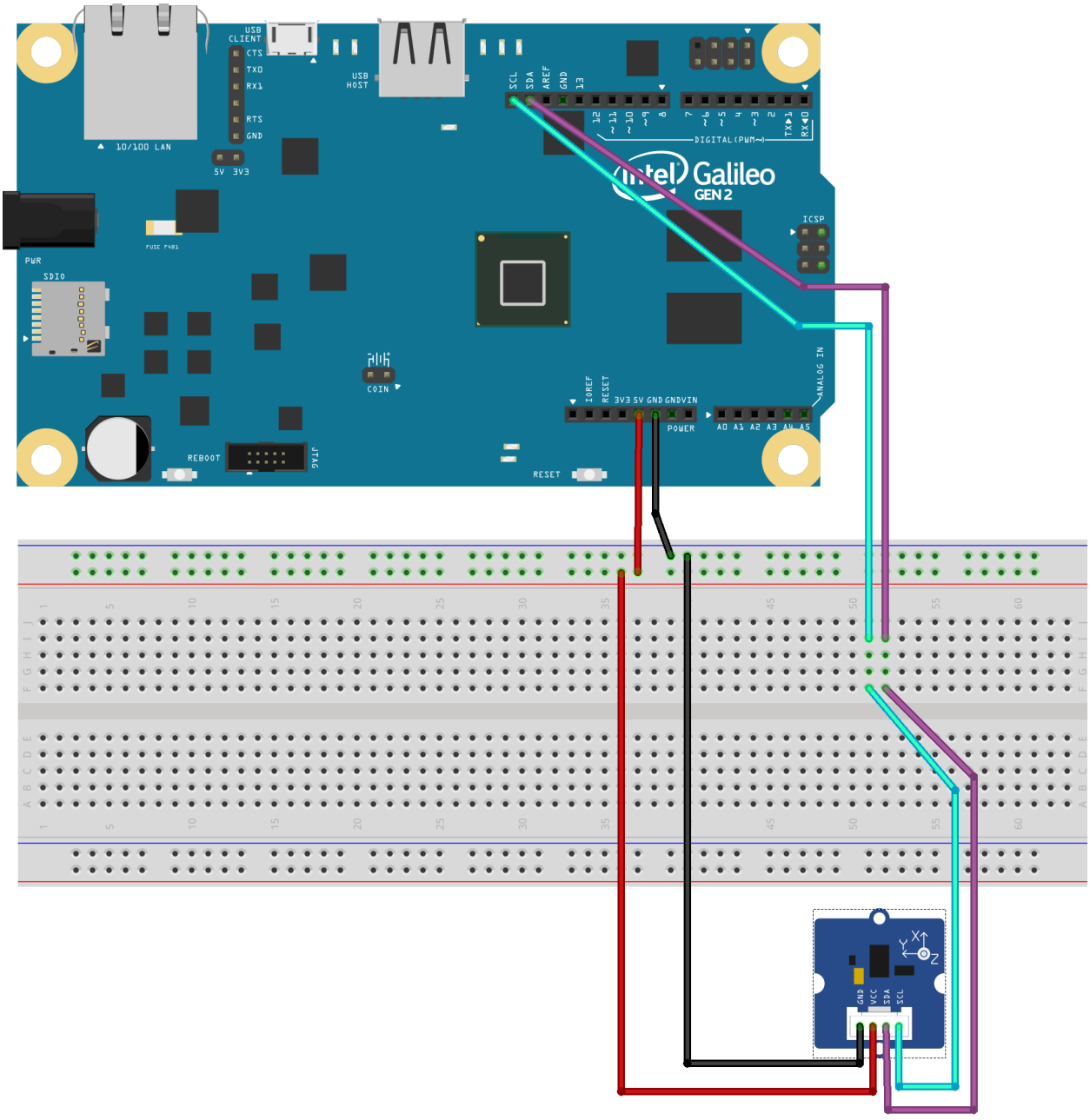

3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
GND
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
Intel
Galileo
Gen2
R2
270Ω
R4
270Ω
R3
270Ω
RGBLED1
R
G
B
LDR1
R1
10kΩ

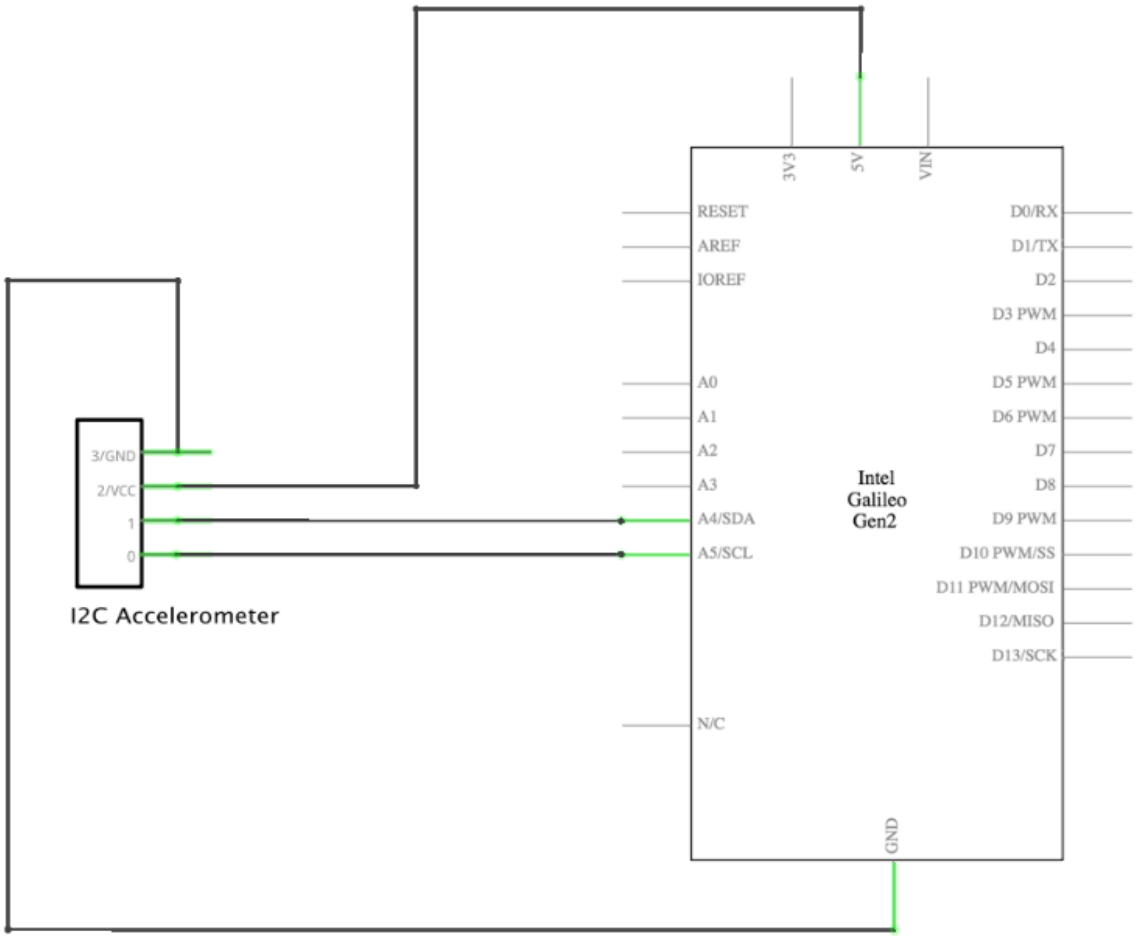

intel
04 H48125-800
MAC
USB CLIENT
USB HOST
intel Galileo
GEN 2
PWR
SDIO
REBOOT
POWER
RESET
ICSP
SN FZGL42902NTR

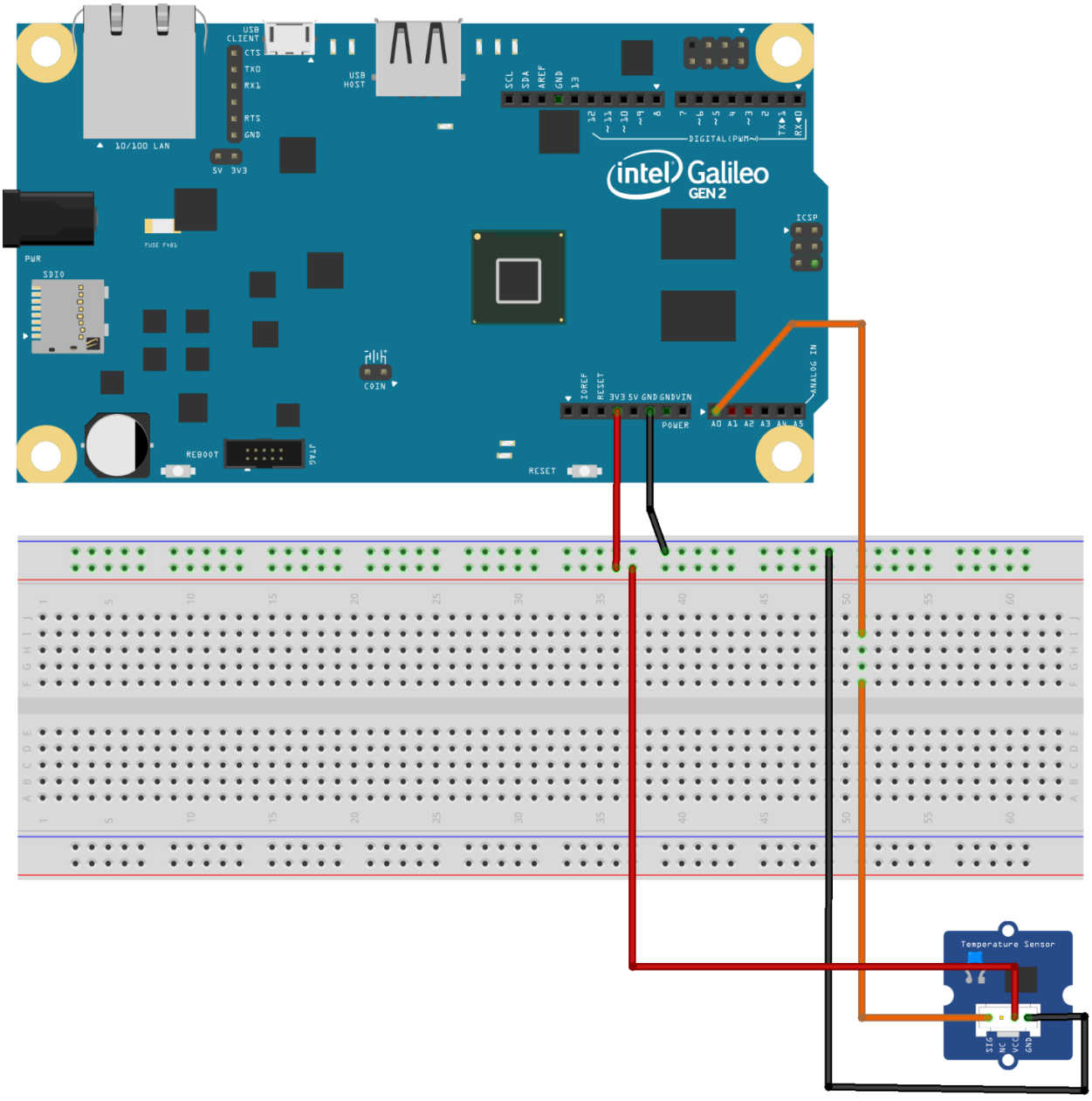
Chapter 7: Retrieving Data from the Real World with Sensors

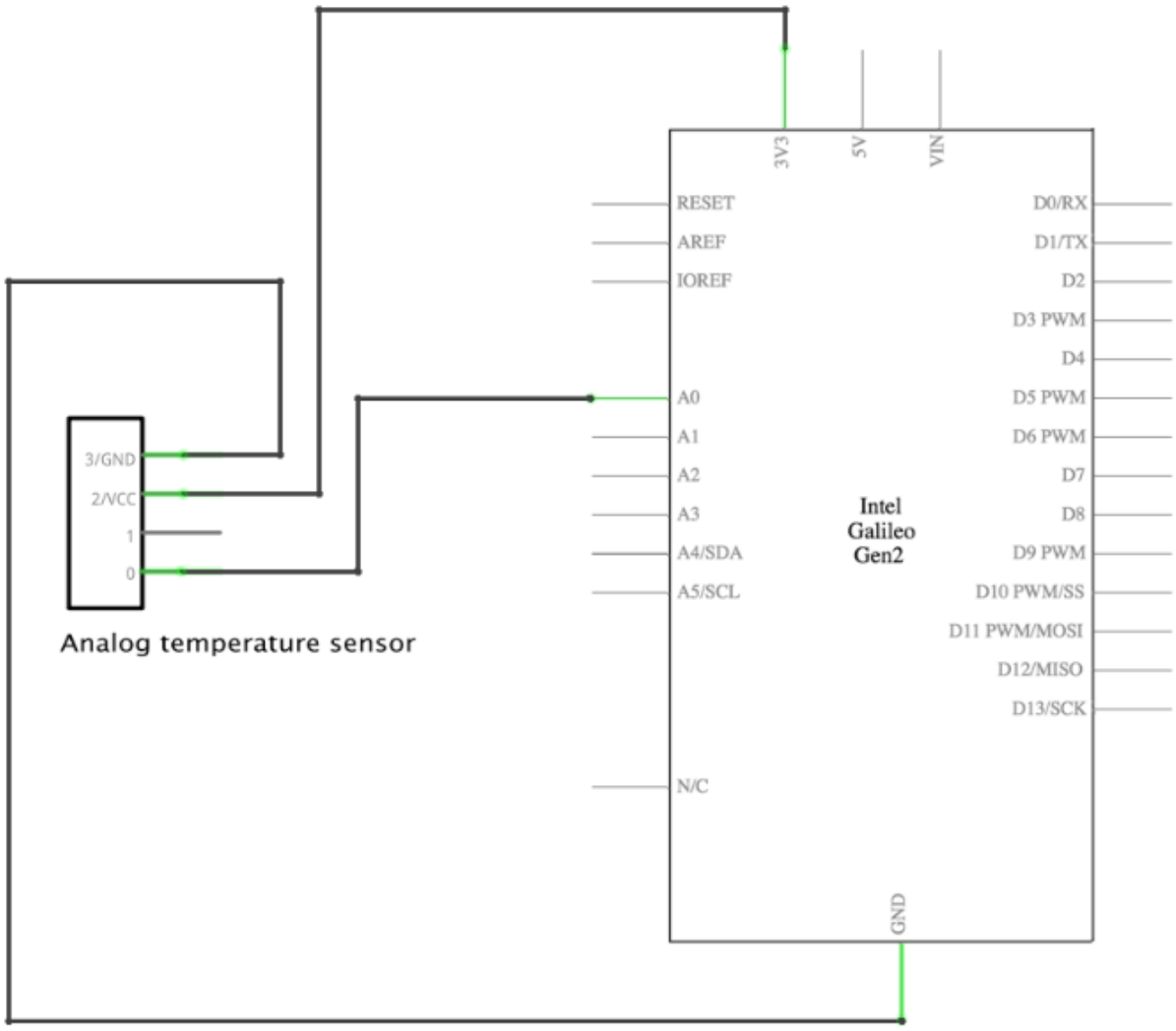


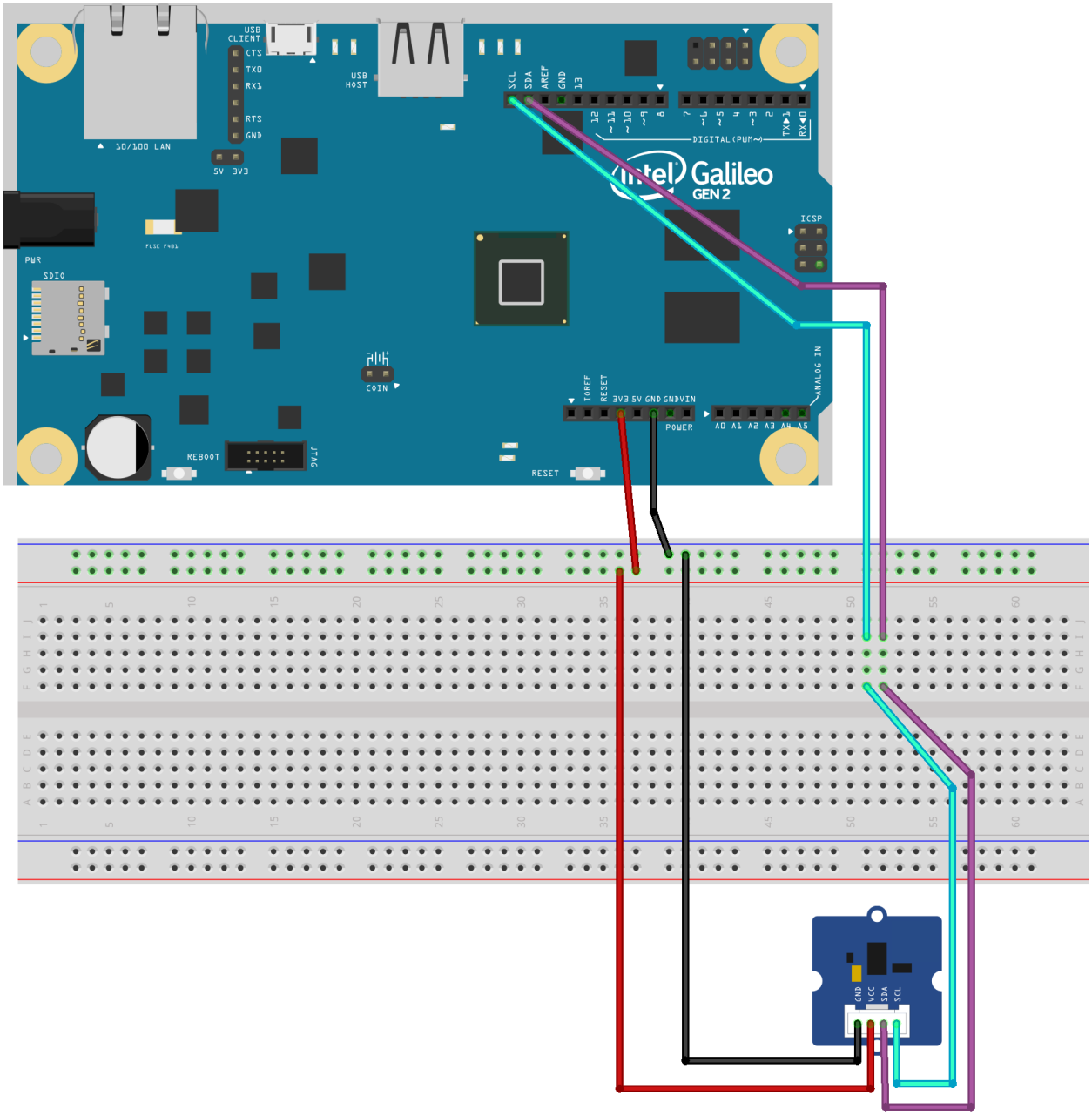

3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
Intel
Galileo
Gen2
VCC
ST
Triple Axis
Accelerometer
Breakout
ADXL335
XOUT
YOUT
ZOUT
GND

