Syncster

Instruction manual

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Contents

1   What is Syncster?

Syncster is an application for the Windows 10 platform that collects data from multiple devices, and can temporally synchronize data from those devices into one file. An application called Touchster was developed for extracting touch data from Android devices. Syncster and Touchster were developed by a group of aspiring programmers as part of the course *TIES405 Sovellusprojekti* in the University of Jyväskylä during spring of 2019. Applications were developed for University of Jyväskylä's driving simulator laboratory for research purposes.

Syncster can gather and synchronize data from the following devices:

1) Eepsoft driving simulator (version 20150311d),
2) Wearable Sensing DSI-24 EEG device and DSI-Streamer (version 1.08.28),
3) Dikablis Professional eye tracking glasses and D-Lab (version 3.52),
4) Android mobile devices and Touchster.

Instructions for all devices and their Syncster modules can be found from chapter 2. A run through of Syncster and its features is covered in chapter 3.

2 Syncster's device modules

All Syncster devices work in a different way. In this chapter, specific information about each device is given.

To ensure Syncster's performance, **all devices must use different port numbers**. If devices and PCs are part of a network that restricts TCP/UDP traffic, user must first manually create firewall rules that allow ports to send or receive TCP/UDP traffic. It should be enough to create these rules on the PC running Syncster.

2.1 Driving simulator (Eepsoft)

Things to check before recording:

1) Use script *peltihamsteri_udp.lua* (name might be different if various versions of the script are used) when launching Eepsoft. Make sure it is in the same folder as *t.exe*.
2) Figure out the IP address of the PC running Syncster and replace script's IP address with it.
3) Choose port number you want to use (default is 5596) and replace script's port number with it.
4) On Syncster's *Devices* tab, input driving simulator's settings.
   a. Select device to be used in study.
   b. Make sure to use the same port number that was used in *peltihamsteri_udp.lua*.
   c. Select the data you want to gather.

Recommended procedure when using this device:

1) Launch driving simulator's software (Eepsoft) with *peltihamsteri_udp.lua*.
2) Connect devices from Syncster.

3) Start recording from Syncster.

4) Start driving.

NB: Driving simulator sends data with UDP, so this procedure doesn't need to be followed to the letter, if you know what you are doing. Just make sure to start the recording before you start driving, so that your data will all be gathered.

2.2   Dikablis Professional eye tracking glasses

Things to check before recording:

1) Eye tracking glasses should be in use and streaming data to D-Lab.

2) D-Lab has a *Relay* function (under screen layout) which can send data in real-time via TCP/IP. Drag and drop the data you would like to send from the *Recording Devices* window on to the *Relay* window.

3) Configure the settings in D-Lab's *Relay* window in order to send from a specified IP address and port number. Configure your client to establish a TCP/IP connection and receive data packets.

4) On Syncster's *Devices* tab, input Eye Tracker's settings.

   a.   Select device to be used in study.

   b.   Make sure to use the same values in Syncster's Eye Tracker module's *IP address* and *Port number* text fields that are used in D-Lab.

   c.   Select the data you want to gather in D-Lab by drag and dropping wanted data from *Recording Devices* window on to the *Relay* window.

5) You can open multiple relays from D-Lab. Different relays need always a different port number to work. Syncster supports two D-Lab relays. To activate the second port check *Eye tracker port 2 is used in this test* checkbox and fill *Port number 2* text field with the same port number that is used in D-Lab's second relay.

6) For more information check *D-Lab Manual version 3.0.*

Recommended procedure when using this device:

1) Launch D-Lab and make it stream data.

2) Connect devices from Syncster.

3) Start recording from D-Lab (optional).

4) Start recording from Syncster.

2.3   DSI-24 EEG headset

Things to check before recording:

1) Syncster and DSI-Streamer must be run on the same PC.

2) EEG should be in use and streaming data to DSI-Streamer. For more information check *Wearing Sensible DSI-24 EEG Headset User Manual version 0.8.*

3) To stream EEG data to Syncster, you must select *Activate TCP/IP Socket* in DSI-Streamer's *TCP IP* tab.

4) On Syncster's *Devices* tab, input EEG's settings.

    a. Select device to be used in study.

    b. Make sure to use the same port number that was used in DSI-Streamer's *Client Inport* field.

    c. Select the data you want to gather.

Recommended procedure when using this device:

1) Launch DSI-Streamer and make it stream data.

2) Connect devices from Syncster.

3) Start recording from Syncster.

