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Newbie



Heart Rate Monitor connected to Raspberry Pi (<http://forum.arduino.cc/index.php?topic=377587.msg2603231#msg2603231>)  
Feb 07, 2016, 04:13 pm (<http://forum.arduino.cc/index.php?topic=377587.msg2603231#msg2603231>)

Hi,  
After much googling I was finally able to get past the last inhibitor to getting the Heart Rate data displayed on a Raspberry Pi as I didn't want to be tied to one of the mobile BLE monitoring apps. I still have a problem connecting with the Python bluepy interface.

Anyway, for those wanting a Linux BLE "companion" for your 101, here's a somewhat terse list of what I did to make them connect. I apologize for the poor formatting below due to my lack of experience with this forum editor; also any errors introduced by a few cosmetic changes to what I actually did.

As well as your Arduino/Genuino 101 you will need a Raspberry Pi and a suitable BLE Bluetooth dongle, I got one off eBay in the UK - "Mini Black Bluetooth V 4.0 Black Dual

2016년 12월 12일 05:52

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Note that the example shows my 101 MAC of 98:4F:EE:0D:06:1A Substitute your MAC...from the scan.

1. Install clean Raspbian image on SD card - I used the (currently latest) 2015-11-21-raspbian-jessie.img - Full desktop image based on Debian Jessie, Kernel 4.1
2. Power up and change Preferences as required:  
(Option/Software) hostname to PiTest
  - o Expand filesystem
  - o reboot
3. Update software  
**sudo apt-get update**  
**sudo apt-get upgrade**
4. Install bluez - I built the (currently latest) version 5.37

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```
mkdir -p bluez
cd bluez
wget https://www.kernel.org/pub/linux/bluetooth/bluez-5.37.tar.xz
tar xvf bluez-5.37.tar.xz
cd bluez-5.37
configure --disable-systemd
make
sudo make install
```

```
sudo cp attrib/gatttool /usr/local/bin/
sudo /usr/bin/install -c tools/btmgmt /usr/bin/btmgmt
sudo reboot
```

5. Check Bluetooth basics - your Bluetooth dongle will need to be plugged in  
**lsusb** --> Bus 001 Device 006: ID 0a12:0001 Cambridge Silicon Radio, Ltd Bluetooth Dongle (HCI mode)  
**sudo hcitool dev** --> Devices:  
hci0 00:1A:7D:DA:71:13, if nothing, then this pair of commands is useful:  
**sudo hciconfig hci0 down** --> to stop it  
**sudo hciconfig hci0 up** --> to start it  
  
**sudo btmgmt le on** --> another useful, and I found critical to get it working, command
6. Ensure your 101 is powered and running the CurieBLE Heart Rate Monitor
  1. Modify sketch. I added delay(10000); before Serial.println("pinMode set..."); in setup() to ensure that the sketch was started and I could start the serial monitor before the messages were printed. I regard this as a temporary fix.
  2. Upload
  3. Wait a few seconds then start serial monitor

pinMode set...

Bluetooth device active, waiting for connections...

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7. Scan for BLE devices. This will not connect to the 101 so nothing displayed in serial monitor

**sudo hcitool lescan** <use Ctl-C to stop scan>

98:4F:EE:0D:06:1A HeartRateSketch

98:4F:EE:0D:06:1A (unknown) --&gt; why a second advertisement?

14:99:E2:2A:64:C6 (unknown) --&gt; another in-range BLE device

98:4F:EE:0D:06:1A HeartRateSketch

98:4F:EE:0D:06:1A (unknown)

98:4F:EE:0D:06:1A HeartRateSketch

98:4F:EE:0D:06:1A (unknown)

98:4F:EE:0D:06:1A HeartRateSketch

98:4F:EE:0D:06:1A (unknown)

.  
.  
.

8. Connect with hcitool

**sudo hcitool lecc 98:4F:EE:0D:06:1A**

o Red LED on for short time

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o Connection handle 72

o Serial monitor:

Connected to central: 00:1a:7d:da:71:13

Heart Rate is now: 74

Heart Rate is now: 73

Heart Rate is now: 74

Heart Rate is now: 73

Heart Rate is now: 74

Heart Rate is now: 73

Disconnected from central: 00:1a:7d:da:71:13

9. If you got this far, breath a sigh of relief!

10. Connect with gatttool in interactive mode, enter the commands

**gatttool -b 98:4F:EE:0D:06:1A --interactive**

pi@PiTest:~ \$ gatttool -b 98:4F:EE:0D:06:1A --interactive

[98:4F:EE:0D:06:1A][LE]> **connect**

Attempting to connect to 98:4F:EE:0D:06:1A

Connection successful

[98:4F:EE:0D:06:1A][LE]> **primary**attr handle: 0x0001, end grp handle: 0x0007 uuid:  
00001800-0000-1000-8000-00805f9b34fbattr handle: 0x0008, end grp handle: 0x0008 uuid:  
00001801-0000-1000-8000-00805f9b34fb

attr handle: 0x0009, end grp handle: 0xffff uuid: 0000180d-