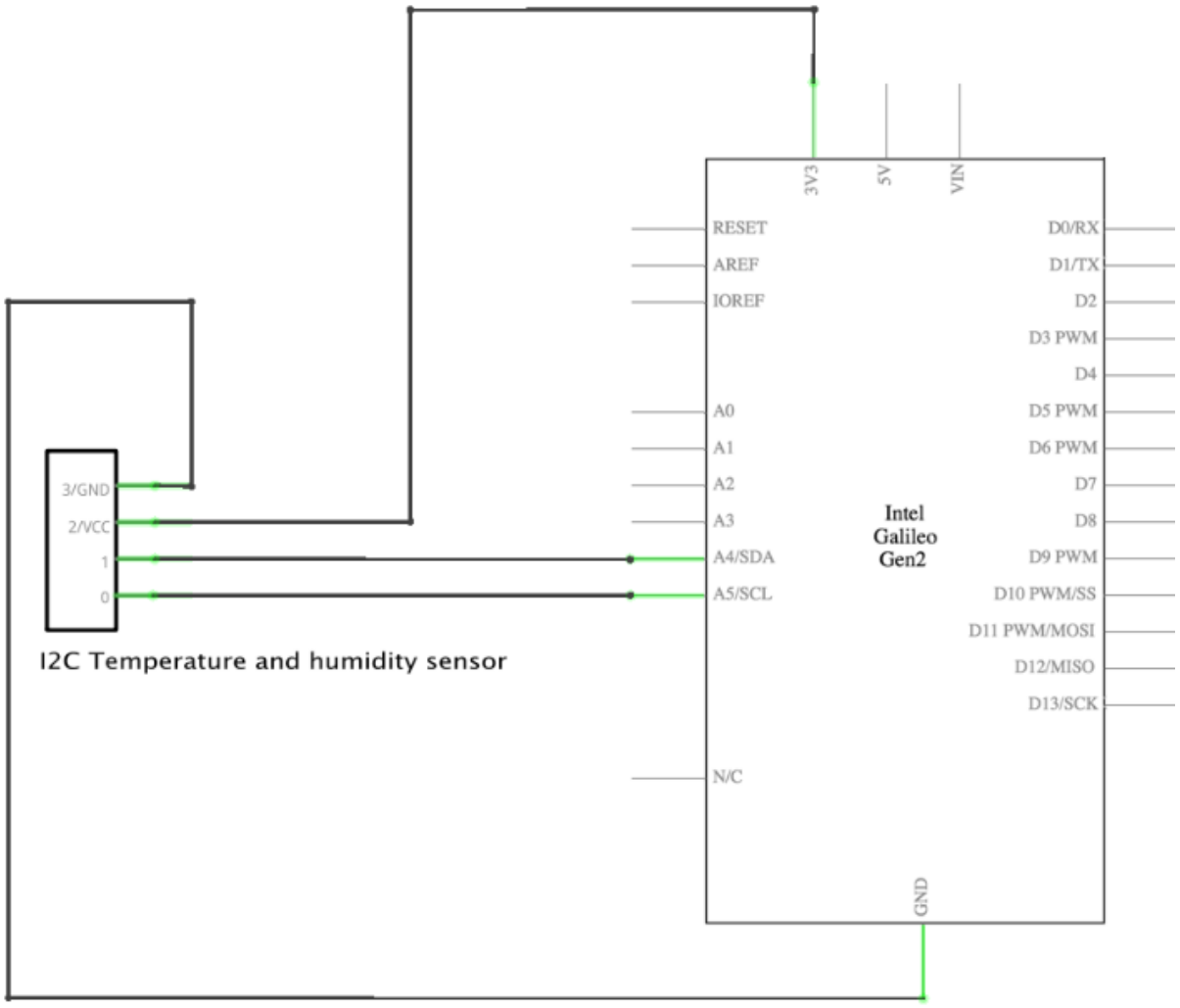

USB CLIENT
CTS
TXD
RXI
RTS
GND
10/100 LAN
5V 3V3
USB HOST
SCL SDA AREF GND 13
12 ~11 ~10 ~9 8
7 ~6 ~5 4 ~3 2 TX→1 RX←0
DIGITAL(PWM~)
Intel Galileo GEN 2
ICSP
PWR
SDIO
COIN
IOREF RESET 3V3 5V GND GND VIN
POWER
A0 A1 A2 A3 A4 A5
ANALOG IN
REBOOT
JTAG
RESET
GND VCC SDA SCL


3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
Intel
Galileo
Gen2
3/GND
2/VCC
1
0
I2C Accelerometer

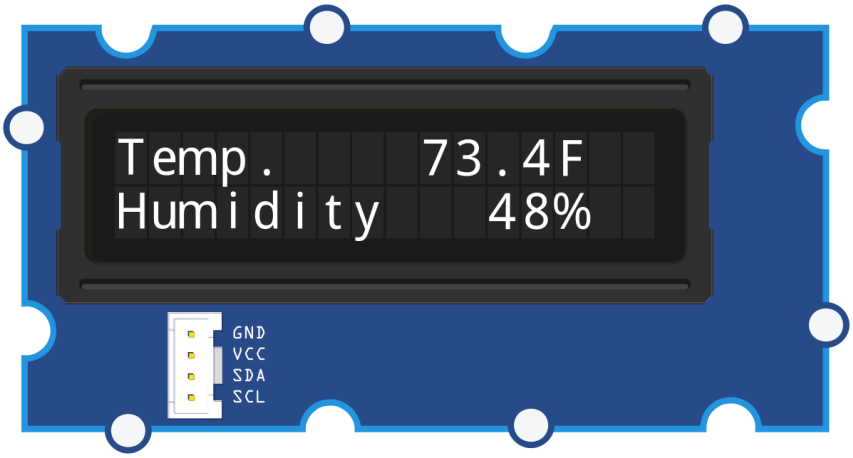

USB CLIENT
CTS
TXO
RX1
RTS
GND
USB HOST
10/100 LAN
5V 3V3
SCL SDA AREF GND 13
12 11 10 9 8 7 6 5 4 3 2 TX→1 RX←0
DIGITAL (PWM~)
intel Galileo GEN 2
ICSP
PWR
SDIO
fuse fsb1
COIN
IOREF RESET 3V3 5V GND GND VIN
POWER
A0 A1 A2 A3 A4 A5
ANALOG IN
REBOOT
JTAG
RESET
Temperature Sensor
SIG NC VCC GND

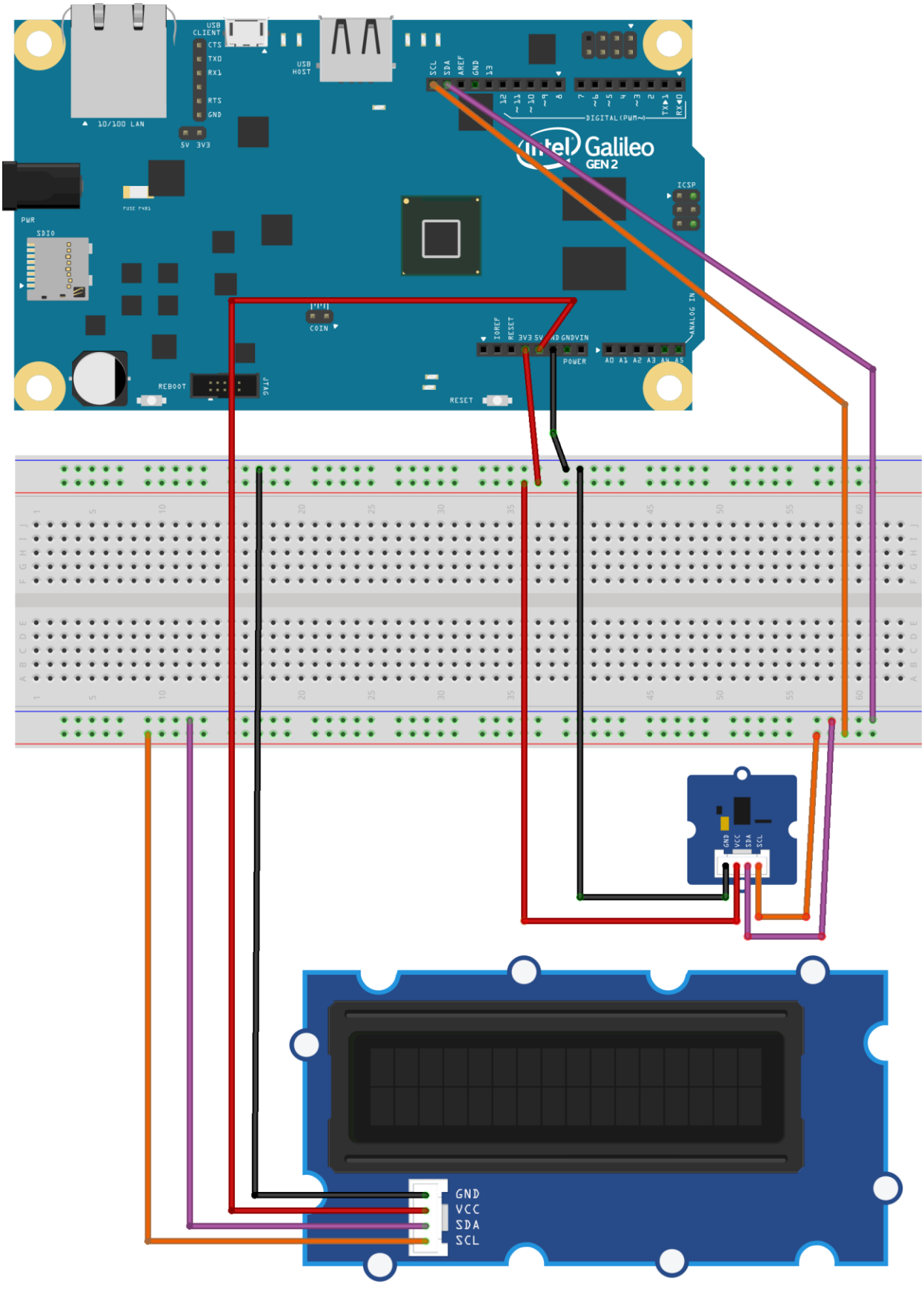

3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
Intel
Galileo
Gen2
3/GND
2/VCC
1
0
Analog temperature sensor

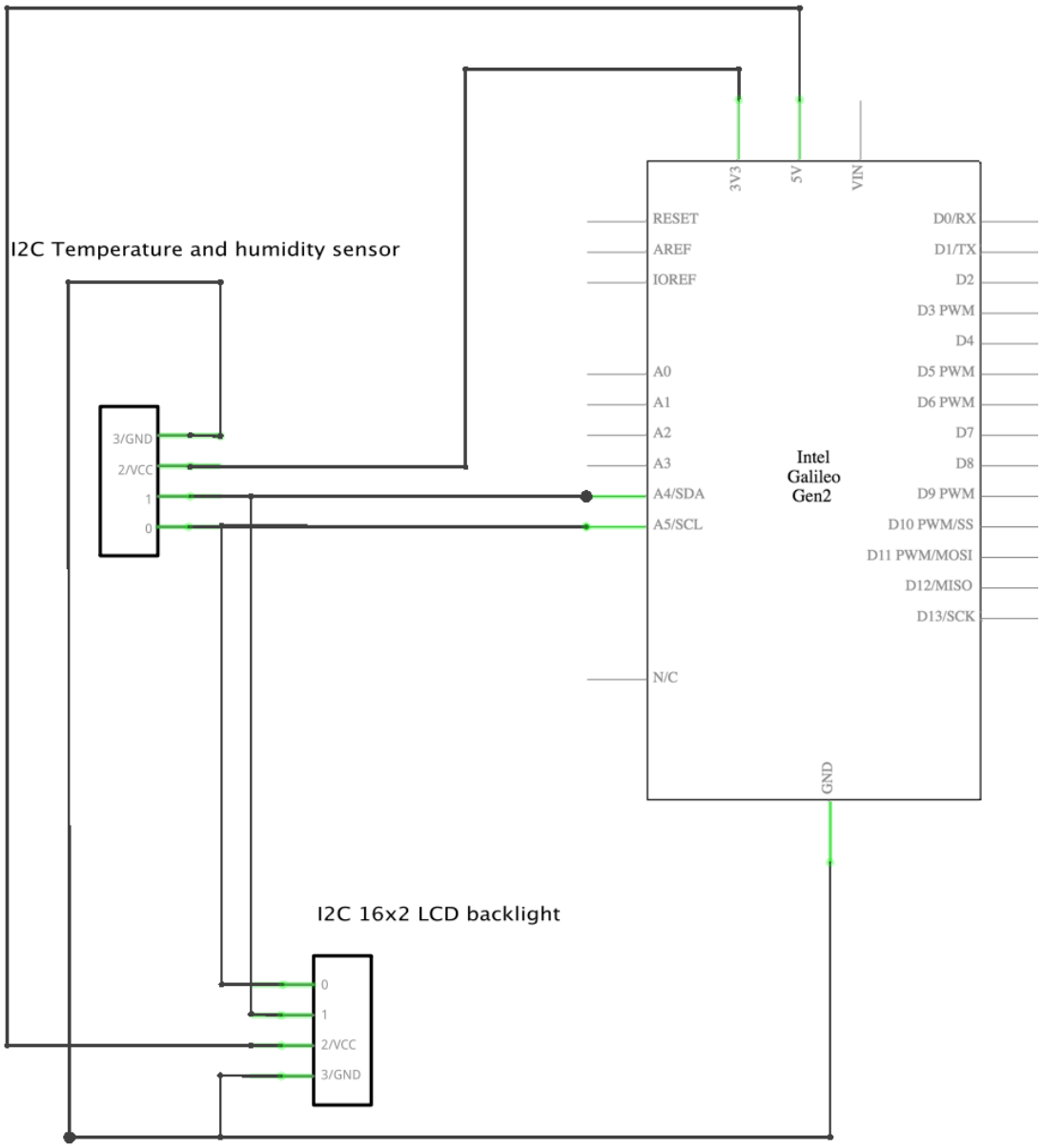

USB CLIENT
CTS
TXO
RXI
RTS
GND
10/100 LAN
5V 3V3
USB HOST
SCL SDA AREF GND 13
12 ~11 ~10 ~9 8 7 ~6 ~5 4 ~3 2 TX→1 RX←0
DIGITAL (PWM~)
Galileo GEN 2
ICSP
PWR
SDIO
COIN
IOREF RESET 3V3 5V GND GND VIN
POWER
A0 A1 A2 A3 A4 A5
ANALOG IN
REBOOT
JTAG
RESET
GND VCC SDA SCL

