

Serial Guide for BeagleY-AI

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Guide has been tested on

- BeagleY-AI (Target):** **Debian 12.8** (bit it's version independent)
- PC OS (host):** **Debian 12.8** (or higher)

This document guides the user through

1. Connecting to the BeagleY-AI via a serial port
2. Access target's Linux terminal via serial connection with `screen` program.

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Formatting

1. Commands for the host Linux's console are show as:
`(host)$ echo "Hello PC world!"`
2. Commands for the target (BeagleBone) Linux's console are shown as:
`(bbg)$ echo "Hello embedded world!"`
3. Almost all commands are case sensitive.

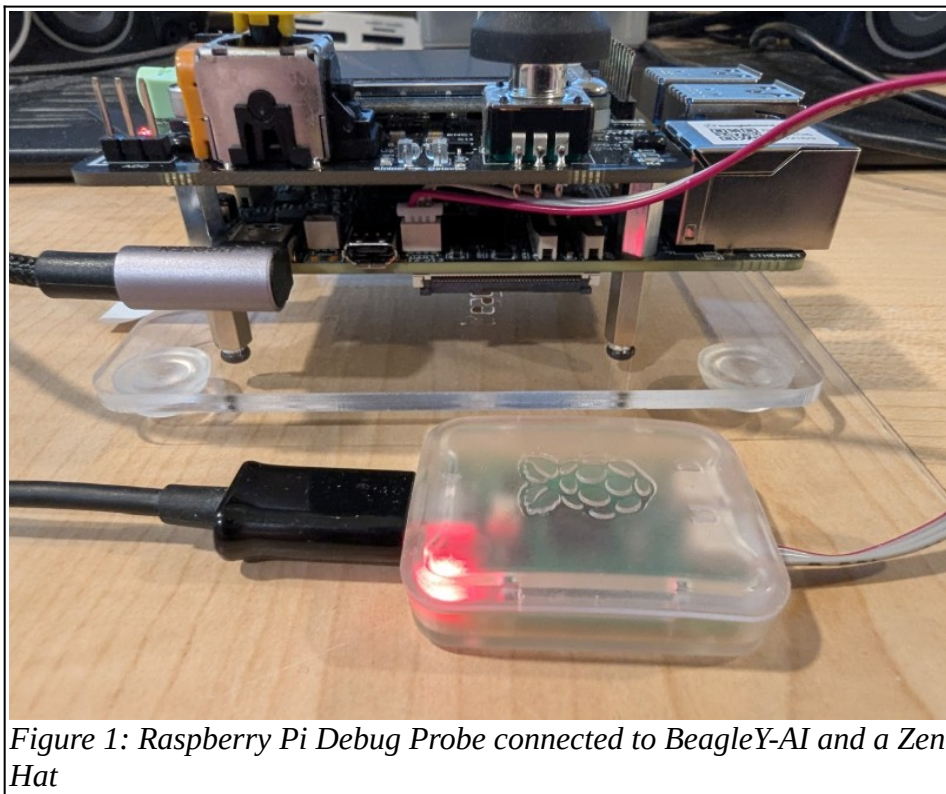
Revision History

- Jan 2025: Target the Beagle-Y AI

1. Screen

Screen is a tool which allows you to interact with a serial port through Linux. To connect to the BeagleY-AI using a serial connection (via Screen), you'll need some serial port hardware to make this work.

1. Connect a hardware serial port device to the BeagleY-AI. You'll need either:
 - Raspberry Pi Debug Probe, such as from [[Digikey](#) tested] or [[Amazon](#) (untested)]
2. Connect serial device to BeagleY-AI:
 - Using the 3-wire connection, plug the serial device into the UART port on the BeagleY-AI (beside the micro HDMI connector, on the same side as the USB-C connector).