```
[98:4F:EE:0D:06:1A][LE]> char-desc 0x0009 0xffff
```

```
handle: 0x0009, uuid: 00002800-0000-1000-8000-00805f9b34fb
```

```
handle: 0x000a, uuid: 00002803-0000-1000-8000-00805f9b34fb
```

```
handle: 0x000b, uuid: 00002a37-0000-1000-8000-00805f9b34fb
```

```
handle: 0x000c, uuid: 00002902-0000-1000-8000-00805f9b34fb
```

```
[98:4F:EE:0D:06:1A][LE]> char-write-req 0x000c 0100
```

```
Characteristic value was written successfully
```

```
Notification handle = 0x000b value: 00 4a
```

```
Notification handle = 0x000b value: 00 49
```

```
Notification handle = 0x000b value: 00 4a
```

```
Notification handle = 0x000b value: 00 49
```

```
Notification handle = 0x000b value: 00 4a
```

```
Notification handle = 0x000b value: 00 47
```

```
Notification handle = 0x000b value: 00 45
```

```
Notification handle = 0x000b value: 00 42
```

```
Notification handle = 0x000b value: 00 41
```

```
Notification handle = 0x000b value: 00 40
```

```
Notification handle = 0x000b value: 00 3f
```

```
[98:4F:EE:0D:06:1A][LE]> char-write-req 0x000c 0000
```

```
Characteristic value was written successfully
```

```
[98:4F:EE:0D:06:1A][LE]> exit
```

```
(gatttool:5856): GLib-WARNING **: Invalid file descriptor.
```

```
pi@PiTest:~ $  
(//store.arduino.cc/ww/index.php?main_page=shopping_cart)
```

- Red LED on whilst connected
- Serial monitor will display rate
- Turn the pot to vary the rate
- GLib-WARNING appears to be bug in bluez due to double disconnection
- The understanding of the characteristics came from the very useful <http://blog.akhq.net/2014/11/polar-h7-bluetooth-le-heart-rate-sensor.html> (<http://blog.akhq.net/2014/11/polar-h7-bluetooth-le-heart-rate-sensor.html>)

#### 11. Connect with gatttool in non-interactive mode

```
pi@PiTest:~ $ gatttool -b 98:4F:EE:0D:06:1A --char-write-req  
--handle=0x000c --value=0100 --listen
```

```
Characteristic value was written successfully
```

```
Notification handle = 0x000b value: 00 3f
```

```
Notification handle = 0x000b value: 00 3e
```

```
Notification handle = 0x000b value: 00 3f
```

```
Notification handle = 0x000b value: 00 3e
```

```
Notification handle = 0x000b value: 00 3a
```

```
Notification handle = 0x000b value: 00 2b
```

```
Notification handle = 0x000b value: 00 1c
```

```
Notification handle = 0x000b value: 00 14
```

```
Notification handle = 0x000b value: 00 0d
```

```
Notification handle = 0x000b value: 00 07
```

```
Notification handle = 0x000b value: 00 01
```

```
Notification handle = 0x000b value: 00 00
Notification handle = 0x000b value: 00 08
Notification handle = 0x000b value: 00 11
Notification handle = 0x000b value: 00 18
Notification handle = 0x000b value: 00 1e
Notification handle = 0x000b value: 00 23
^C
```

```
pi@PiTest:~ $
Download (//www.arduino.cc/en/Main/Software)
```

12. Install bluepy...not working but documenting the step here in expectation of a fix

```
mkdir -p bluepy
cd bluepy
git clone https://github.com/IanHarvey/bluepy.git
cd bluepy/bluepy
make
```

```
Connecting to: 98:4F:EE:0D:06:1A, address type: public
Service <uuid=Generic Attribute handleStart=8 handleEnd=8> :
Traceback (most recent call last):
  File "btle.py", line 687, in <module>
    for ch in svc.getCharacteristics():
  File "btle.py", line 106, in getCharacteristics
    self.chars =
  File "btle.py", line 420, in getCharacteristics
    self.peripheral.getCharacteristics(self.hndStart, self.hndEnd)
  File "btle.py", line 420, in getCharacteristics
    rsp = self._getResp('find')
  File "btle.py", line 334, in _getResp
    resp = self._waitResp(wantType + ['ntfy', 'ind'], timeout)
  File "btle.py", line 296, in _waitResp
    raise BTLEException(BTLEException.COMM_ERROR, "Error from
Bluetooth stack (%s)" % errcode)
__main__.BTLEException: Error from Bluetooth stack (comerr)
```

Hope that enables others to explore their 101 further,

Kelvin

---

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Re: Heart Rate Monitor connected to Raspberry Pi (<http://forum.arduino.cc/index.php?topic=377587.msg2603507#msg2603507>)  
Feb 07, 2016, 07:30 pm (<http://forum.arduino.cc/index.php?topic=377587.msg2603507#msg2603507>)

Were you able to clear the error with bluepy at the end of your listing?

There is a similar example at Adafruit using their BlueFruit devices and a CSR8510 Bluetooth 4.0 USB dongle on the RasPi.  
(<https://learn.adafruit.com/adafruit-bluefruit-usb-bluetooth-module/tutorial>)

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Re: Heart Rate Monitor connected to Raspberry Pi (<http://forum.arduino.cc/index.php?topic=377587.msg2603552#msg2603552>)

Feb 07, 2016, 07:57 pm (<http://forum.arduino.cc/index.php?topic=377587.msg2603552#msg2603552>)

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