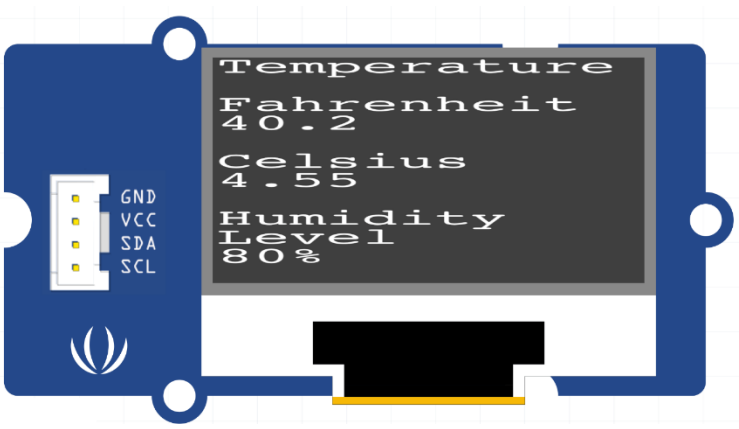

3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
GND
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
Intel
Galileo
Gen2
3/GND
2/VCC
1
0
I2C Temperature and humidity sensor

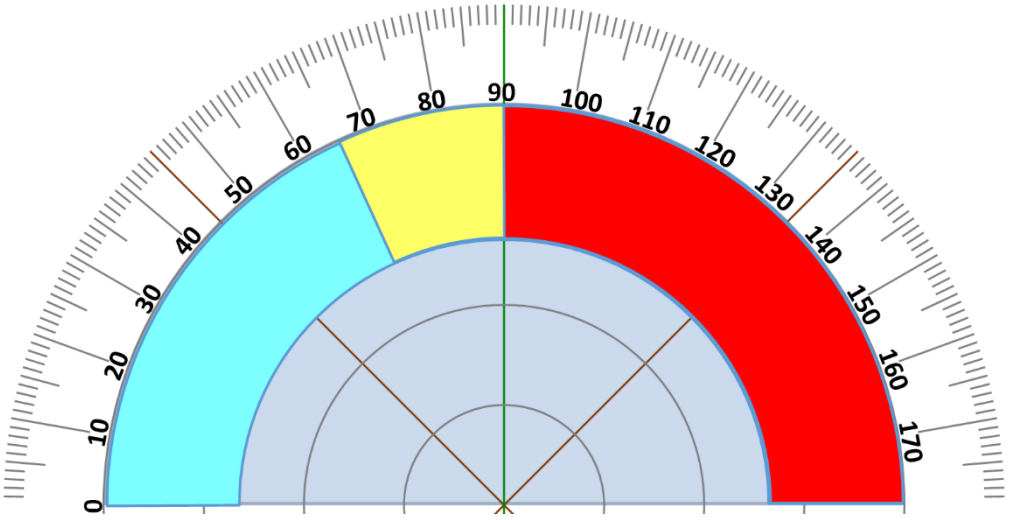
Chapter 8: Displaying Information and Performing Actions

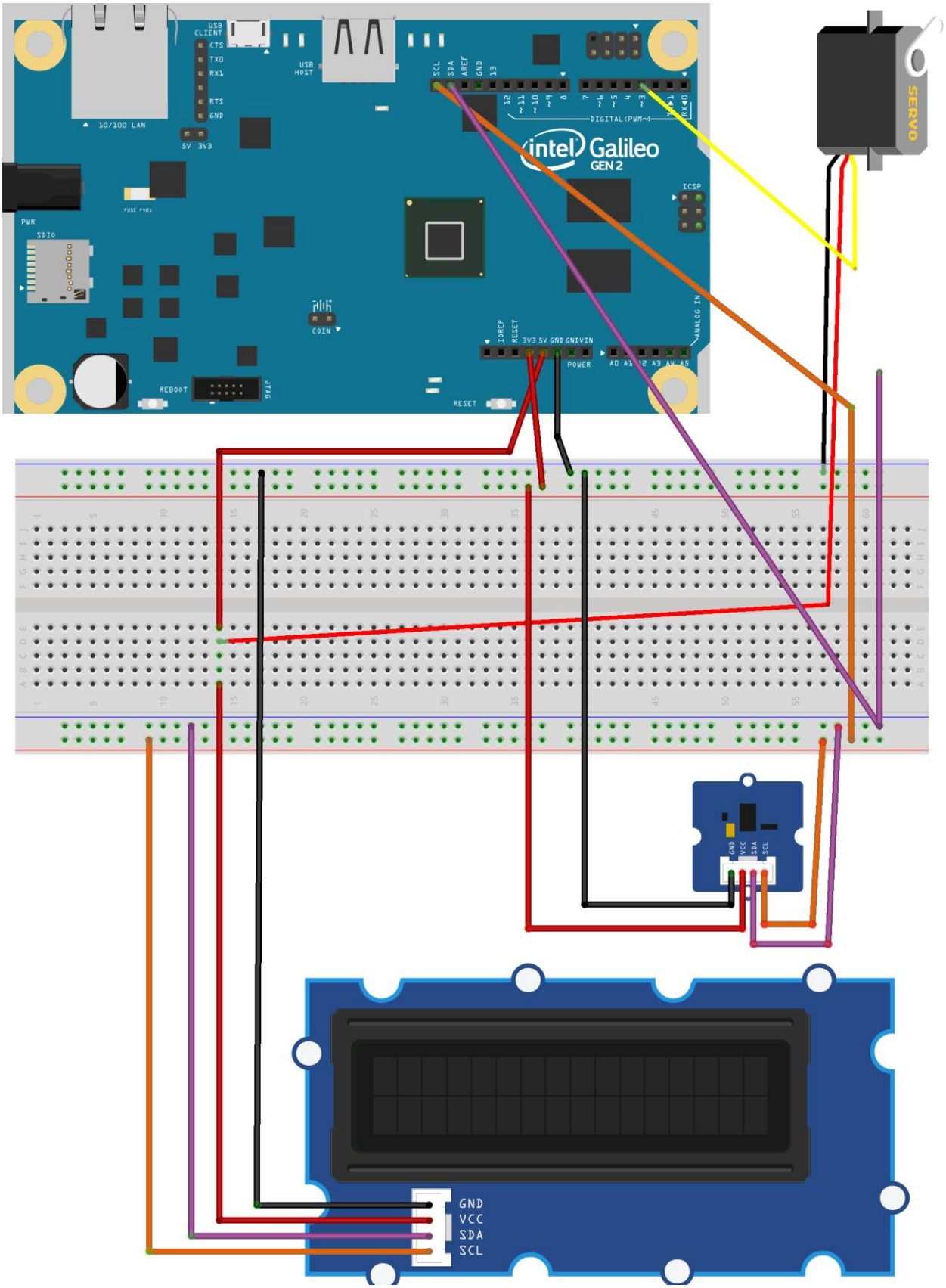


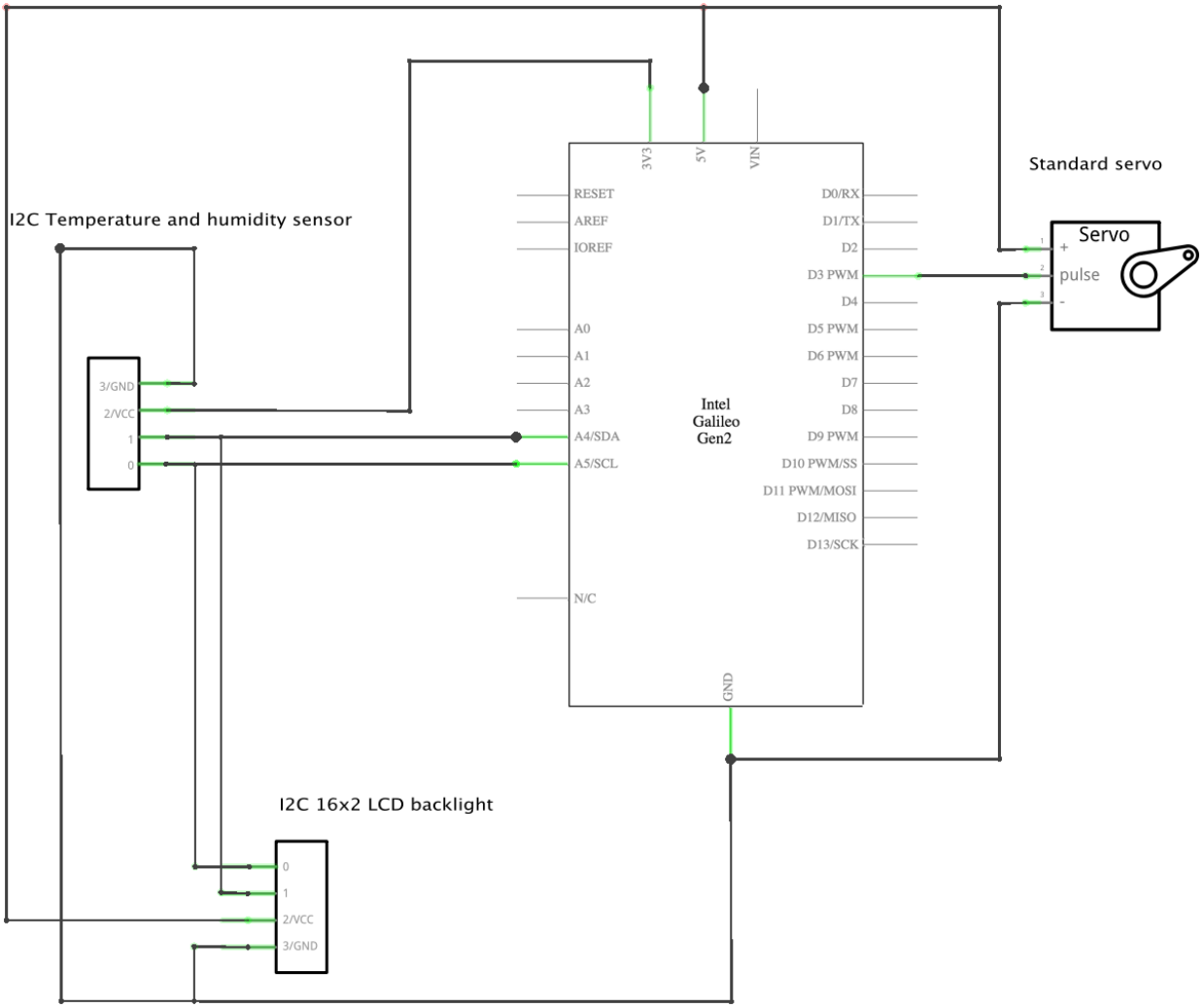

Galileo
GEN 2
GND
VCC
SDA
SCL


I2C Temperature and humidity sensor
3/GND
2/VCC
1
0
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
GND
Intel
Galileo
Gen2
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
I2C 16x2 LCD backlight
0
1
2/VCC
3/GND

