Help Document for 'CameraEEG' App

1   Installation Manual

This section contains the instructions required to install and use the smartphone app from the Android project folder. It also lists the software prerequisites that are required for installing and using the app.

1.1   Prerequisites

1. Smartphone with minimum API 21 (Android Lollipop) and a decent back camera.
2. Have ~ 5 GB of free storage in the mobile if recording for >= 1 hour.

1.2   Procedure for using the app

1. Open the installed CameraEEG app, the various modules in the app that is the Camera. preview window, Marker Button, Connect Button, Chronometer, and the Recording button as shown in Figure 1.
2. The buttons are locked until the Smarting Device is configured with the app through Bluetooth.
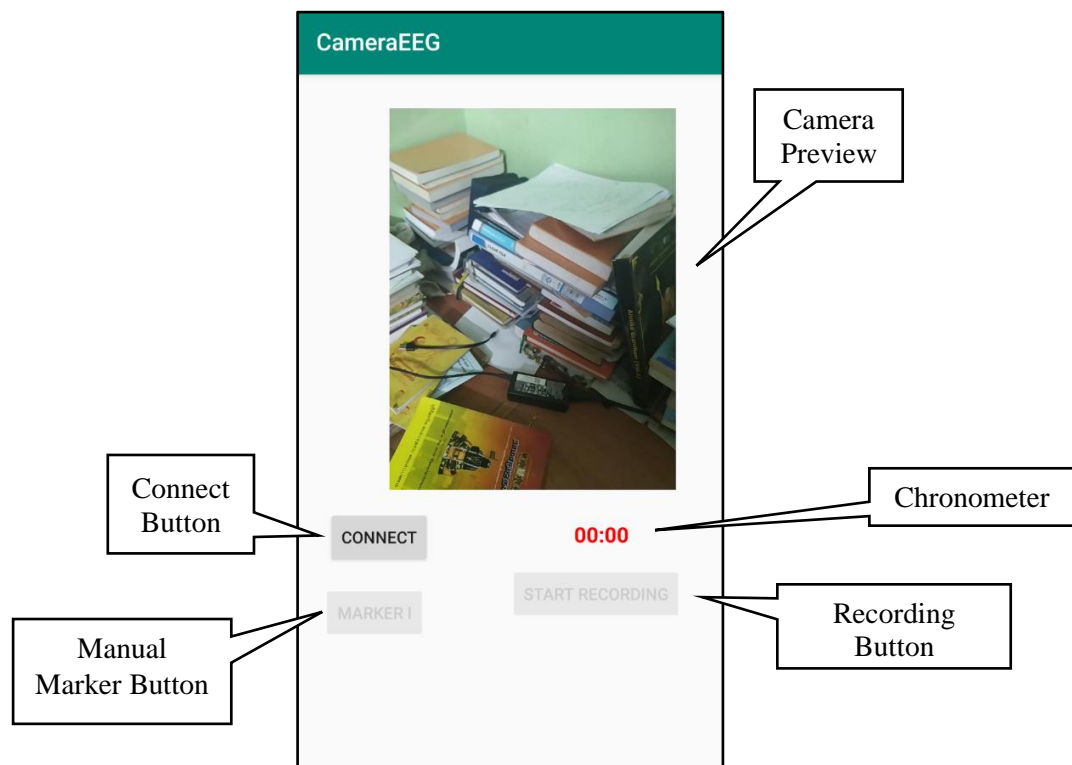

