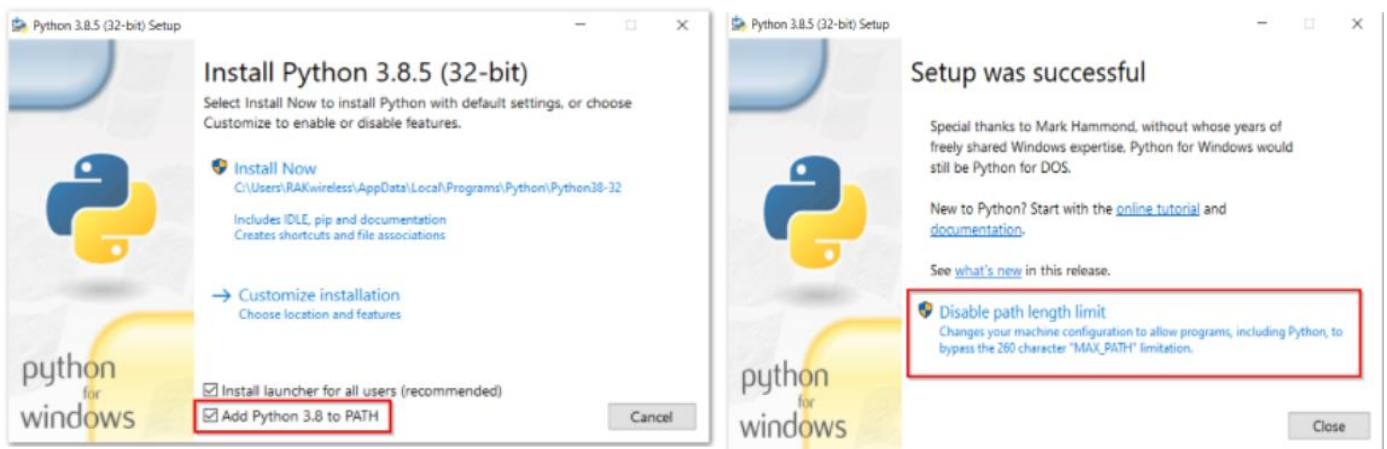


1. Download python 3.8.5 (According to your computer, choose 64 or 32 bit) <https://www.python.org/downloads/release/python-385/>



## 2. Open Command Line Interface (administrator mode)

```
# python --version
```

```
# pip --version
```

```
C:\Users\mikeweng>python --version
Python 3.8.5

C:\Users\mikeweng>pip --version
pip 20.1.1 from c:\users\mikeweng\appdata\local\programs\python\python38\lib\site-packages\pip (python 3.8)

C:\Users\mikeweng>
```

## 3. Download pyocd

```
# pip3 install pyocd
```

```
C:\Users\mikeweng>pip3 install pyocd
Requirement already satisfied: pyocd in c:\users\mikeweng\appdata\local\programs\python\python38\lib\site-packages (0.33.1)
Requirement already satisfied: pylink-square<1.0,>=0.11.1 in c:\users\mikeweng\appdata\local\programs\python\python38\lib\site-packages (from pyocd) (0.12.0)
Requirement already satisfied: pyyaml<7.0,>=6.0 in c:\users\mikeweng\appdata\local\programs\python\python38\lib\site-packages (from pyocd) (6.0)
Requirement already satisfied: cmsis-pack-manager<1.0,>=0.4.0 in c:\users\mikeweng\appdata\local\programs\python\python38\lib\site-packages (from pyocd) (0.4.0)
```

```
# pyocd --version
```

```
C:\Users\mikeweng>pyocd --version
0.33.1
```

## 4. Install packages for different platform

For RAK4630, install the following package:

```
# pyocd pack --install nrf52840
```

For RAK3172, install the following package:

```
# pyocd pack --install stm32wle5ccux
```