2.4   Touchster (Android device)

Things to check before recording:

1) Write IP address and port number to Touchster's fields. Make sure to write the IP address, which is used in PC that runs Syncster. The port number must be open in the PC that runs Syncster.

2) If your PC which runs Syncster is using University's Internet, make sure your Android device running Touchster is also in University's Internet. Otherwise University's firewall will block the connection.

3) On Syncster's *Devices* tab, input Android device's settings.

    a. Select device to be used in study. Syncster will automatically select touch data.

    b. Make sure to use the same port number that was used in Touchster's port number field.

4) Starting touch detection will be different with different Android devices:

    a. If your Android version is 8.0.0 or higher, you need to give Touchster permission to draw over other apps (without permission Touchster will show message reading *Touchster needs permission to draw overlay!*). Go to device's options and apps. Search for Touchster and go to its options. From there you can give Touchster permissions to draw over other apps.

    b. If your Android version is 6.0 – 7.1, you need to give Touchster permission to draw over other apps. Touchster will ask you this permission when you start detecting touches.

    c. If your Android version is 5.1 or lower, Touchster doesn't need permission.

Recommended procedure when using this device:

1) Connect devices from Syncster.
2) Connect Touchster to Syncster.
3) Start detecting touches from Touchster.
4) Start recording from Syncster.

NB: Connect Touchster to Syncster after you have pressed *Connect devices* button in Syncster. Touchster's device module in Syncster won't actively show heartbeats. Heartbeats happen when user touches device's screen. It is recommended that before recording with Syncster user checks that heartbeats are coming to make sure connection is fine.

3 Using Syncster

In this chapter we go through step-by-step instructions on how to use Syncster.

3.1 Text field validation

Many of Syncster's text fields have an ability to check if content in them is valid. If user tries to use characters that are not allowed, text field's text color will turn red to inform user that content that is being offered is invalid. You can't start recording if there are text fields with invalid content in them. Figure 1 shows an example of text field that has invalid content in it.

Figure 1. Example on characters that are not allowed.

3.2 Study details and result folder

Before recording you need to set up study details and result folder from the *Study setup* tab. Result folder can be selected by pressing *Open* button on the Result folder section. All recordings will be saved into this folder, so it is important, that it holds enough space. If result folder runs out of space the recording process will fail.

Every recording session requires a study name and at least one task that will be performed. You can create a new study name by writing it on the *Study name* text field. Text field will automatically turn its color red to inform user if study name that is being offered is invalid. This occurs when you are trying to use characters that are not allowed.

A new task name can be created by writing it on the *Add a task name* text field. After writing a task name you need to add it to tasks by pressing *Add* button next to text field. After this task will be shown in *Task names* list above. You can create as many tasks as is needed. Already created tasks can be removed afterwards by pressing right mouse button on top of the task name.

3.3 Selecting devices

To select devices, you need to go to *Devices* tab. From here you can find all devices that Syncster is supporting. Each device has its own tab that can be accessed by pressing device's name on top of *Devices* tab.