Figure 1. Layout of Mobi App Before connecting to EEG Stream

3. First time opening the app, accept the camera, audio and file permissions of the app as they're critical for the app.
4. Open the EEG Streamer app and pair the app to the EEG device by Bluetooth and select "Connect".
5. This Connects with the EEG device by pairing (if not already paired), and setting the configurations and settings of the recording to the EEG device (Sampling rate, buffering rate etc.).
6. Once the app configures with the EEG device a popup denotes its connection and the buttons are unlocked.
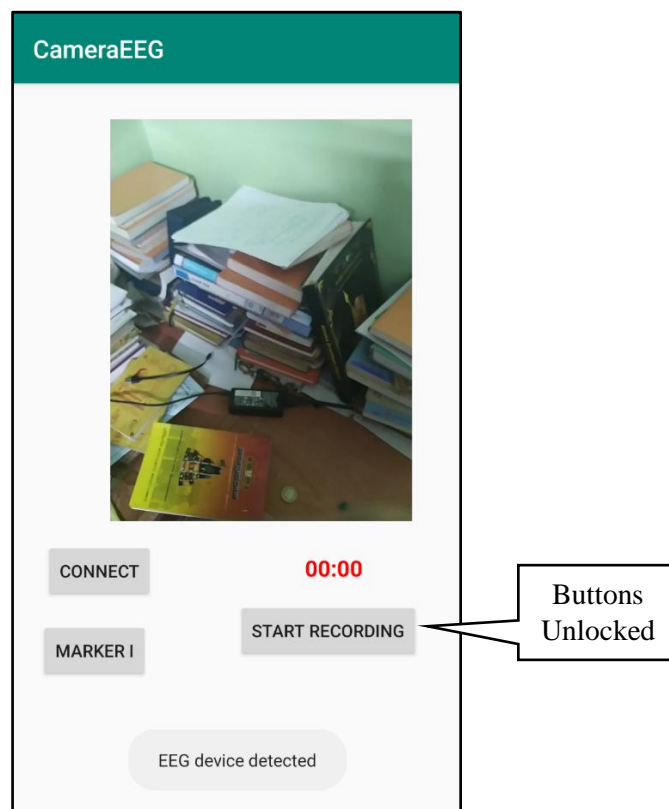

Figure 2. App after connecting to EEG Device

7. To start the experiment (Recording video with EEG data), Press the Start Recording button
8. The Start Recording Button turns to "Stop Recording" once pressed to denote that the data has started to be recorded. A chronometer appears above the button to show time passed since recording as shown in Figure 1.
9. It is essential to keep the screen active, i.e prevent the mobile from going into sleep mode. Thus check the app recording regularly.
10. Place the mobile in the front shirt pocket with camera exposed or use a transparent cell phone hanger to record the video while handsfree.
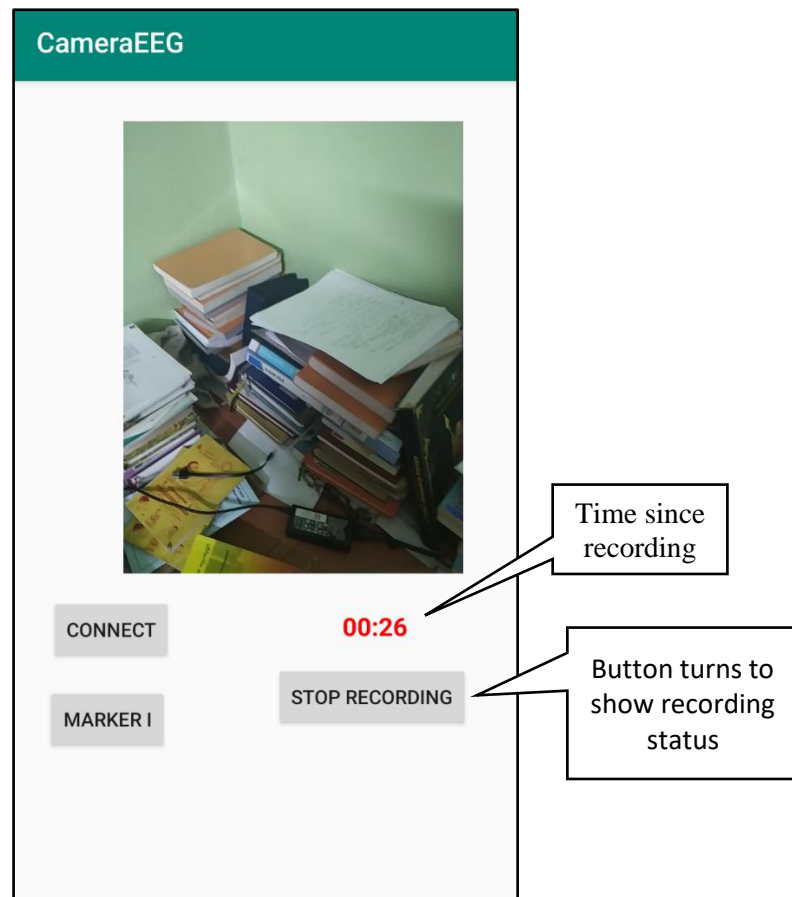
Figure 3. App during recording session