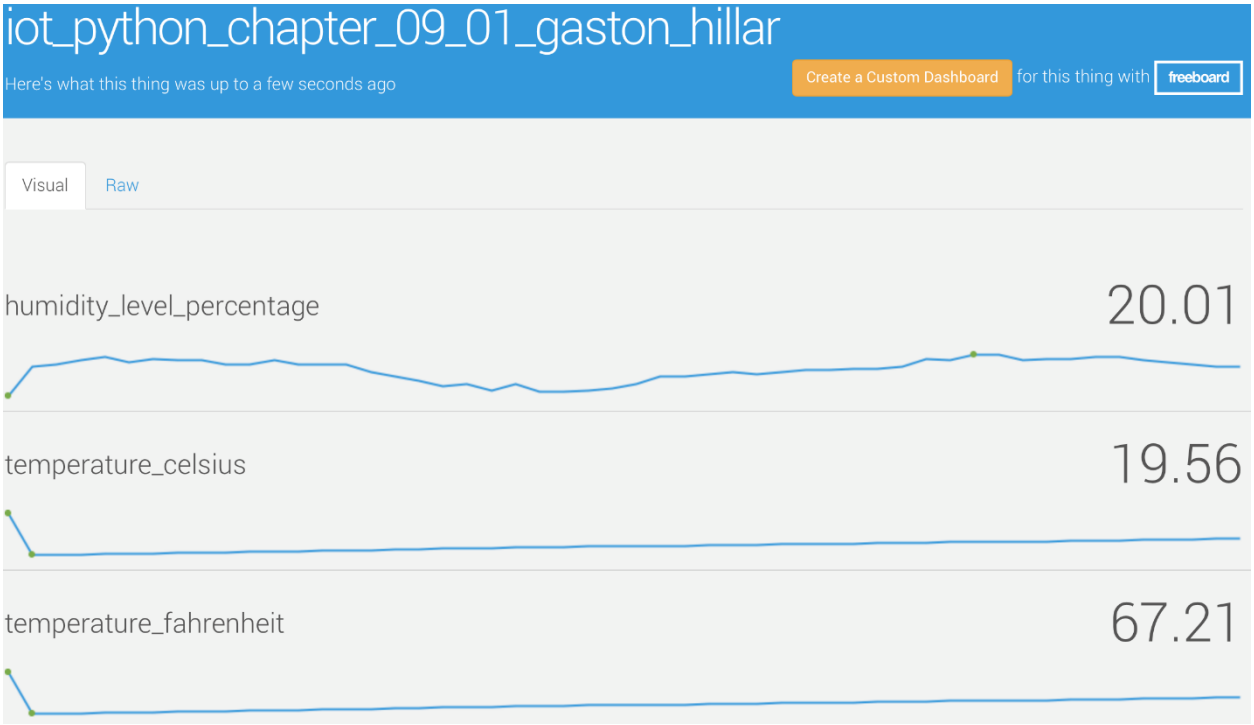

Temperature
Fahrenheit
40.2
Celsius
4.55
Humidity
Level
80%
GND
VCC
SDA
SCL

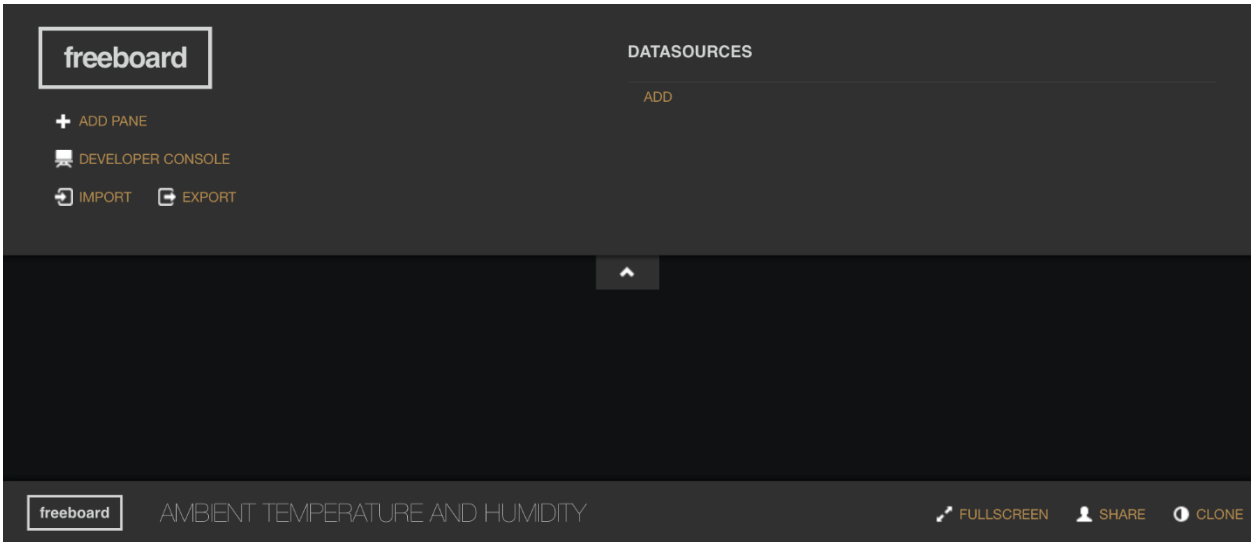

0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170

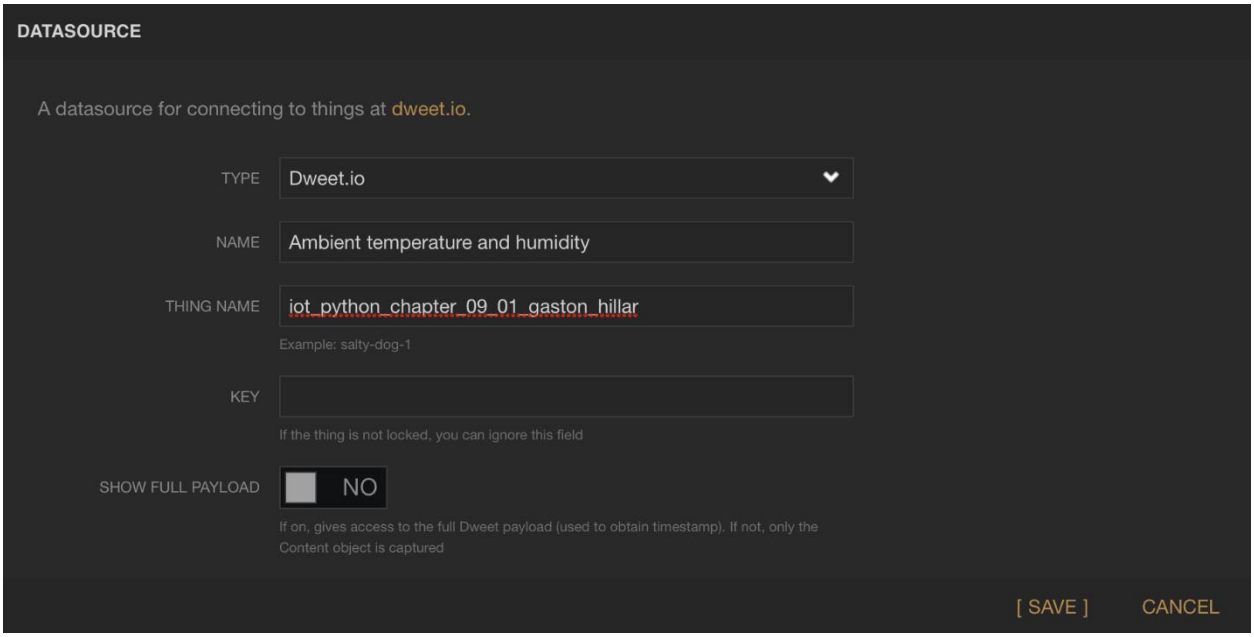

intel Galileo
GEN 2
SERVO
GND
VCC
SDA
SCL

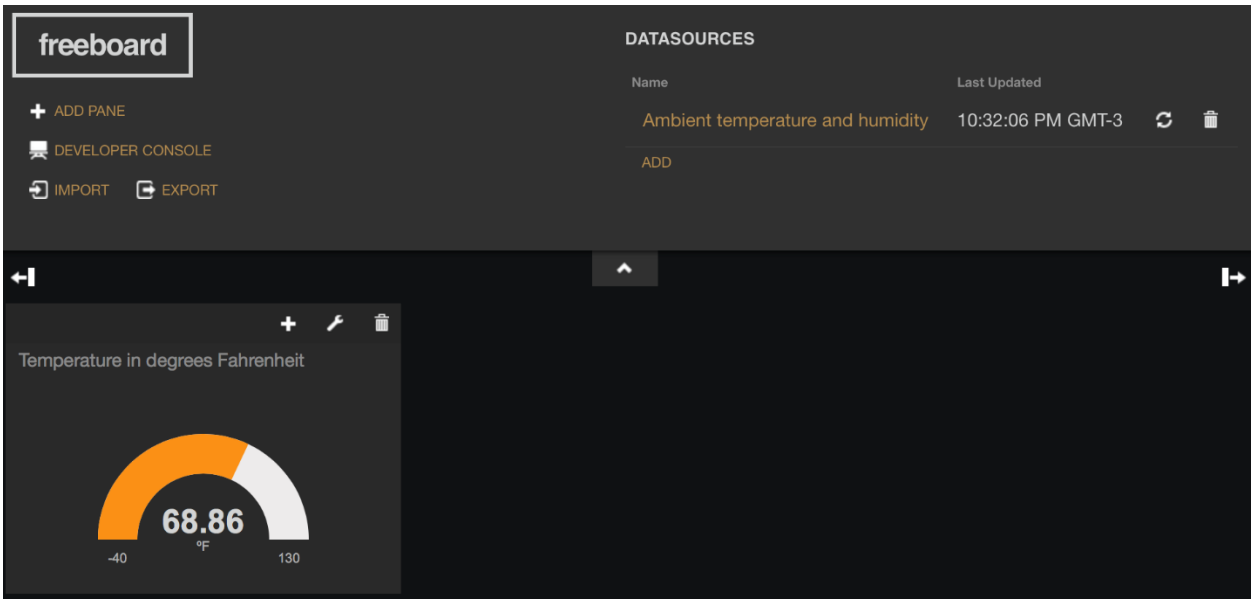

Standard servo
I2C Temperature and humidity sensor
Servo
pulse
3V3
5V
VIN
RESET
AREF
IOREF
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
Intel
Galileo
Gen2
3/GND
2/VCC
1
0
I2C 16x2 LCD backlight
0
1
2/VCC
3/GND

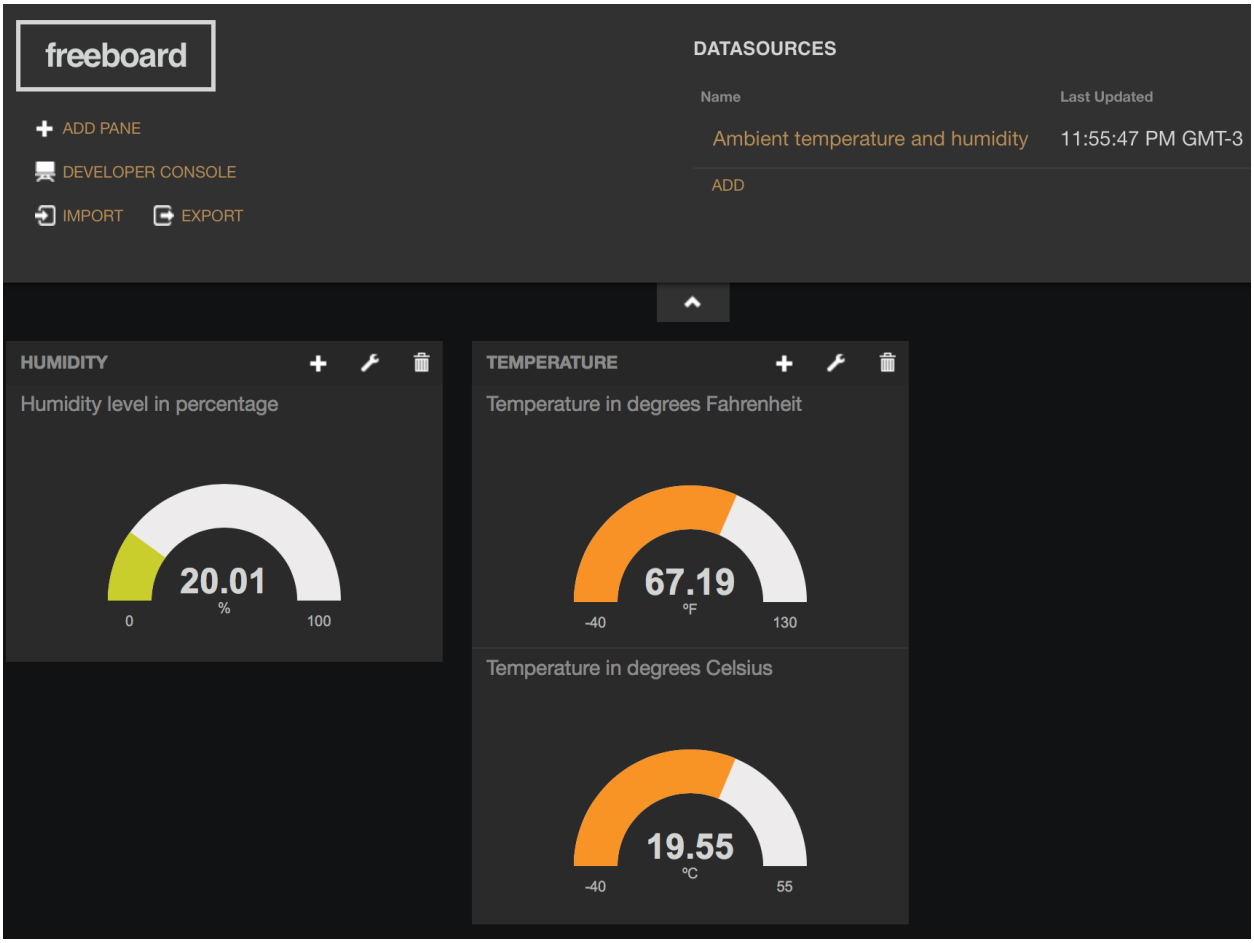
Chapter 9: Working with the Cloud

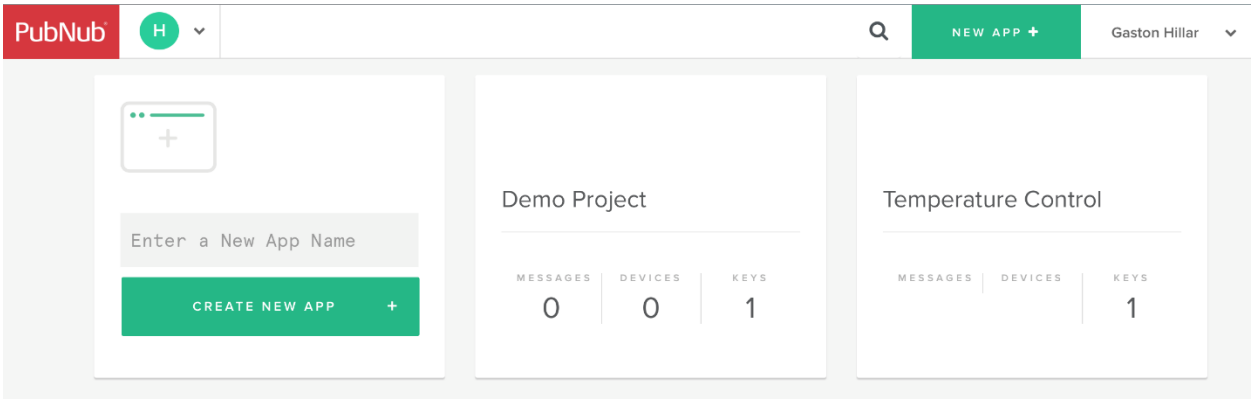


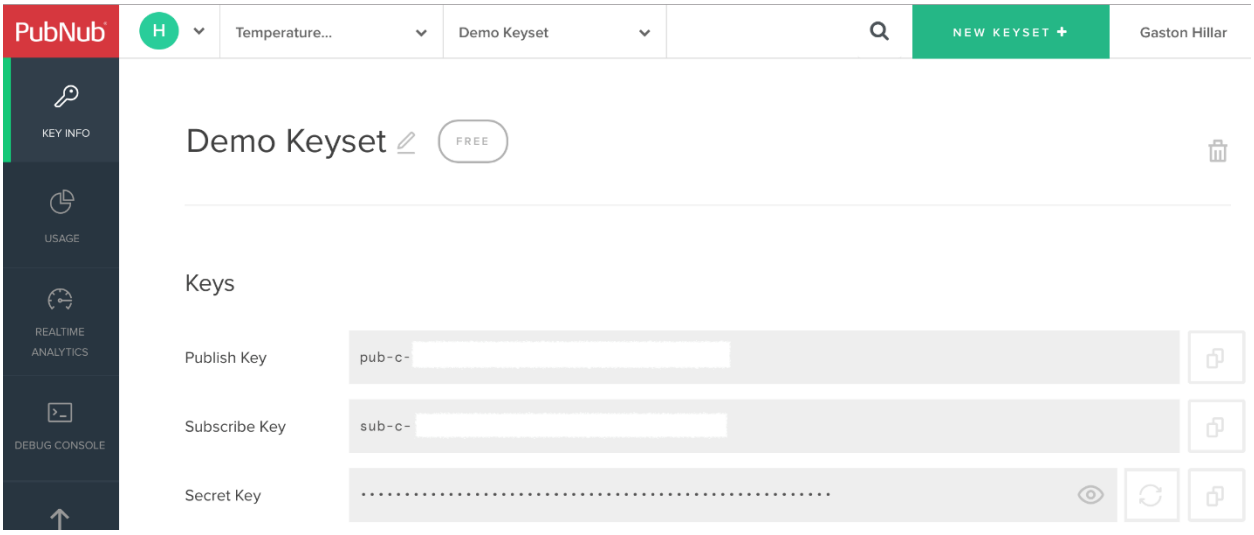


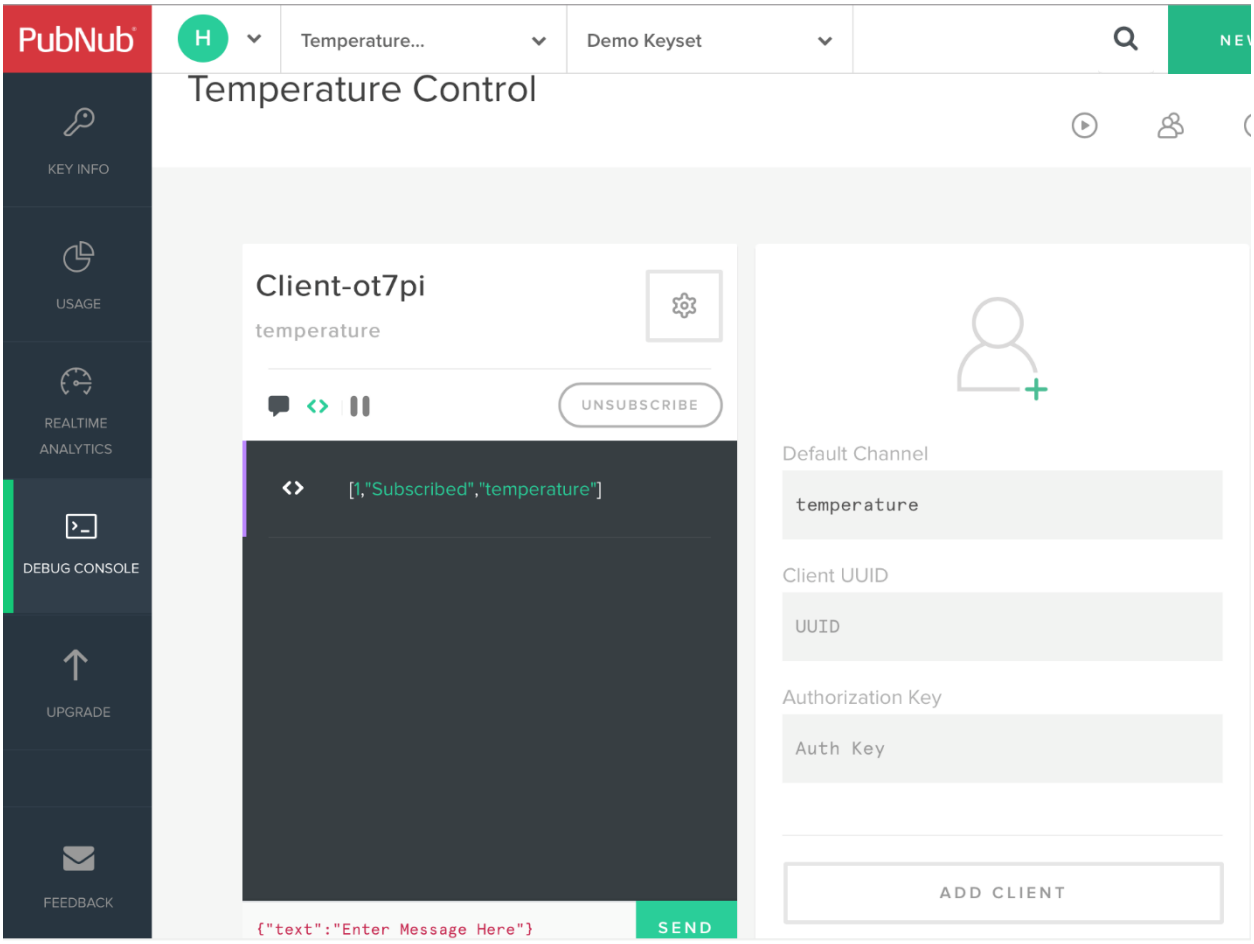

DATASOURCE
A datasource for connecting to things at dweet.io.
TYPE
Dweet.io
NAME
Ambient temperature and humidity
THING NAME
iot_python_chapter_09_01_gaston_hillar
Example: salty-dog-1
KEY
If the thing is not locked, you can ignore this field
SHOW FULL PAYLOAD
NO
If on, gives access to the full Dweet payload (used to obtain timestamp). If not, only the Content object is captured
[SAVE]
CANCEL