You can select a device by checking *<Device name> is used in this test* checkbox. After that you can select data you want and fill possibly obligatory text fields. Obligatory text fields are highlighted in red. All obligatory data must be filled before you can start recording. Every device has different types of data that you can choose to have in your recording. You can choose as much data as you want to your recording. Figure 2 shows an example selection from driving simulator.
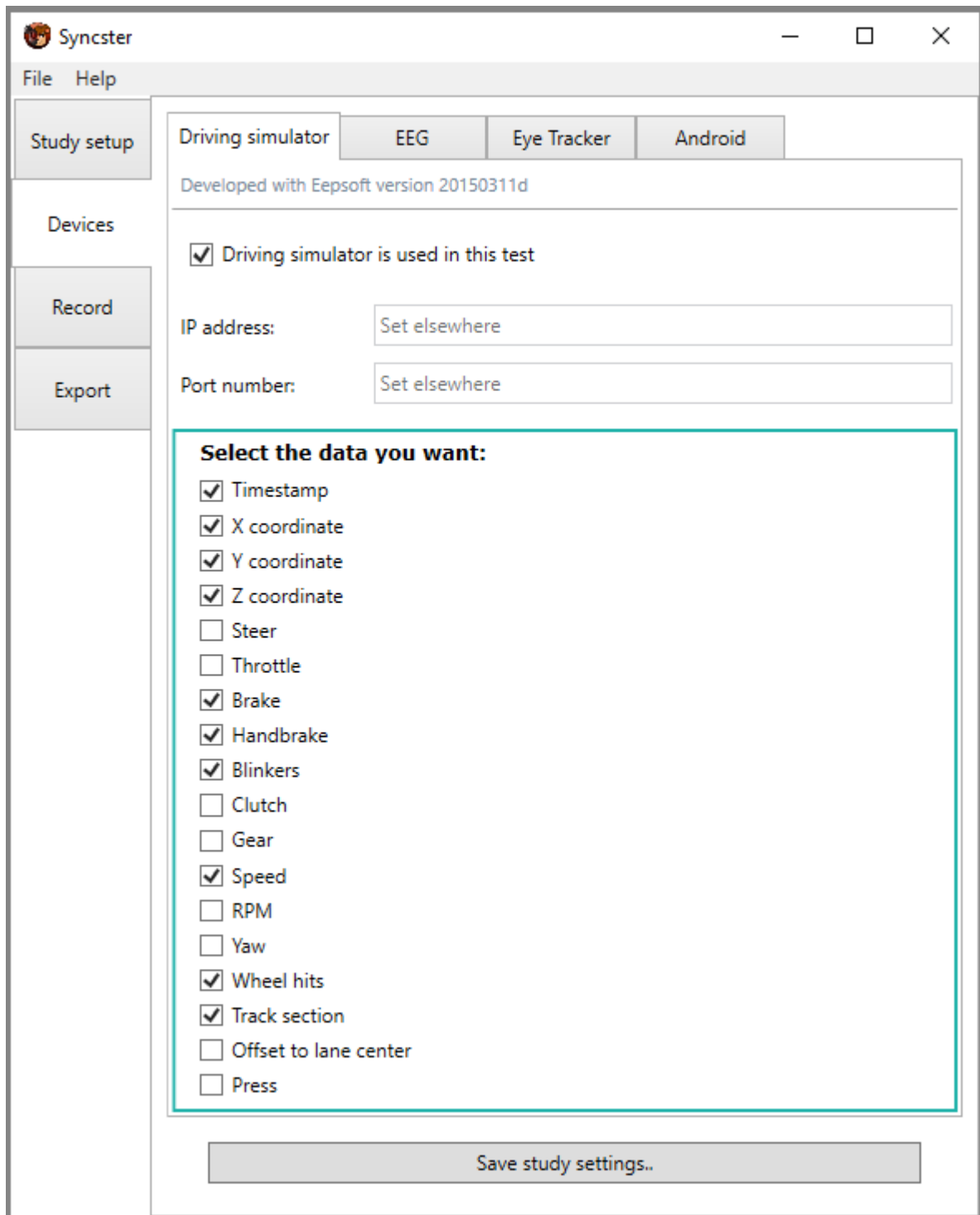
Figure 2. Example data selected from driving simulator.

3.4 Saving study settings

The fastest way to fill all information before recording is to use settings that you used

earlier. To save your settings press *Save study settings* button that can be found from

the bottom of *Study setup* and *Devices* tabs. This will open a dialog that allows you to name your save file and choose save directory.

You can use earlier saved study settings from the *Study setup* -tab's *Study settings* section. Press *Open* button to find and use an old study settings file. Syncster will automatically fill all study setup and devices information that was filled when study settings file was originally created. After this you can still edit current settings as much as you like.