11. During the recording, press the marker button to store markers for unique/significant events.

12. To stop the recording press the Video capture button again.

13. The recorded EEG, timestamps and markers along with the recorded video can be found in the folder "\CameraEEG" in ".BDF" format and ".mp4" format respectively.

1.3 Reading EEG data from .BDF file

1. In order to read and analyse the data from the .bdf file (using Matlab), we require the EEGlab extension along with the Biosig toolbox plugin for EEGLAB.
2. Type "eeglab" in Matlab commandwindow to open up EEGLAB.
3. To open the bdf file, click on **File>Import data>Use EEGLAB functions and plugins>From Biosemi BDF and EDF files** (refer Figure 4). You can name the bdf file and choose channel you wish to analyse.
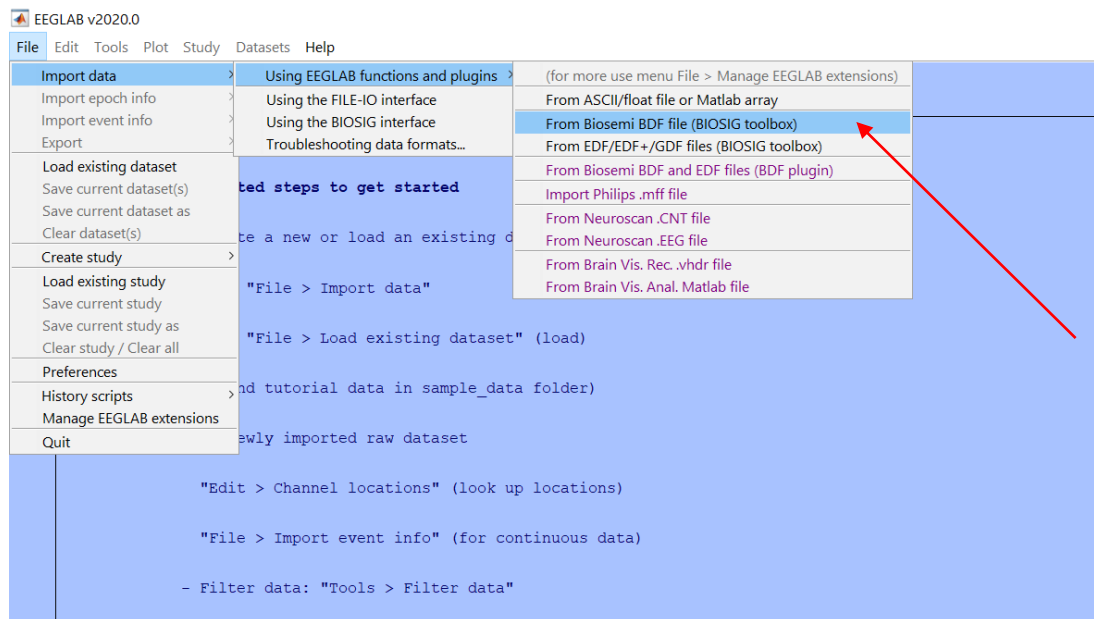
Figure 4. Importing .BDF file to EEGLAB

4. After importing the bdf file, the info regarding the eeg data recorded, such as sampling rate, total recording time,etc, are shown in the window.