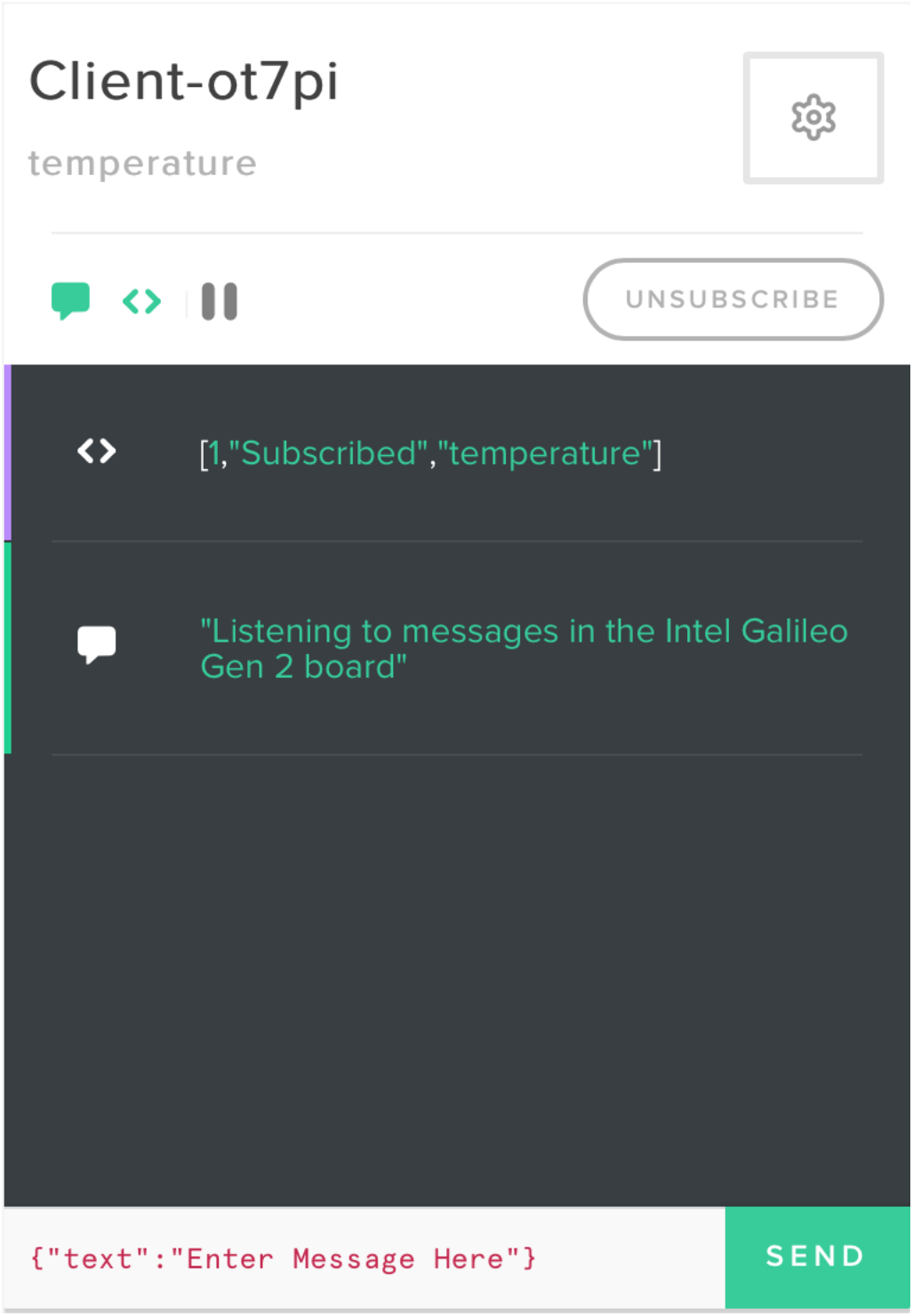

freeboard
ADD PANE
DEVELOPER CONSOLE
IMPORT
EXPORT
DATASOURCES
Name
Last Updated
Ambient temperature and humidity
10:32:06 PM GMT-3
ADD
Temperature in degrees Fahrenheit
68.86
°F
-40
130

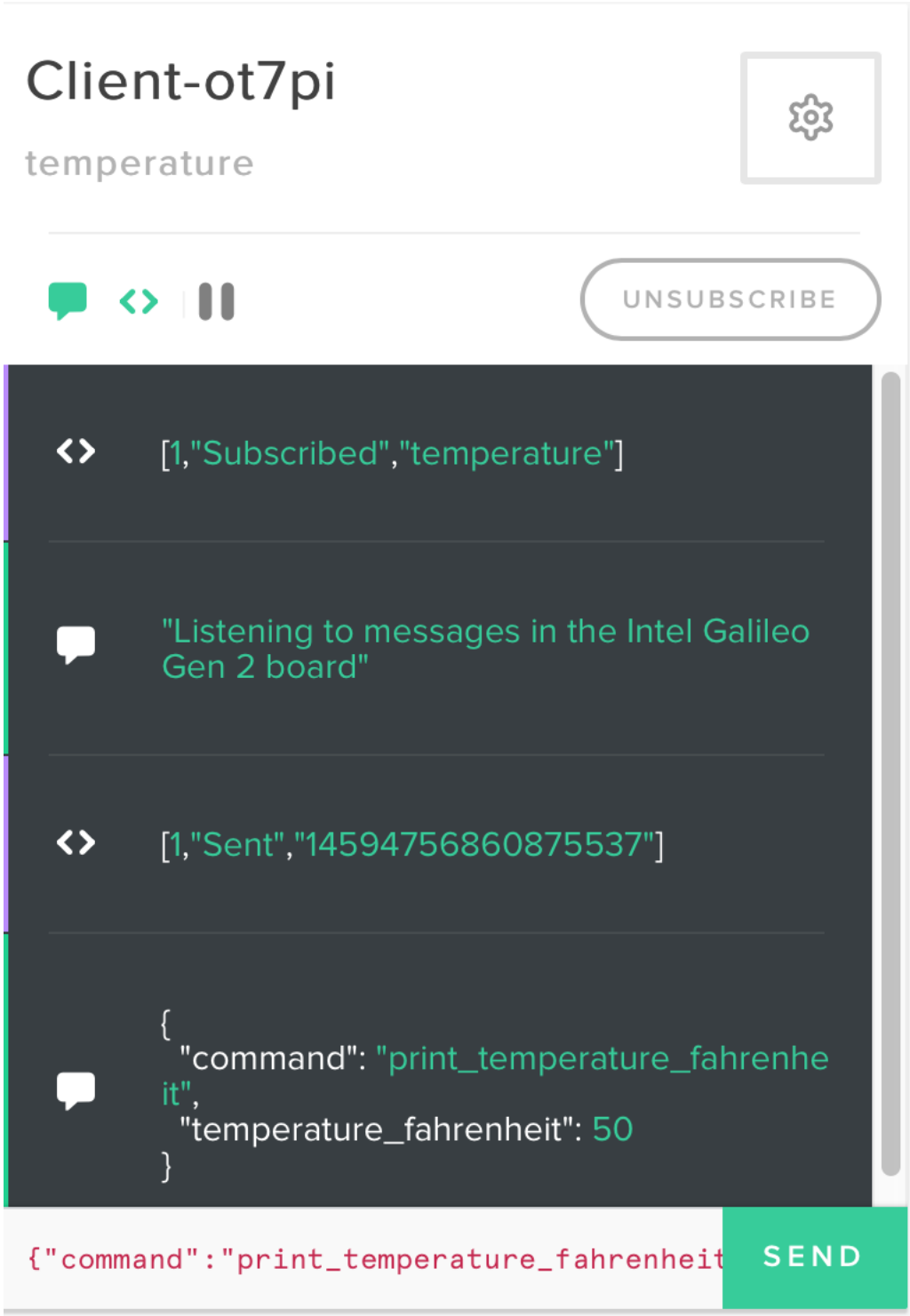

freeboard
ADD PANE
DEVELOPER CONSOLE
IMPORT
EXPORT
DATASOURCES
Name
Last Updated
Ambient temperature and humidity
11:55:47 PM GMT-3
ADD
HUMIDITY
Humidity level in percentage
20.01
%
0
100
TEMPERATURE
Temperature in degrees Fahrenheit
67.19
°F
-40
130
Temperature in degrees Celsius
19.55
°C
-40
55

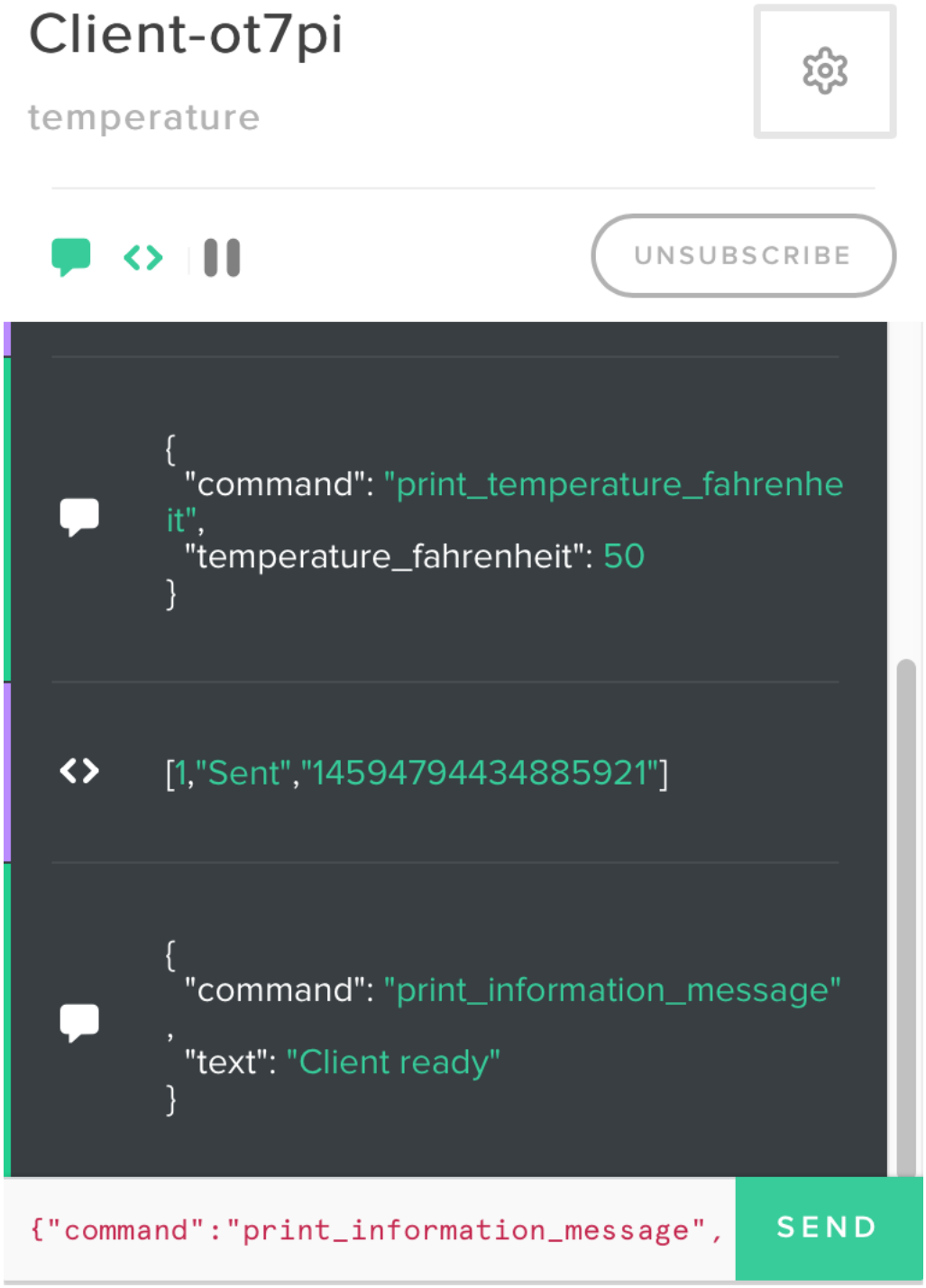

PubNub
H
NEW APP +
Gaston Hillar
Enter a New App Name
CREATE NEW APP +
Demo Project
MESSAGES
DEVICES
KEYS
0
0
1
Temperature Control
MESSAGES
DEVICES
KEYS
1

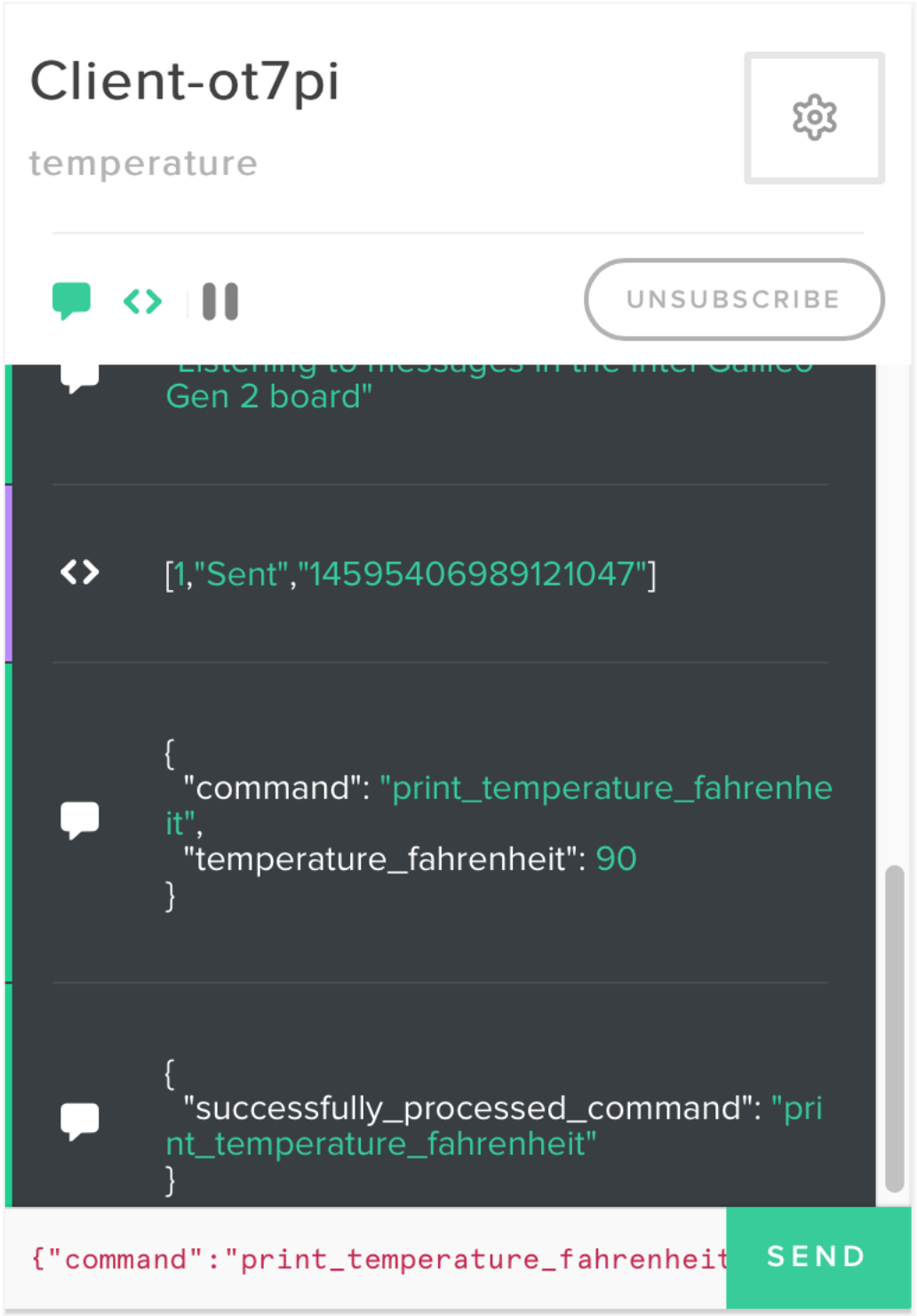

PubNub
H
Temperature...
Demo Keyset
NEW KEYSET +
Gaston Hillar
KEY INFO
USAGE
REALTIME ANALYTICS
DEBUG CONSOLE
Demo Keyset
FREE
Keys
Publish Key
pub-c-
Subscribe Key
sub-c-
Secret Key