## 5. Open GDB server

```
# pyocd-gdbserver -t stm32wle5ccux --allow-remote
```

```
C:\WINDOWS\system32>pyocd-gdbserver -t stm32wle5ccux --allow-remote
0000969:WARNING:gdb_server:pyocd-gdbserver is deprecated; please use the new combined pyocd tool.
0001710:INFO:board:Target type is stm32wle5ccux
0001866:INFO:dap:DP IDR = 0x6ba02477 (v2 rev6)
0001881:INFO:ap:AHB-AP#0 IDR = 0x24770011 (AHB-AP var1 rev2)
0001891:INFO:ap:AHB-AP#1 IDR = 0x84770001 (AHB-AP var0 rev8)
0001908:INFO:rom_table:AHB-AP#0 Class 0x1 ROM table #0 @ 0xe00ff000 (designer=020 part=497)
0001915:INFO:rom_table:[0]<e000e000:SCS v7-M class=14 designer=43b part=000>
0001918:INFO:rom_table:[1]<e0001000:DWT v7-M class=14 designer=43b part=002>
0001921:INFO:rom_table:[2]<e0002000:FPB v7-M class=14 designer=43b part=003>
0001925:INFO:rom_table:[3]<e0000000:ITM v7-M class=14 designer=43b part=001>
0001931:INFO:rom_table:[4]<e0040000:TPIU M4 class=9 designer=43b part=9a1 devtype=11 archid=0000 devid=ca0:0:0>
0001937:INFO:rom_table:[6]<e0043000:CTI class=9 designer=43b part=906 devtype=14 archid=0000 devid=40800:0:0>
0001946:ERROR:ap:Transfer error while reading AHB-AP#1 ROM table: Memory transfer fault @ 0xf0000fd0-0xf0000fff
Traceback (most recent call last):
```

## 6. Open GDB Client & Start to analyze

open another Command Line Interface (administrator mode)

```
# cd C:\Users\<username>\AppData\Local\arduino15\packages\rak_rui\tools\arm-none-eabi-gcc\9-2019q4\bin
```

Execute GDB client and enter GDB client shell.

# arm-none-eabi-gdb.exe

```
C:\Users\mikeweng\AppData\Local\arduino15\packages\rak_rui\tools\arm-none-eabi-gcc\9-2019q4\bin>arm-none-eabi-gdb.exe
C:\Users\mikeweng\AppData\Local\arduino15\packages\rak_rui\tools\arm-none-eabi-gcc\9-2019q4\bin\arm-none-eabi-gdb.exe:
cache directory.
GNU gdb (GNU Tools for Arm Embedded Processors 9-2019-q4-major) 8.3.0.20190709-git
Copyright (C) 2019 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
Type "show copying" and "show warranty" for details.
This GDB was configured as "--host=i686-w64-mingw32 --target=arm-none-eabi".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
  <http://www.gnu.org/software/gdb/documentation/>.

For help, type "help".
Type "apropos word" to search for commands related to "word".
(gdb) target remote 10.6.20.77: 3333
```

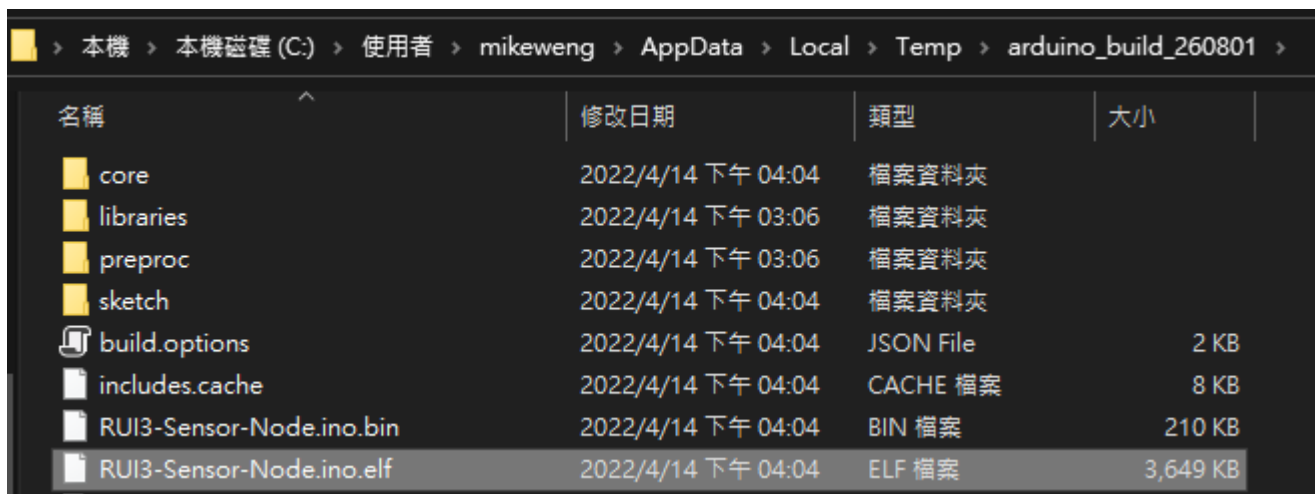
(gdb) target remote <GDB server ip>: 3333

```
(gdb) target remote 127.0.0.1: 3333
Remote debugging using 127.0.0.1: 3333
0x0802bf8e in HardFault_Handler ()
```