3.5 Recording

3.5.1 Recording process

Once you have filled all obligatory setup information and chosen at least one device you can start recording with Syncster. To start recording you need to go to *Record* tab. The most substantive area here is *Device names, heartbeats, and statuses* section. Devices that you have chosen earlier are highlighted here with blueish border. Heartbeats-number shows different numbers when Syncster is receiving data from the device. Before connecting every device will show number zero. Status ellipse indicates device's current state. Grey color indicates that device is not yet connected. Figure 2 shows an example where we have selected some devices, but we haven't connected them yet.
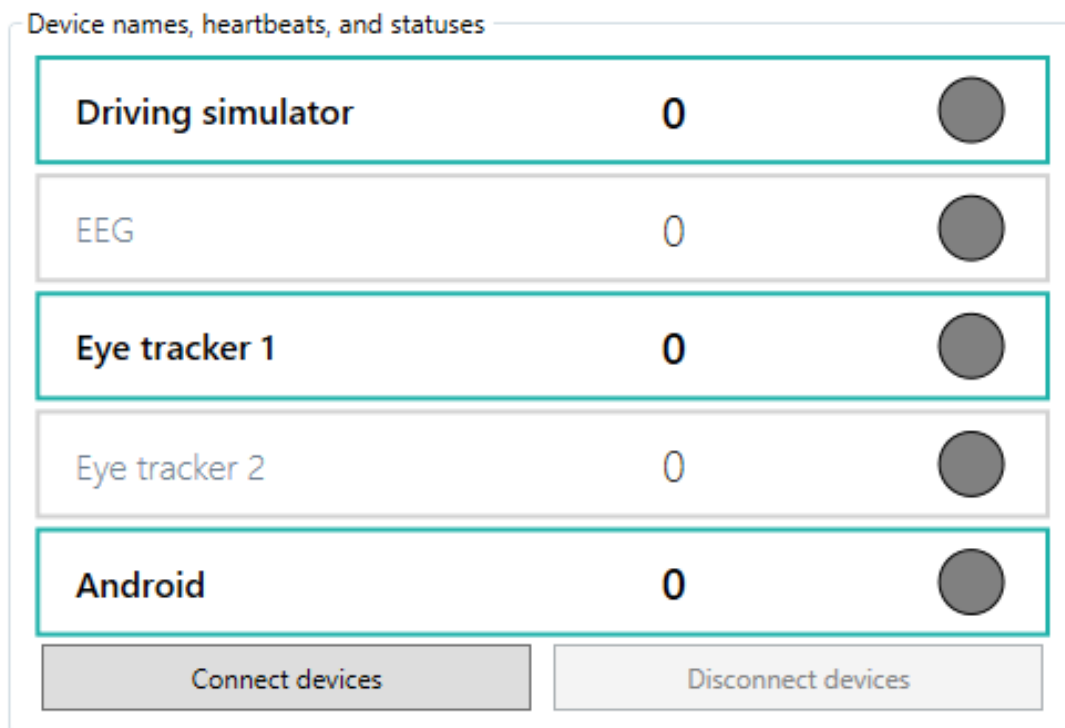
Figure 3. Device names, heartbeats, and statuses.

You can start using devices by pressing *Connect devices* button. Device's status color shows green when Syncster has launched its device module successfully. Some devices, for example Eye tracker, will also start updating their heartbeat. Be aware that some devices won't start showing heartbeat right away. For example driving simulator will show heartbeat only when you are driving in the simulator. Also Android device will show heartbeat only when user touches device's screen.

Figure X will show connected devices after *Connect devices* –button is pressed.

PICTURE

Next you need to fill *Subject* text field and choose one task. Filling these is mandatory before you can start recording. Below these is also an optional *Comment* text field, where you can write a comment about the recording. You can write a comment before you start recording or while recording is going on. You can't write a comment after you have stopped recording, because Syncster will use the comment text when

recording is stopped. *Comment* text field also has a validity check which it must pass before comment can be used. If comment is not valid when recording stops, Syncster will not use the comment.

3.5.2   Starting and stopping recording

After all required information is filled in *Start Recording* button will change its appearance from grey to green. You can start the recording process by pressing this button. If button's appearance won't change, check possible validation errors from earlier tabs. Remember also to check each device's own tab.

When you are done with recording press *Stop Recording* button. Syncster will automatically start writing temporary files from each recorded device. Depending on the length of your recording and devices used, this process might take time from couple of seconds to multiple minutes. You can follow the progress of this process from *Spooling progress* bar, which is in bottom of the *Record* tab. Syncster will inform you when temporary files are created.

3.6   Exporting

3.6.1   Exporting process

Exporting process creates one CSV-file per recording that includes all device data synchronized. This file can be then opened in other programs like Excel for further use. To start exporting you need to go to *Export* tab.

First pick a folder where your temporary files are. If you are exporting right after recording, Syncster will use automatically result folder that you have chosen before recording. However if you open Syncster just to export earlier files, you need to pick the right folder. To do this press *Change folder* button located in the top of *Export* tab.

After picking the right folder Syncster will list all recordings it holds. These are visible for the user in table located in the middle of *Export* tab. You can filter recordings by pressing *Study name, Subject, Task name, Start time, Duration* and *Comment* fields on top of the table. You can select a recording by pressing it on the table. Syncster will show its information in *Current selection* area. Here you can see what devices were used in recording and how much data each device provided.

3.6.2 Ways to export

Syncster offers two ways to export recordings:

1. Export one recording by choosing it from the table and pressing *Export selected* button. This option allows you to choose your own file name and save directory. Press *Save* to start the exporting process.