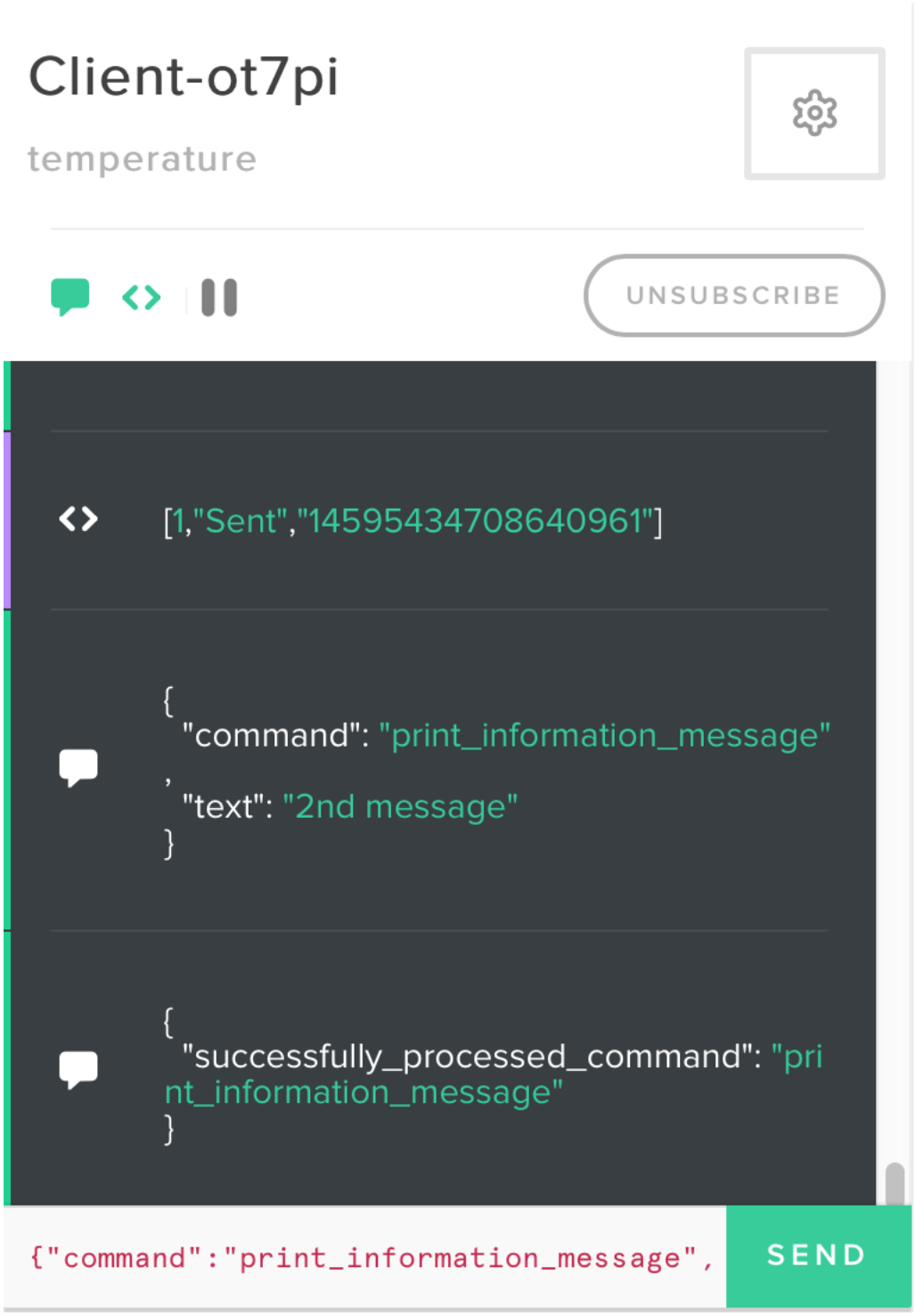

PubNub
H
Temperature...
Demo Keyset
NEW
Temperature Control
KEY INFO
USAGE
REALTIME ANALYTICS
DEBUG CONSOLE
UPGRADE
FEEDBACK
Client-ot7pi
temperature
UNSUBSCRIBE
[1,"Subscribed","temperature"]
{"text":"Enter Message Here"}
SEND
Default Channel
temperature
Client UUID
UUID
Authorization Key
Auth Key
ADD CLIENT

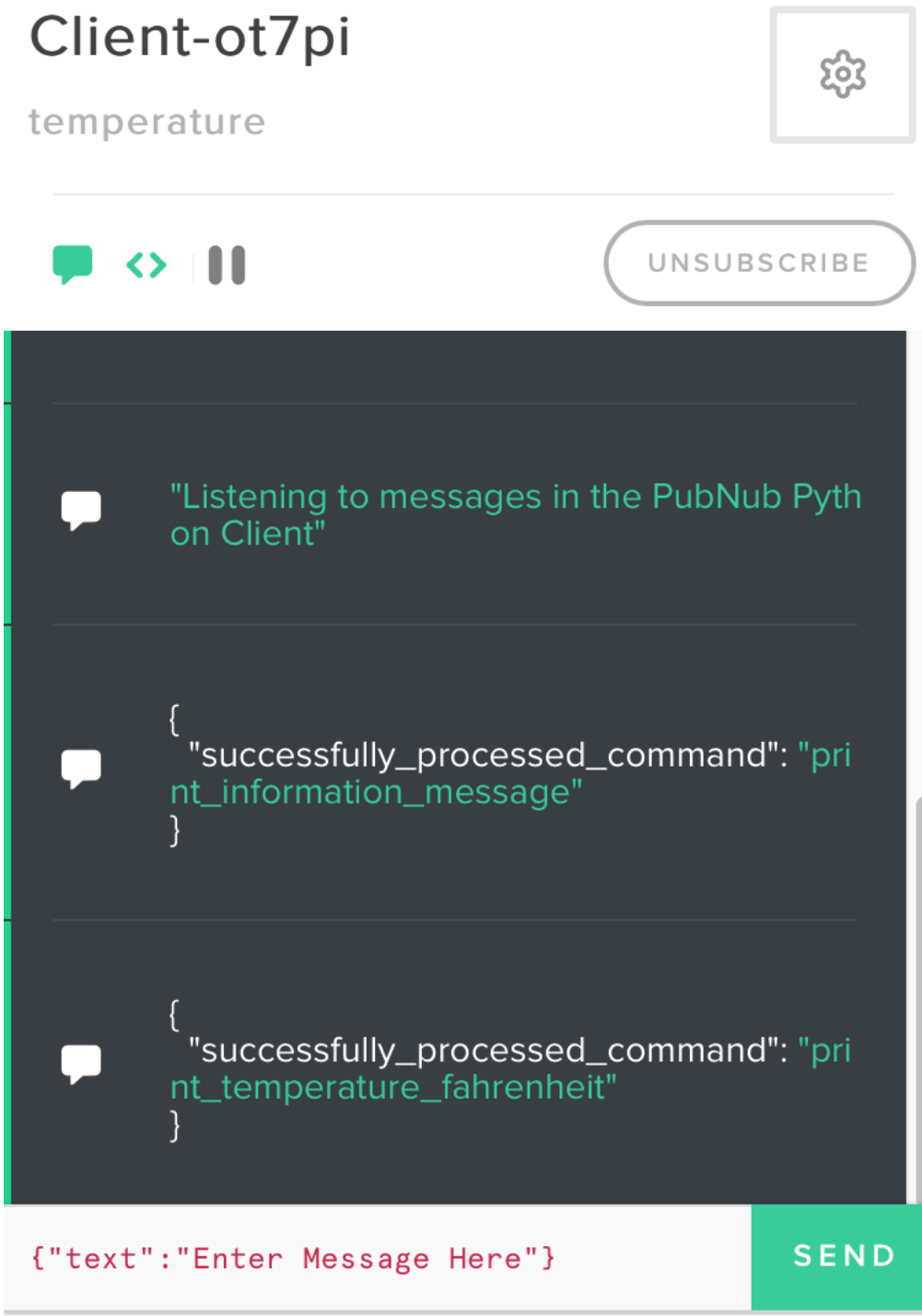

Client-ot7pi
temperature
UNSUBSCRIBE
[1,"Subscribed","temperature"]
"Listening to messages in the Intel Galileo Gen 2 board"
{"text":"Enter Message Here"}
SEND


Client-ot7pi
temperature
UNSUBSCRIBE
[1,"Subscribed","temperature"]
"Listening to messages in the Intel Galileo Gen 2 board"
[1,"Sent","14594756860875537"]
{
"command": "print_temperature_fahrenheit",
"temperature_fahrenheit": 50
}
{"command":"print_temperature_fahrenheit
SEND

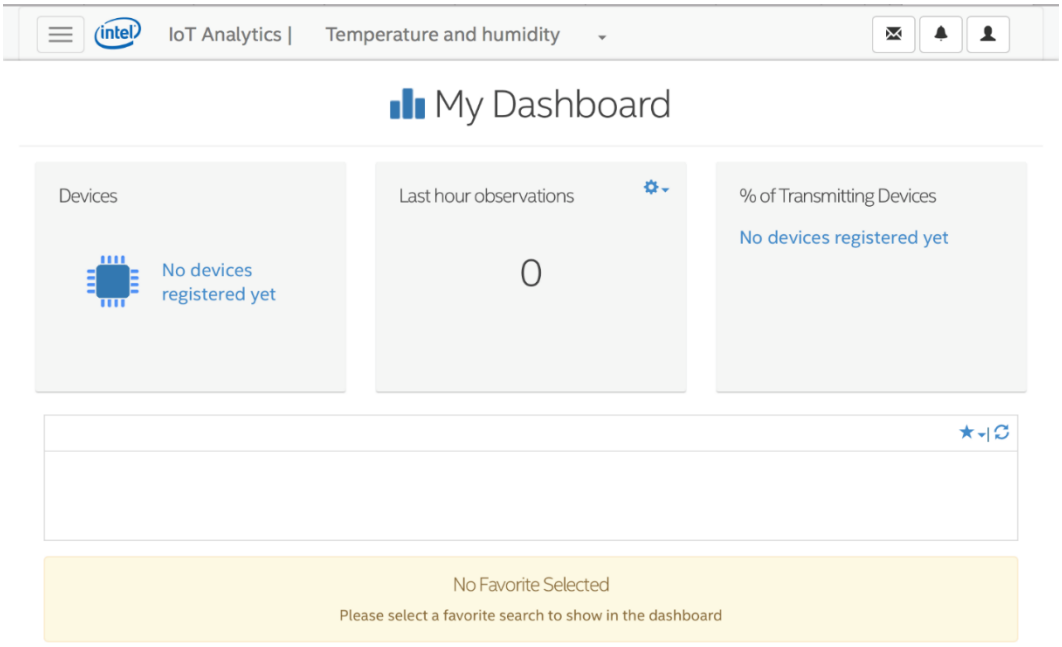

Client-ot7pi
temperature
UNSUBSCRIBE
{
"command": "print_temperature_fahrenheit",
"temperature_fahrenheit": 50
}
[1,"Sent","14594794434885921"]
{
"command": "print_information_message",
"text": "Client ready"
}
{"command":"print_information_message",
SEND

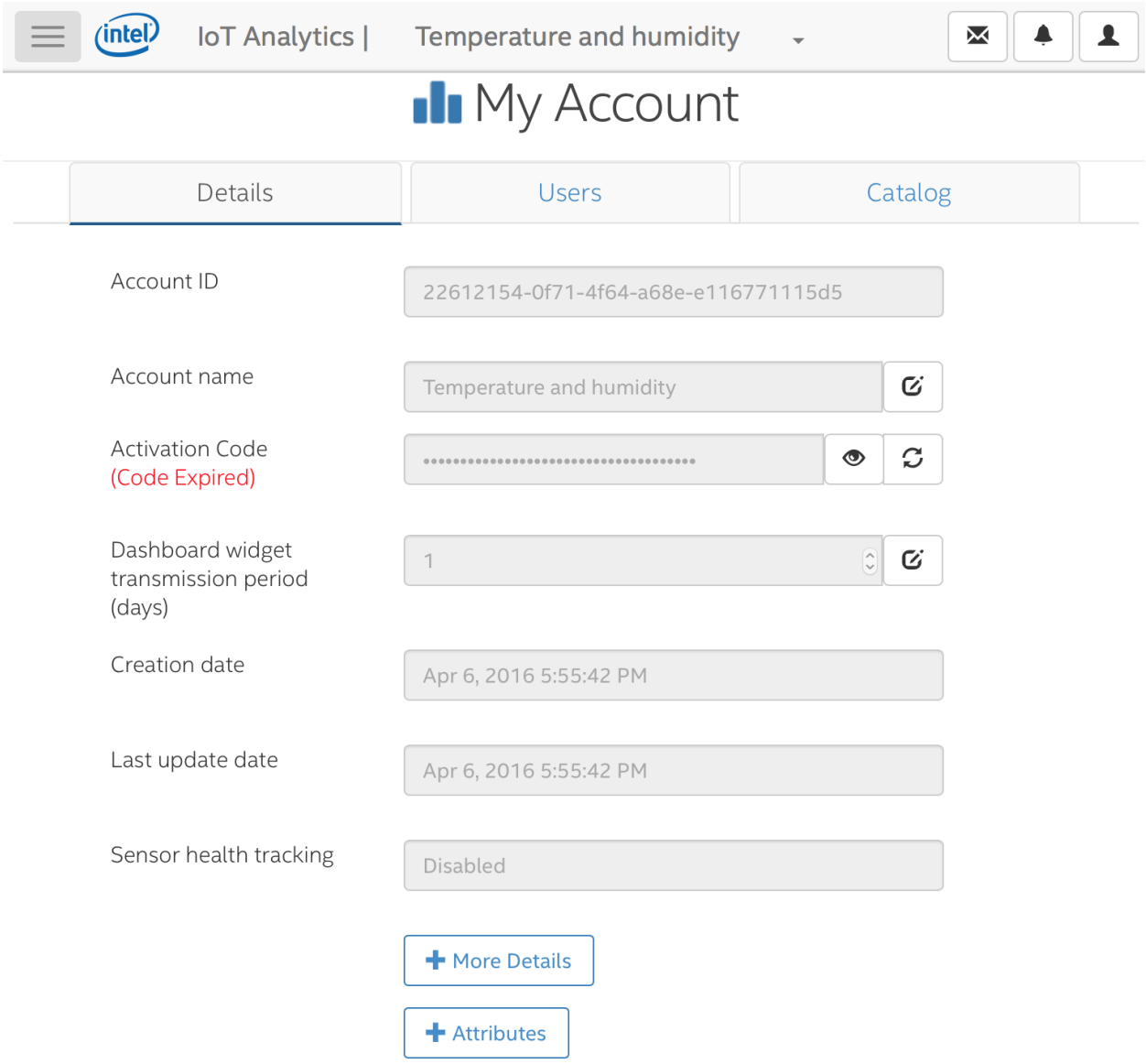

Client-ot7pi
temperature
UNSUBSCRIBE
Gen 2 board"
[1,"Sent","14595406989121047"]
{
"command": "print_temperature_fahrenhe
it",
"temperature_fahrenheit": 90
}
{
"successfully_processed_command": "pri
nt_temperature_fahrenheit"
}
{"command":"print_temperature_fahrenheit
SEND


Client-ot7pi
temperature
UNSUBSCRIBE
[1,"Sent","14595434708640961"]
{
"command": "print_information_message"
,
"text": "2nd message"
}
{
"successfully_processed_command": "pri
nt_information_message"
}
{"command":"print_information_message",
SEND


Client-ot7pi
temperature
UNSUBSCRIBE
"Listening to messages in the PubNub Python Client"
{
"successfully_processed_command": "print_information_message"
}
{
"successfully_processed_command": "print_temperature_fahrenheit"
}
{"text":"Enter Message Here"}
SEND

Chapter 10: Analyzing Huge Amounts of Data with Cloud-based IoT Analytics



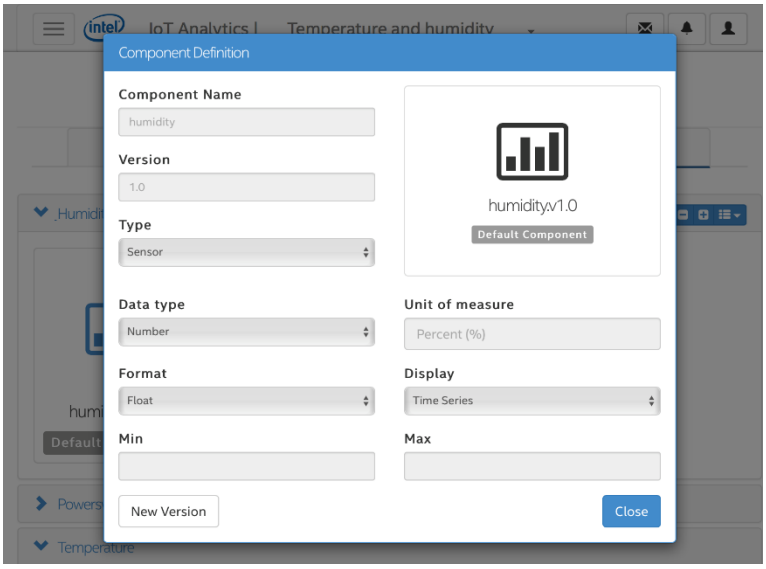

IoT Analytics | Temperature and humidity
My Account
Details
Users
Catalog
Account ID
22612154-0f71-4f64-a68e-e116771115d5
Account name
Temperature and humidity
Activation Code
(Code Expired)
Dashboard widget transmission period (days)
1
Creation date
Apr 6, 2016 5:55:42 PM
Last update date
Apr 6, 2016 5:55:42 PM
Sensor health tracking
Disabled
More Details
Attributes