(If you can't connect, please close your Windows Firewall)

Locate the ELF file of your project by compiling message from Arduino IDE. In this example, my ELF file is located at

C:\Users\mikeweng\AppData\Local\Temp\arduino\_build\_260801\RUI3-Sensor-Node.ino.elf



(gdb) file

C:\\Users\\mikeweng\\AppData\\Local\\Temp\\arduino\_build\_260801\\RUI3-Sensor-Node.ino.elf

```
(gdb) file C:\\Users\\mikeweng\\AppData\\Local\\Temp\\arduino_build_260801\\RUI3-Sensor-Node.ino.elf
A program is being debugged already.
Are you sure you want to change the file? (y or n) y
Reading symbols from C:\\Users\\mikeweng\\AppData\\Local\\Temp\\arduino_build_260801\\RUI3-Sensor-Node.ino.elf...
(gdb)
```

Let program continue to run

```
(gdb) c
```

```
(gdb) c  
Continuing.
```

when Serial Monitor hangs, press Ctrl+C

Debug back trace. In this case, the firmware crashes at line #132 in RAK1921\_display.cpp

```
(gdb) bt
```

```
(gdb) bt  
#0 0x0802bf8e in HardFault_Handler ()  
#1 <signal handler called>  
#2 0x77bbff18 in ?? ()  
#3 0x08009102 in rak1921_show () at C:\Users\mikeweng\Desktop\RU13-Sensor-Node\RAK1921_display.cpp:132  
#4 0x08009168 in rak1921_add_line (line=line@entry=0x8034ea3 "Joined NW")  
    at C:\Users\mikeweng\Desktop\RU13-Sensor-Node\RAK1921_display.cpp:113  
#5 0x08009442 in sensor_handler () at C:\Users\mikeweng\Desktop\RU13-Sensor-Node\RU13-Sensor-Node.ino:480  
#6 sensor_handler () at C:\Users\mikeweng\Desktop\RU13-Sensor-Node\RU13-Sensor-Node.ino:449  
#7 0x0800e0ec in rui_event_handler_func (data=<optimized out>, size=<optimized out>)  
    at C:\Users\mikeweng\AppData\Local\Arduino15\packages\rak_rui\hardware\stm32\3.2.0\variants\WisDuo_RAK3172_Evaluation_Board\rui_inner_main.c:277  
#8 0x08030064 in fund_event_queue_execute ()  
    at C:\Users\mikeweng\AppData\Local\Arduino15\packages\rak_rui\hardware\stm32\3.2.0\cores\STM32WLE\component\fund\event_queue\fund_event_queue.c:72  
#9 0x0800e212 in rui_running ()  
    at C:\Users\mikeweng\AppData\Local\Arduino15\packages\rak_rui\hardware\stm32\3.2.0\variants\WisDuo_RAK3172_Evaluation_Board\rui_inner_main.c:401  
#10 main ()  
    at C:\Users\mikeweng\AppData\Local\Arduino15\packages\rak_rui\hardware\stm32\3.2.0\variants\WisDuo_RAK3172_Evaluation_Board\rui_inner_main.c:401  
(gdb)
```

Analyze completed & leave

```
(gdb) quit
```

```
(gdb) quit  
A debugging session is active.  
  
    Inferior 1 [Remote target] will be detached.  
  
Quit anyway? (y or n) y  
Detaching from program: C:\Users\mikeweng\AppData\Local\Temp\arduino_build_260801\RU13-Sensor-Node.ino.elf, Remote target  
Ending remote debugging.  
[Inferior 1 (Remote target) detached]  
C:\Users\mikeweng\AppData\Local\Arduino15\packages\rak_rui\tools\arm-none-eabi-gcc\9-2019q4\bin>_
```