2. Export all recordings from the table. You can hide an unwanted recording by choosing it from the table and pressing *Hide selected* button. You can unhide all hidden rows by pressing *Unhide rows* button. This option won't allow you to choose file name, but uses the default file name Syncster provides. You can choose save directory, but all CSV –files will be saved there. Press *Save* to start the exporting process.

You can follow the progress of exporting process from *Export progress* bar, which is in bottom of the *Export* tab. Syncster will inform you when exporting is done.

3.6.3 Importing D-Lab data

Some data is not possible to gather at the same time when recording is happening. At the moment Syncster supports importing eye tracker software's (D-Lab) data, which is recorded at the same time Syncster is recording. To import D-Lab's data to Syncster first select a recording from the table and then press *Import new source* button located in *Current selection* area. Find the right file and open it. Syncster will ask

you if you want to import all the data or just Area-Of-Interest data. You also need to select to use local time or time which D-Lab is providing. After this D-Lab's data is imported and you can start exporting as described earlier.
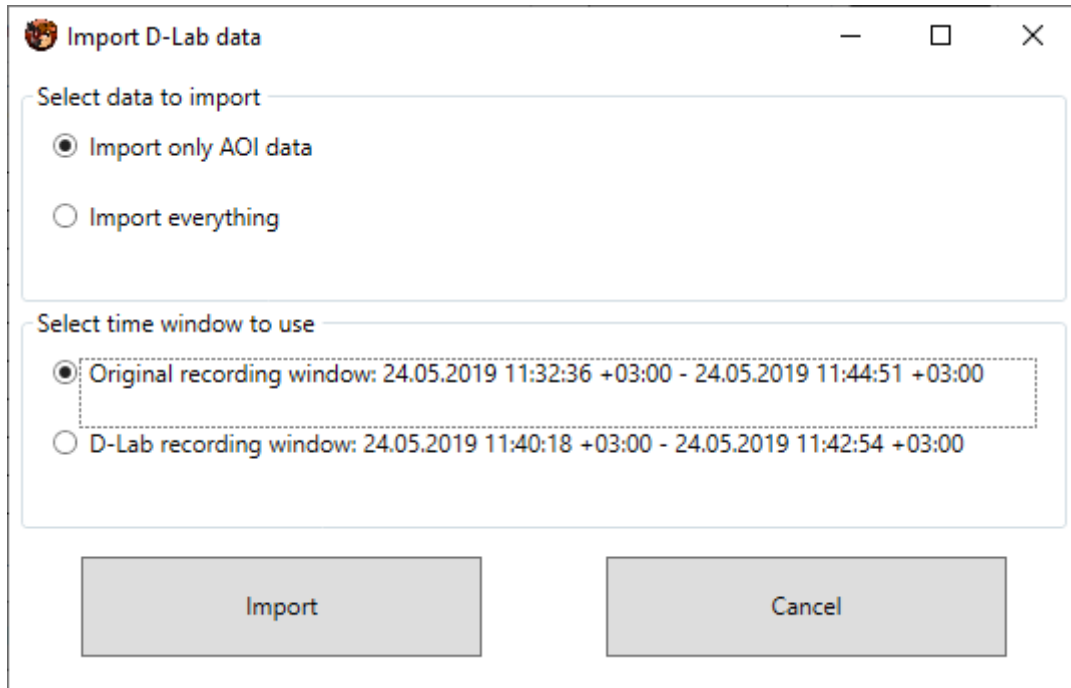

Figure 4. Import D-Lab data window.

3.6.4 Remarks about exporting

1) You can export multiple different recordings at the same time by using *Export selected* button. However, *Export progress* bar won't show exporting progress correctly.

2) It is not recommended that you export the same recording multiple times at the same time by using *Export selected* button. Doing this might put Syncster into a lock state.

3) It is not recommended that you export multiple times at the same time by using *Export all* button. Doing this will put Syncster into a lock state.

4) It is not recommended that you try importing D-Lab data to a recording while you are exporting it and vice versa.

3.7 Menu bar

You can open and save study settings from menu bar's *File* menu by clicking *Open study settings* or *Save study settings*. You can also exit from Syncster by clicking *Exit* from *File* menu.

Menu bar also has a *Help* menu that includes *Help*, *Device status help* and *About* buttons. *Help* button opens Syncster's instruction manual (you probably have already found that because you are reading this document).

Device status help button opens a window that explains the device status colors used in *Record* tab. From these colors *Paused* color isn't used in Syncster's current modules.

About button opens a little window that shows the application name and the last day application was modified.