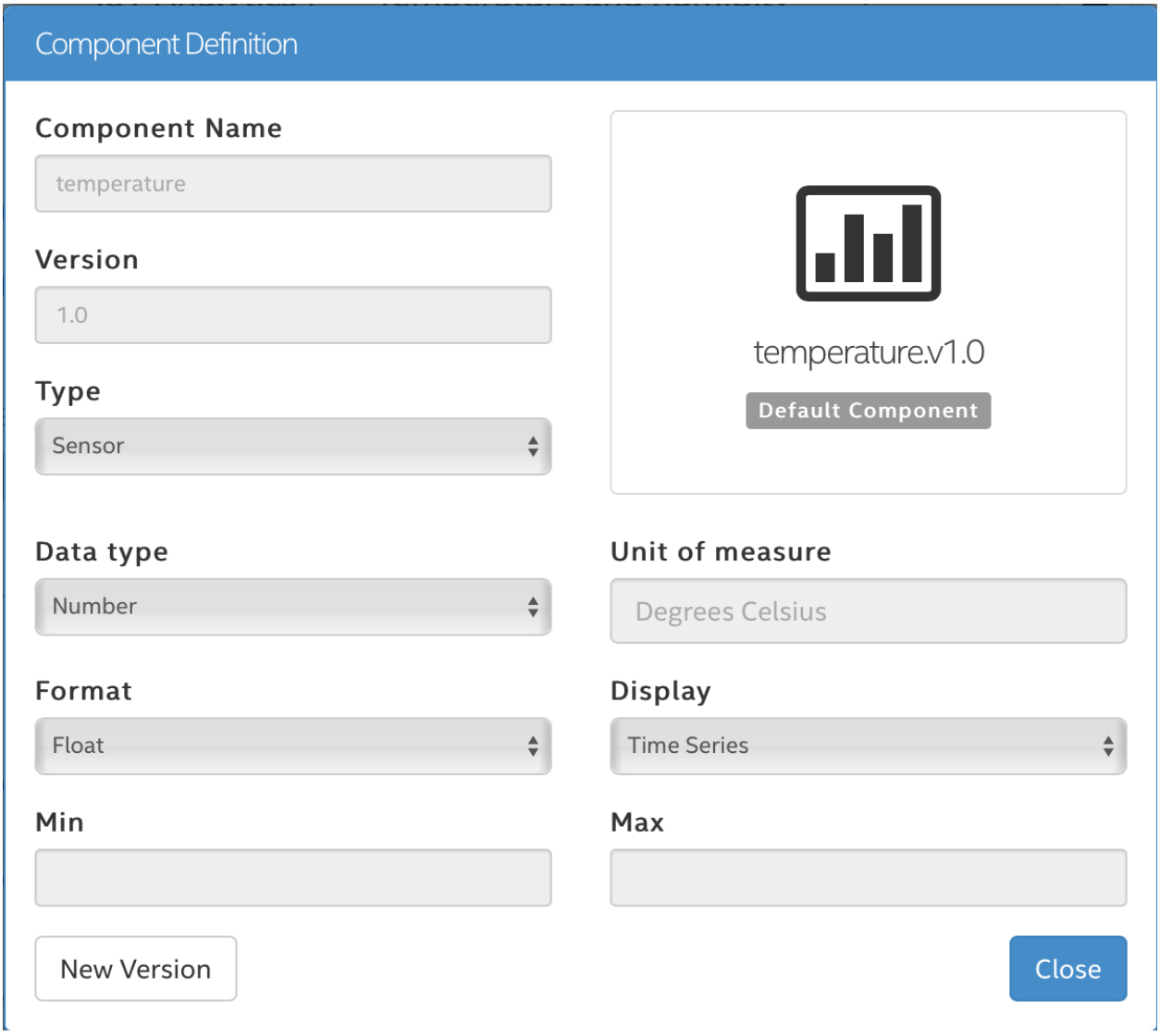
My Devices

Search Devices

Id	Gateway	Name	Tags	Status
filter	filter	filter	filter	filter
kansas-temperature-humidity-01	kansas-temperature-humidity-01	kansas-temperature-humidity-01-NAME		active

Add a New Device




Component Definition
Component Name
temperature
Version
1.0
Type
Sensor
temperature.v1.0
Default Component
Data type
Number
Unit of measure
Degrees Celsius
Format
Float
Display
Time Series
Min
Max
New Version
Close