Figure 5. Basic info of EEG data recorded in .bdf file

5. Following the above, the data can be analysed in Matlab (or EEGLAB), the EEG data is present in the workspace as a structure variable 'EEG'.
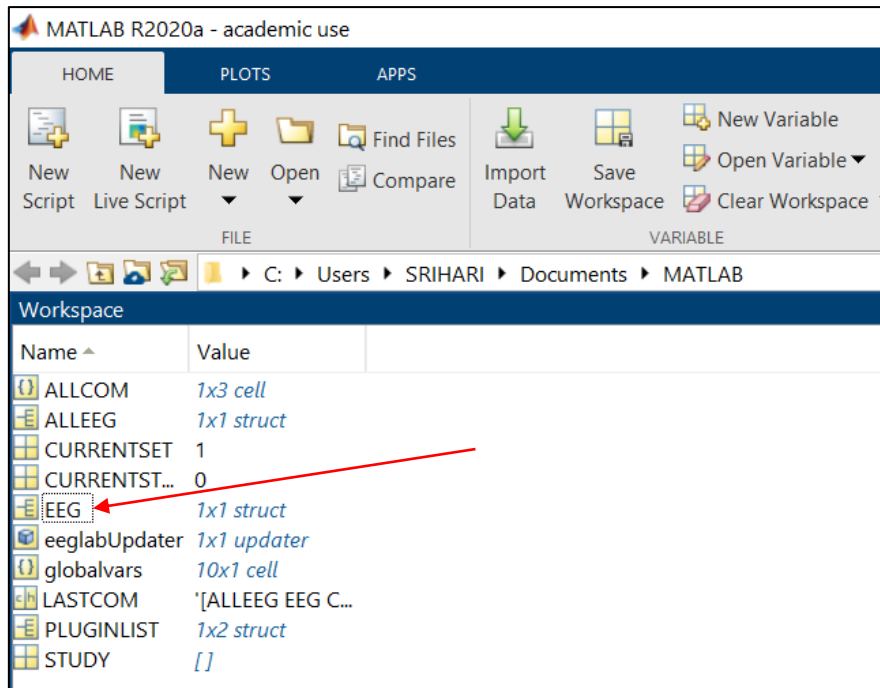
Figure 6. EEG struct variable with bdf data

6. This struct variable contains all data present in the bdf file including the data (EEG.data), no of points (EEG.points), sampling rate (EEG.srate), Markers (EEG.event) etc. which can be used for further analysis.
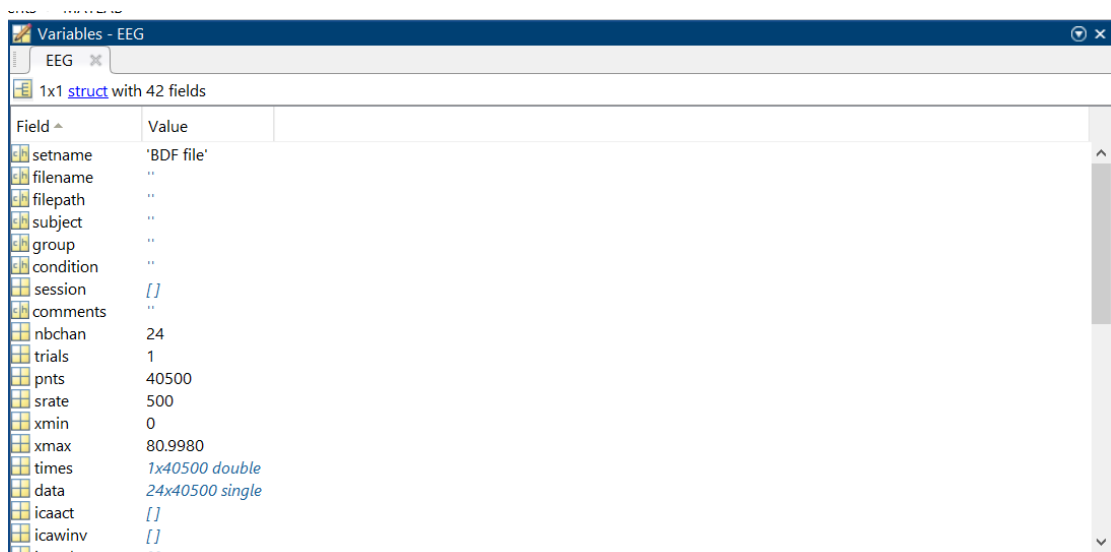

Figure 7. Contents of EEG struct variable