3. If using a virtual machine (VM), you may need to map the adapter to the VM.
In VMware:
 - Go to the menu VM > Removable Devices > “Debug Probe (CMSIS-DAP)” or something mentioning “UART”, “FTDI”, “Future Devices”, or “serial”.
 - You may also use the icon in upper right (on tool bar) or bottom right; right click it, and select connect.**In VirtualBox:**
 - Go to the menu Devices > USB and check “Debug Probe (CMSIS-DAP)” (or the like)

- You can also use Devices > USB > USB Settings to configure the VM to automatically gain control of this device.
- In Linux, just after connecting the device you can see if it has been configured correctly:
(host)\$ sudo dmesg

- This shows messages produced by the kernel. You should see the last few lines being:

```
[...] usb 1-2.1: USB disconnect, device number 7
[...] usb 1-2.1: new full-speed USB device number 8 using uhci_hcd
[...] usb 1-2.1: New USB device found, idVendor=2e8a, idProduct=000c, bcdDevice=1.01
[...] usb 1-2.1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[...] usb 1-2.1: Product: Debug Probe (CMSIS-DAP)
[...] usb 1-2.1: Manufacturer: Raspberry Pi
[...] usb 1-2.1: SerialNumber: E663AC91D33D5336
[...] cdc_acm 1-2.1:1.1: tttyACM0: USB ACM device
```

- This shows that the device is connected to /dev/tttyACM0. If you have multiple devices connected, yours may connect to tttyACM0 or higher. It may also show up as /dev/tttyUSB0 or /dev/tttyUSB1.

4. Check /dev/tttyACM0 exists with the following command (expected output shown on next line):

```
(host)$ ls -al /dev/tttyACM0
crw-rw---- 1 root dialout 166, 0 Sep  1 09:57 /dev/tttyACM0
```

5. Install the Screen program to be able to read/write to the serial port:

```
(host)$ sudo apt install screen
```

6. Start Screen with the following command:

```
(host)$ sudo screen /dev/tttyACM0 115200
```

- Where /dev/tttyACM0 is the port. May be tttyACM1, tttyUSB0, or tttyUSB1, etc.
- 115200 is the “baud rate”, or the speed of the connection. 115200 is the default serial port speed for the BeagleBone.
- NOTE: If in SFU labs, you do not have root permission on host OS. Do not try any sudo commands in the host OS in the lab. Our IT staff will be automatically notified and they may contact you about it. In the lab use sudo only inside your VM.

7. In screen, press Enter (perhaps a couple times) to see text on the serial port if you are connecting to a target device which is already running.

- Enter your user name and password.

8. Screen commands:

- Help: Ctrl-a then ?
- Quit: Ctrl-a then \

9. Trouble shooting

- After launching screen, if you immediately see the message: [screen is terminating] then you may have forgotten to use sudo. (In SFU labs, you do not have sudo (root) access.)
- If you briefly see the following message at the bottom of the screen:
Cannot exec 'tttyACM0': No such file or directory

it likely means that you have not correctly connected the serial hardware to the computer, or if you are using a virtual machine, that you have not mapped it to the virtual machine correctly.

- For the virtual machine, try disconnecting the serial adapter from the VM, and then reconnecting it.
- To verify you are connecting the correct USB device to the VM, do the following:
 - Unplug all the USB connections from the serial device.
 - Make it so later `dmesg` shows us a message:

```
(host)$ echo "-----" | sudo tee /dev/kmsg
```
 - Plug in the serial device
 - If needed, map the serial device to the VM
 - Check what your Linux host says:

```
(host)$ sudo dmesg
```
 - You should now see the message:

```
[...] cdc_acm 1-2.1:1.1: ttyACM0: USB ACM device
```
- If you run `screen` and see nothing, try:
 - press enter: if the board is at the log-in prompt it will show you the prompt.
 - ensure the serial device is connected to the target board correctly.
 - ensure the target has power (lights are flashing on the target)
 - reboot the target by removing power and reconnecting the power.
 - reboot your VM (if applicable) and your computer.
- If your Screen session locks up or begins dropping characters or corrupting text, try:
 - In a VM, disconnect the serial device from the VM and/or physically disconnect the USB cable. Perhaps try plugging it back into another USB slot.
 - Ensure `screen` is running with the correct baud rate (115200).
 - Try closing the `screen` session (Ctrl-A then \), and restarting the screen session. Sometimes under VirtualBox it seems that closing `screen` also locks up, but it then resolves within a minute and successfully quits `screen`.
- If trying to reconnect gives the error: “Failed to attach the USB device ...” and “... is busy with a previous request”, with VirtualBox then you may need to kill the `VBoxSVC.exe` process in the Host OS, and/or reboot the host OS.
- If the VM has problems (locks up, etc) when you connect the target to the PC, if you are automatically mapping both the target and the serial device to the VM then it may cause problems.
 - Try disabling the configuration in the VM’s settings which automatically map the target and serial device to the VM and see if that helps.