ID

kansas-temperature-humidity-01

Gateway

kansas-temperature-humidity-01

Name

kansas-temperature-humidity-01-NAME

Tags

Add a tag and press enter

Status

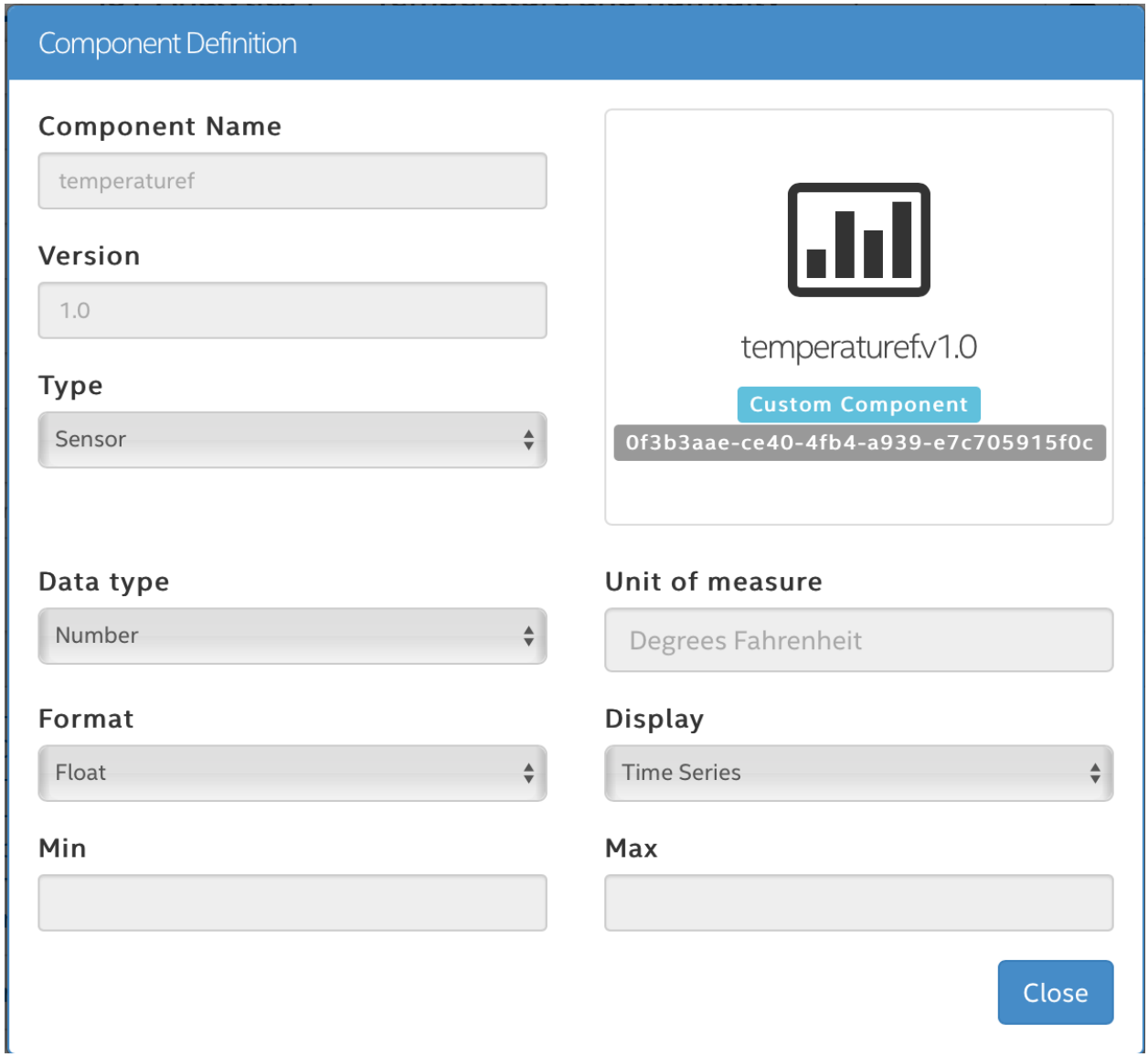
active

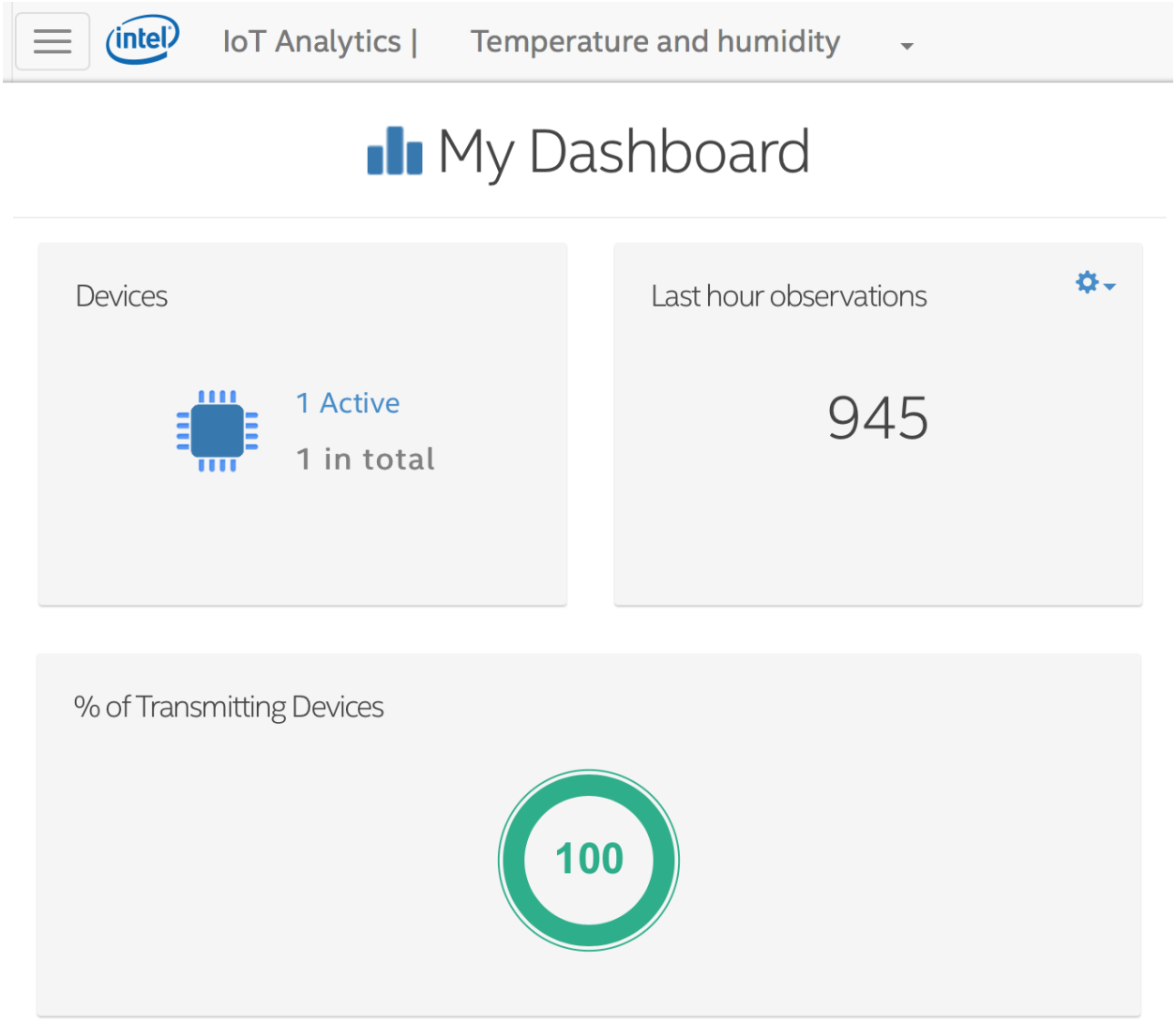
+ More Details

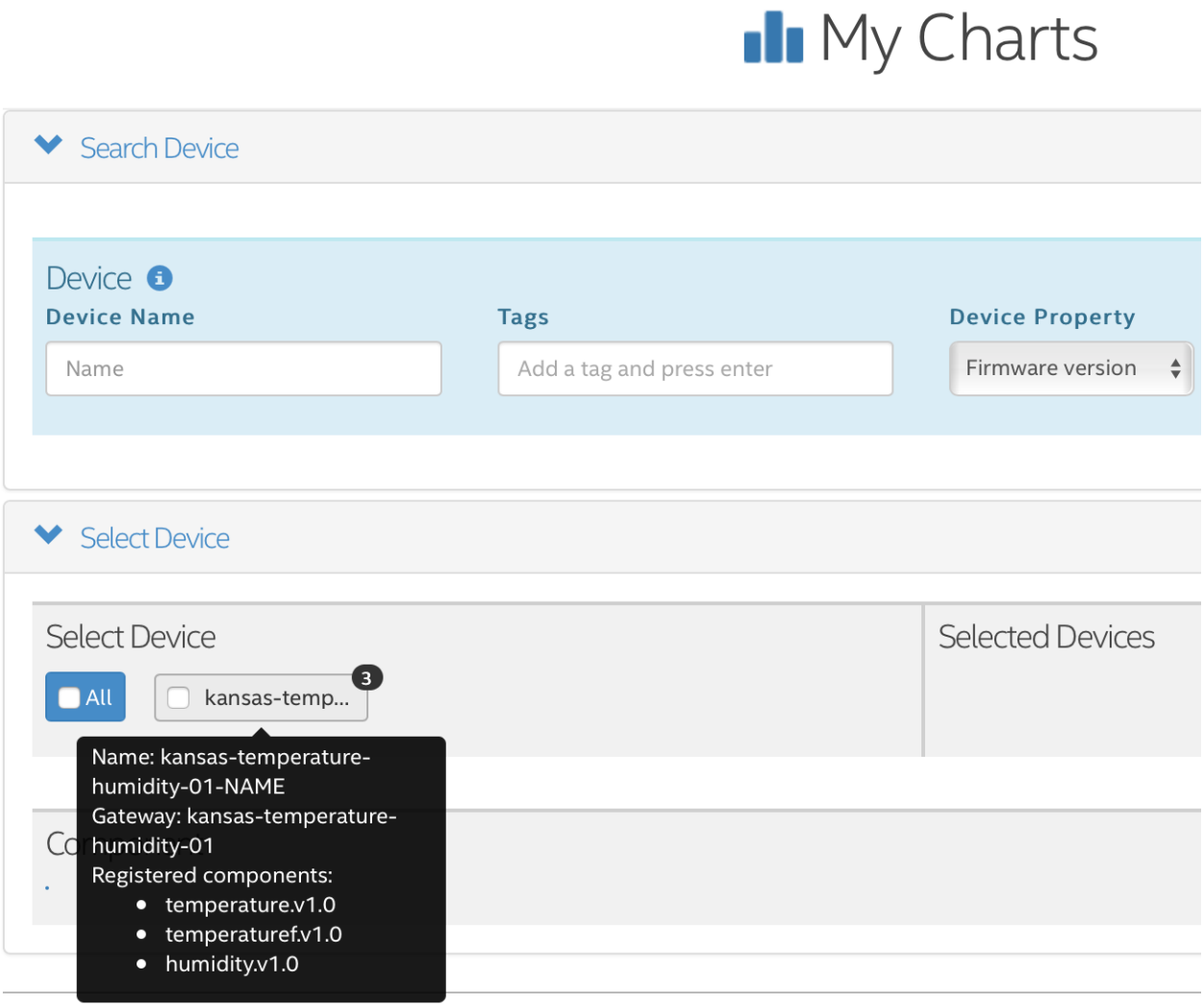
− Components

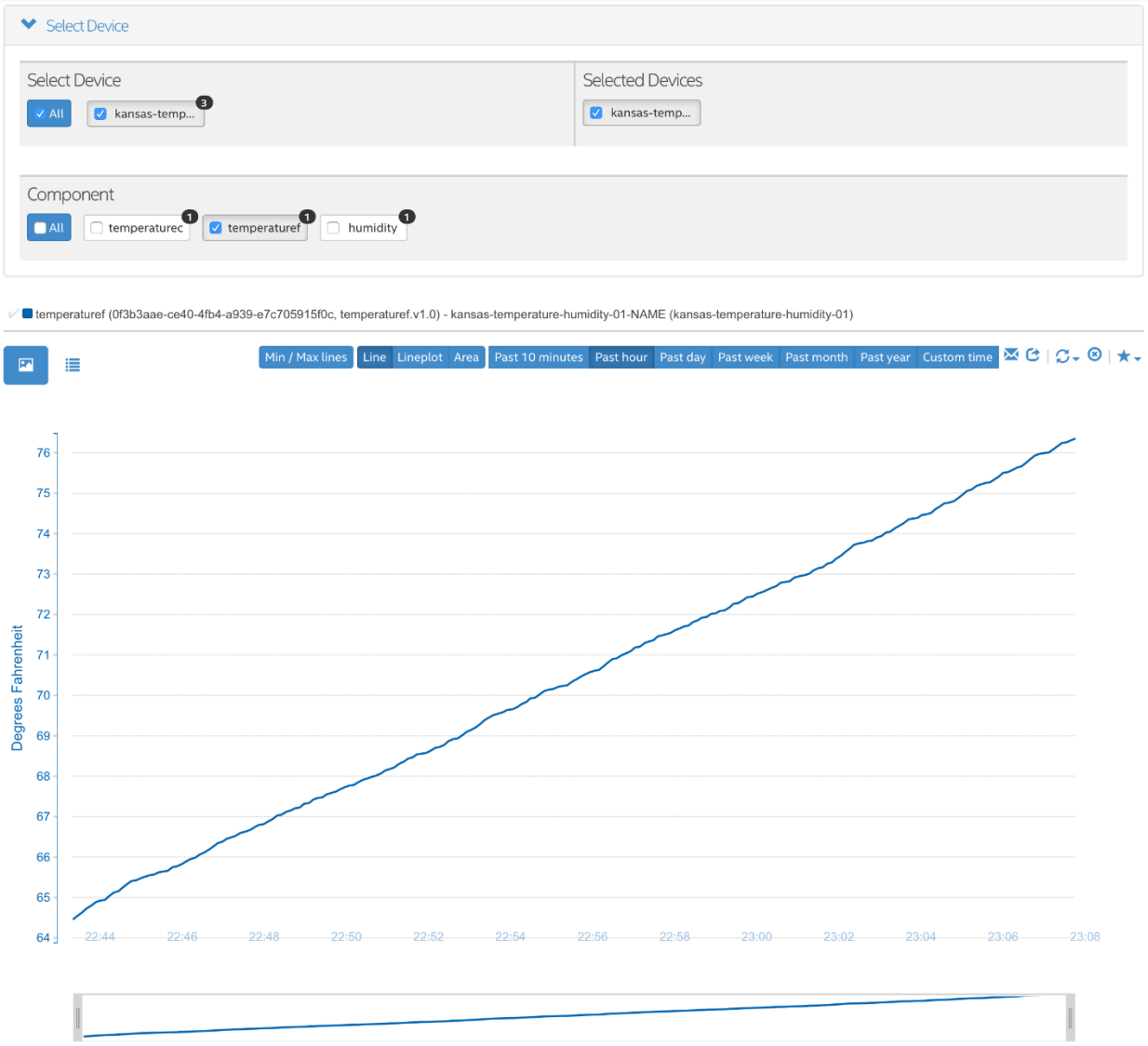
- temperaturec
- temperaturef
- humidity

+ Attributes


Component Definition
Component Name
temperaturef
Version
1.0
Type
Sensor
temperaturef.v1.0
Custom Component
0f3b3aae-ce40-4fb4-a939-e7c705915f0c
Data type
Number
Unit of measure
Degrees Fahrenheit
Format
Float
Display
Time Series
Min
Max
Close

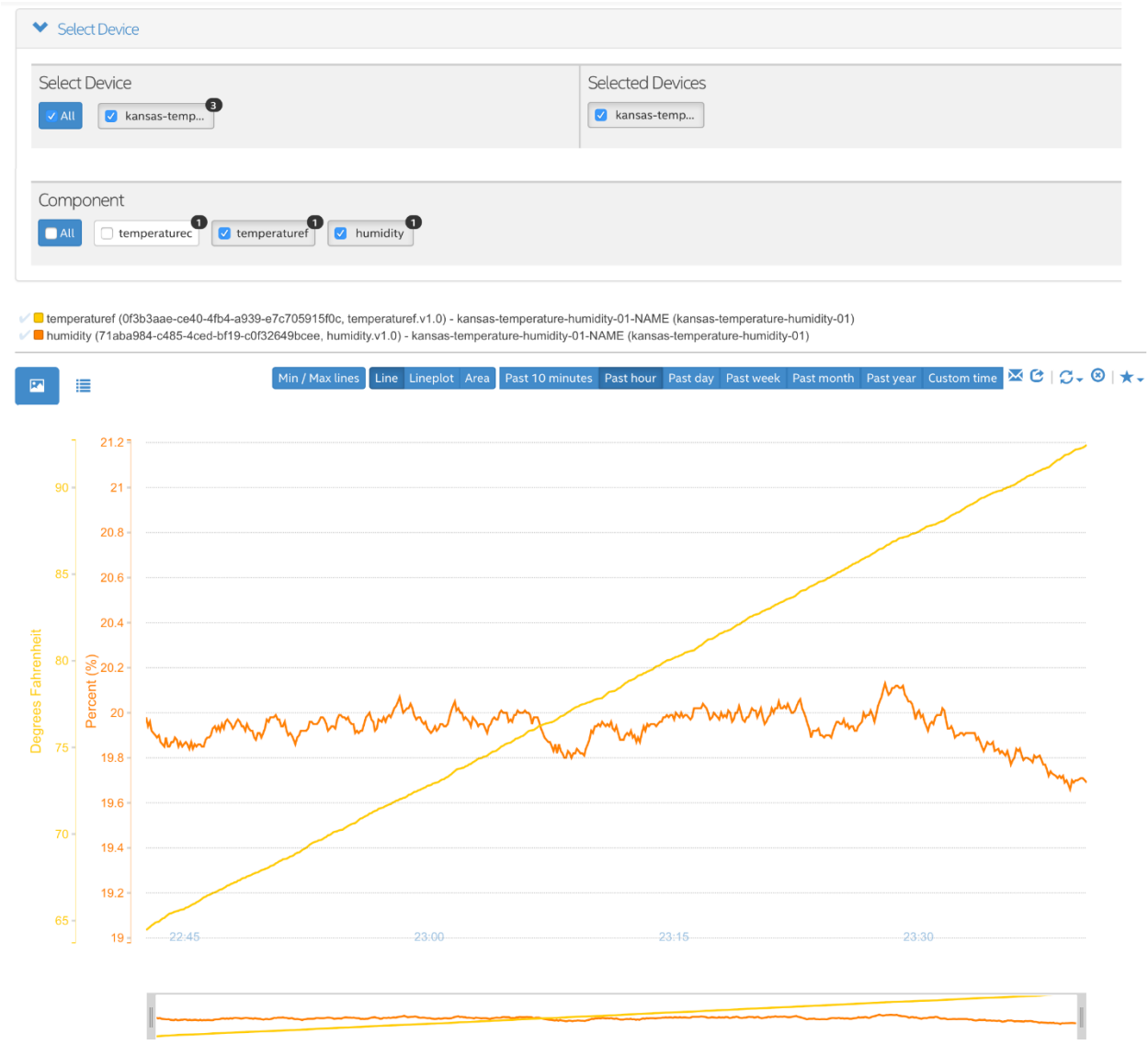

IoT Analytics | Temperature and humidity
My Dashboard
Devices
1 Active
1 in total
Last hour observations
945
% of Transmitting Devices
100

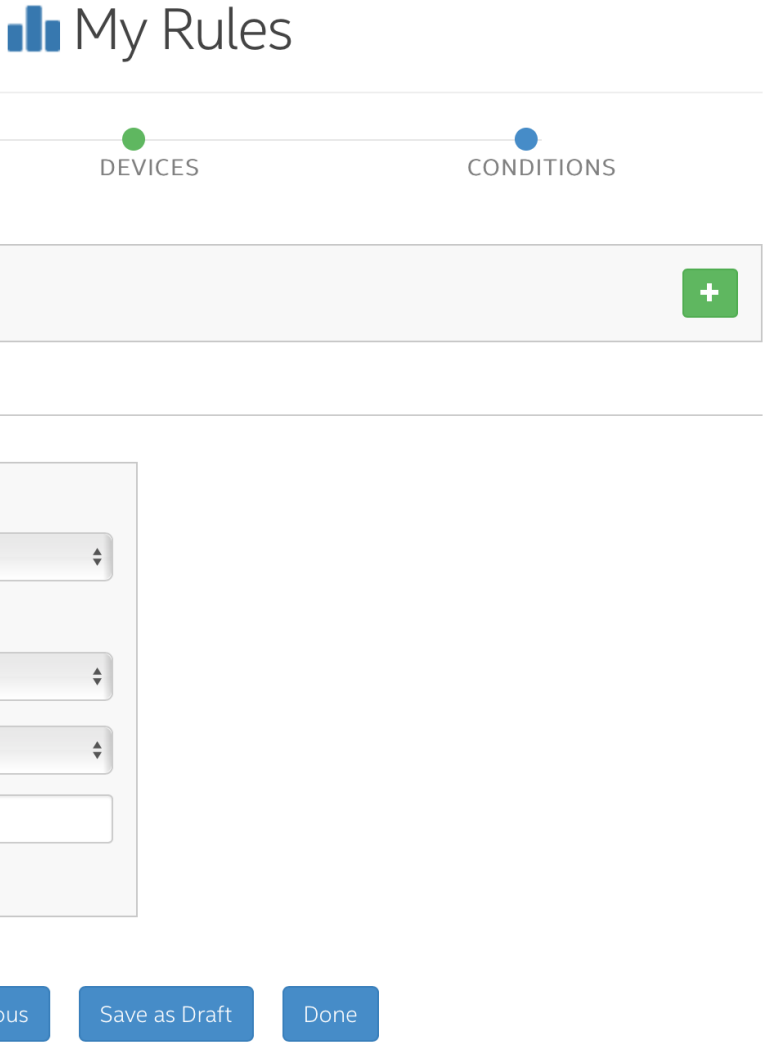

My Charts
Search Device
Device
Device Name
Name
Tags
Add a tag and press enter
Device Property
Firmware version
Select Device
Select Device
All
kansas-temp...
3
Selected Devices
Name: kansas-temperature-humidity-01-NAME
Gateway: kansas-temperature-humidity-01
Registered components:
temperature.v1.0
temperaturef.v1.0
humidity.v1.0


Select Device
Select Device
All
kansas-temp...
3
Selected Devices
kansas-temp...
Component
All
temperaturec
1
temperaturef
1
humidity
1
temperaturef (0f3b3aae-ce40-4fb4-a939-e7c705915f0c, temperaturef.v1.0) - kansas-temperature-humidity-01-NAME (kansas-temperature-humidity-01)
Min / Max lines
Line
Lineplot
Area
Past 10 minutes
Past hour
Past day
Past week
Past month
Past year
Custom time
Degrees Fahrenheit
76
75
74
73
72
71
70
69
68
67
66
65
64
22:44
22:46
22:48
22:50
22:52
22:54
22:56
22:58
23:00
23:02
23:04
23:06
23:08

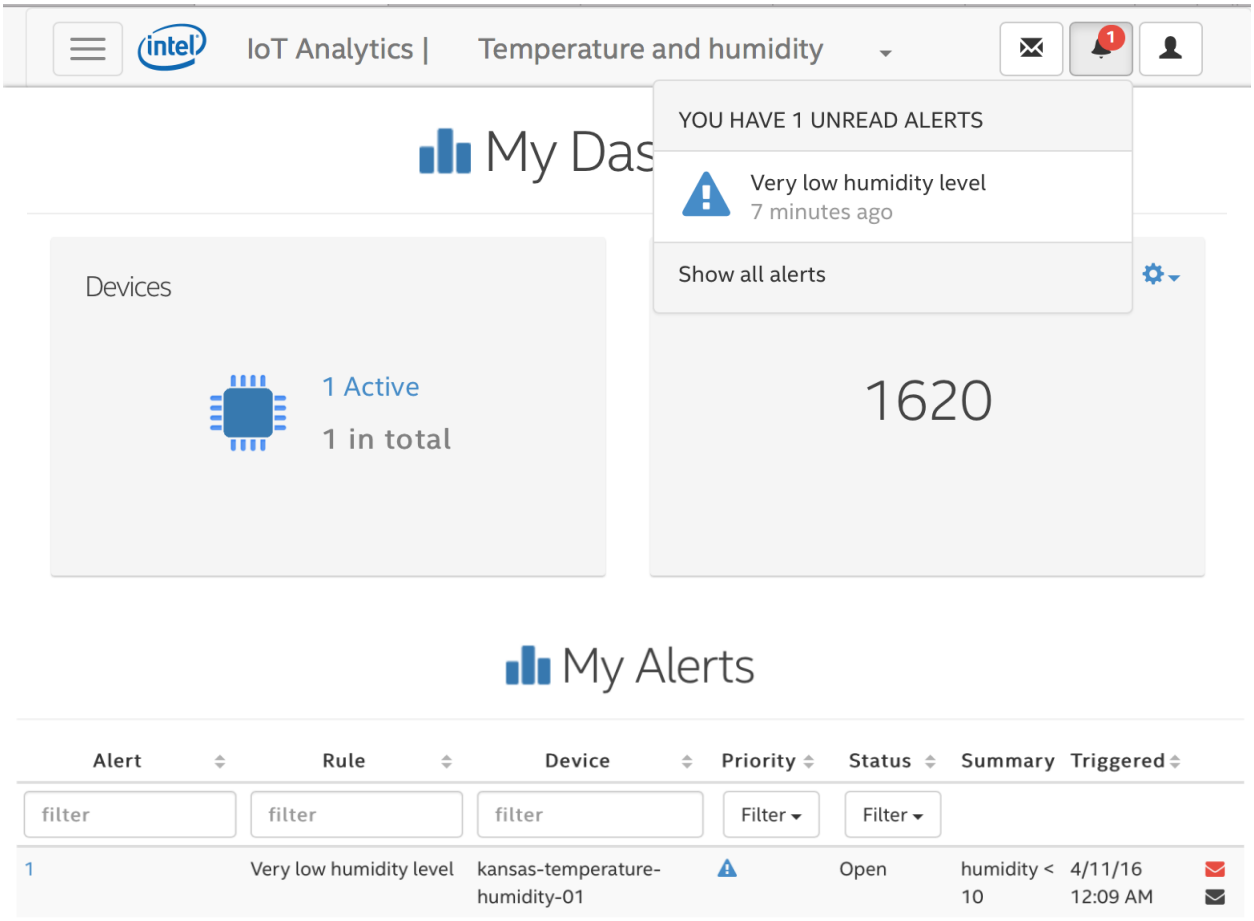
Past 10 minutes | Past hour | Past day | Past week | Past month | Past year | Custom time

Device	Component Name	Component Id	Component Catalog Type	Timestamp	Value
filter	filter	filter	filter	filter	filter
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:43:48 GMT-3	64.454
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:43:55 GMT-3	64.544
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:44:02 GMT-3	64.634
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:44:08 GMT-3	64.724
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:44:15 GMT-3	64.796
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:44:22 GMT-3	64.886
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:44:28 GMT-3	64.922
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:44:35 GMT-3	64.94
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:44:41 GMT-3	65.03
kansas-temperature-humidity-01	temperaturef	0f3b3aae-ce40-4fb4-a939-e7c705915f0c	temperaturef.v1.0	Sun, 10 Apr 2016 22:44:48 GMT-3	65.12


Select Device
Select Device
All
kansas-temp...
3
Selected Devices
kansas-temp...
Component
All
temperaturec
1
temperaturef
1
humidity
1
temperaturef (0f3b3aae-ce40-4fb4-a939-e7c705915f0c, temperaturef.v1.0) - kansas-temperature-humidity-01-NAME (kansas-temperature-humidity-01)
humidity (71aba984-c485-4ced-bf19-c0f32649bcee, humidity.v1.0) - kansas-temperature-humidity-01-NAME (kansas-temperature-humidity-01)
Min / Max lines
Line
Lineplot
Area
Past 10 minutes
Past hour
Past day
Past week
Past month
Past year
Custom time
Degrees Fahrenheit
Percent (%)
90
85
80
75
70
65
21.2
21
20.8
20.6
20.4
20.2
20
19.8
19.6
19.4
19.2
19
22:45
23:00
23:15
23:30


My Rules
DETAILS
DEVICES
CONDITIONS
Enable Automatic Reset
Monitored Measure
humidity (Number)
Trigger When
Basic Condition
<
10
Previous
Save as Draft
Done

Name	Very low humidity level
Owner	gastonhillar@hotmail.com
Priority	⚠
Status	Active
Summary	humidity < 10
Last update	4/11/16 12:04 AM



My Alerts

ID 1

Comments

Alert from Very low humidity level

Comment

Triggered Apr 11, 2016 12:09:50 AM

Priority Low

Device kansas-temperature-humidity-01

Status Open

Alert details

Condition	Measured Value
humidity < 10	7.99

Close