**FRIENDS Serial Communication**

**Requirements:**

* Install VCP (Virtual Com Port) Driver.
* Install FRIENDS Serial Monitor.

**Installation Process of VCP Driver:**

* Download VCP driver from this link: (<https://ftdichip.com/drivers/vcp-drivers/> ).The downloaded zipped file may be named as CDM212364\_Setup
* Unzip the downloaded file and open CDM212364\_Setup
* Step 1:

A screenshot of a computer

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* Step 2:

A screenshot of a software wizard

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* Step 3:

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* Step 4:

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* When FRIENDS is connected to the computer by USB, a serial port appears after installing the VCP driver.

A computer screen shot of a computer

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**Installation process of FRIENDS serial monitor:**

* Open Friends Serial Monitor.exe
* A screenshot of a computer

  Description automatically generatedChoose the installation path by pressing browse and select install.
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  Description automatically generated with medium confidenceThe installation process will start and then press close button after the installation is complete.
* Go to the installation directory and open main\_gui to run the FRIENDS Serial Monitor.

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**The FRIENDS Serial Communication GUI:**

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**Status Bar:** It shows the connectivity status between the computer and the FRIENDS device. It turns into “green” and shows “connected” when the connection between the two devices have been established after selecting the appropriate COM port and baud rate (115200).

**COM:** Appropriate COM port should have been selected for establishing the connection for a particular FRIENDS device.

**Baudrate:** For the FRIENDS device, the baud rate will be 115200.

**Reload:** If the appropriate com port for the device doesn’t show up in the options, reload button should be pressed to get the appropriate com port.

**Connect:** After setting the com port and baud rate, connect button should be pressed to establish the connection between the computer and the FRIENDS device

**Disconnect:** To turn off the connection, disconnect button should be pressed.

**Minimum puffing duration:** By setting the threshold (minimum puffing duration), user can separate the puffing events in the plots based on this threshold. By default, the value of this entry is 0.0.

There are two options to show the puffing events in the plot based on the threshold.

1. Display all puffing events
2. Display puffs that exceed the threshold

1st option will show all the puffing events in the plots.

Example: For minimum puffing duration 0.1s:

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2nd option will show the puffing events that only exceed the specified minimum puffing duration,

Example: For minimum puffing duration 0.1s

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**Plot types:** Three types of plots (Line, Stem, and Step) are available for user selection to generate the plots.

**Read Time:** This button returns the device’s actual time in POSIX format. It shows the timestamps in the Rx monitor of the GUI. Besides, it also saves the timestamps and generate the plots.

**Set Time:** This button set the local time in POSIX format to the device.

**Erase flash:** This button will erase the device’s flash memory. It requires a confirmation (YES) and “Yes” button will be enabled after pressing “Erase” button. At the beginning, the erase button will be disabled. After saving the data and generating the plots by “Read Data” button, the erase button will be enabled.

**Start Data Collection**: This button should be pressed before start collecting the data. It will set the local time in POSIX format to the device and erase the flash memory of the device and make it ready to start the data collection. At the beginning, the “Start Data Collection” button will be disabled as this button erases the flash memory without requiring any confirmation. So, after saving the data and generating the plots by “Read Data” button, the “Start Data Collection” button will be enabled.

**Read Data:** After pressing the “Read Data” button, the data from the device will be read in the RX monitor.

**File Conversion:** This button converts the original timestamps to human-readable time and generates the plots. It creates two text files.

* File 1: It contains the local time in human readable format (e.g., Local Time: 2023-06-05 13:06:47.836938), and event’s timestamps in **human readable format** (converted)
* A screenshot of a computer code

  Description automatically generatedFile 2: It contains a data table with four columns (Event, Date, Range, Duration\_in\_seconds). One can find each complete event’s occurring date, time range and duration from this table. Example:

After pressing the “File Conversion” button, a file dialog will be popped up to get the input file (The file generated from “Read Data” button), then it converts the timestamps. Afterwards, another file dialog will be popped up to save the files with converted timestamps. The second file dialog will require a path to save the converted files, and it takes the filename from the input file and add postfixes to save the converted text files. File 1 will be saved as “input file name”\_converted and file 2 will be saved as “input file name”\_duration.

**Clear:** This button will clear all the text in RX monitor

**Save data and generate plots:** After pressing the “**Read Data**” button, the data from the device will be read in the RX monitor. For saving those data, user should click on “**Save data and generate plots**” button. The raw data will be saved in a text file and converted ones will also be generated.

The system will generate the plots from the data. The number of plots depends on the number of days in the data (one plot for one day). Time from 00:00 to 24:00 represents the horizontal x-axis.

**Data Status Bar**: It shows the status while performing the functionality of “Read Data”, “File Conversion”, and “Save data and generate plots” button.

**Save the plot:** For saving the plot, press the marked icon by red circle below.

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**FAQ:**

**1. What to do before giving the device to any participant?**

Answer:

* Connect the device to the computer via USB
* Open FRIENDS serial monitor app.
* Select appropriate COM port and baud rate (115200) and press connect button.
* Press “Start Data Collection Button”. It will set the internal time to the device and put a request to erase the storage (flash)
* Press “Yes” button to erase the flash.
* The device is now ready for transfer to the participant.

**2. Is it required to install python programming language to use this software?**

Answer: Yes. You have to install the latest version of Python on your computer. Besides, you also need to install the “requirements.txt” into your system.

* At first, install this software by the executable file in your preferred location.
* The go to the installation location, and find the “FRIENDS Serial Monitor” folder.
* Copy the path. (e.g., C:\Users\sheha\OneDrive\Desktop\FRIENDSGUI-main (5)\FRIENDSGUI-main\FRIENDS Serial Monitor)
* Search Command Prompt in your windows search bar, and open it
* Type “cd copied path” [ In my case, copied path = C:\Users\sheha\OneDrive\Desktop\FRIENDSGUI-main (5)\FRIENDSGUI-main\FRIENDS Serial Monitor ] and press enter
* Then you need to install the python packages required for this software by executing “pip install -r requirements.txt” in the command prompt
* Now, you can go to the installation folder – FRIENDS Serial Monitor – main\_gui.exe to use the software.

**3. What to do after receiving the device from the participants?**

* Connect the device to the computer via USB.
* Open FRIENDS serial monitor app.
* Select appropriate COM port and baud rate (115200) and press connect button.
* Read the data from the flash by pressing “Read Data” button, wait until the completion of reading (check status bar).
* Don’t forget to save the data by pressing “Save data and generate plots”. You will be required to specify the name and the location to save the files.
* Finally, save the graphs as well.