USER MANUAL

Meal assistant BCI system Based on SSVEP

NeuroComputing LAB,
Korea Institute of Science and Technology

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User Manual

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TABLE OF CONTENTS

Chapter 1

Installation

Under normal conditions, This Program does not impact on any programs already installed. However, only guarantees that programs will interact without problems if the programs concerned have been tested for compatibility. This applies to systems with the Microsoft operating system Windows® 10 or later, provided no modifications have been made to the provided operating system configuration (including official service packs and updates).

System requirements

The following hardware and software requirements must be fulfilled:

- ✓ Operating system: Windows® 10 or later (It may work in lower versions, but we are not sure about that)
- ✓ Minimum configuration: Intel Core i5 or higher, 512 MB of RAM, 8 GB hard disk, graphics adapter with 64 MB of RAM
- ✓ We recommend that a monitor with a screen diagonal of at least 15 inch is used.
- ✓ You must have equipment to acquire brain waves. We provide LSL programs for Biosemi, BrainProduct(actiCHamp), Cognionix, and G.tec (gNeedaccess) equipment. If you use other equipment, please install and use a separate LSL(Lab streaming layer) link program required for that equipment.
- ✓ Since all devices acquire data through LSL, LSL must be available. For more information about LSL, see Lab Streaming Layer (https://labstreaminglayer.org/#/)
- ✓ When installing for the first time, an internet connection is required.
- ✓ Depending on the selected mode, a bluetooth connection is required.

1. Installing program under Windows

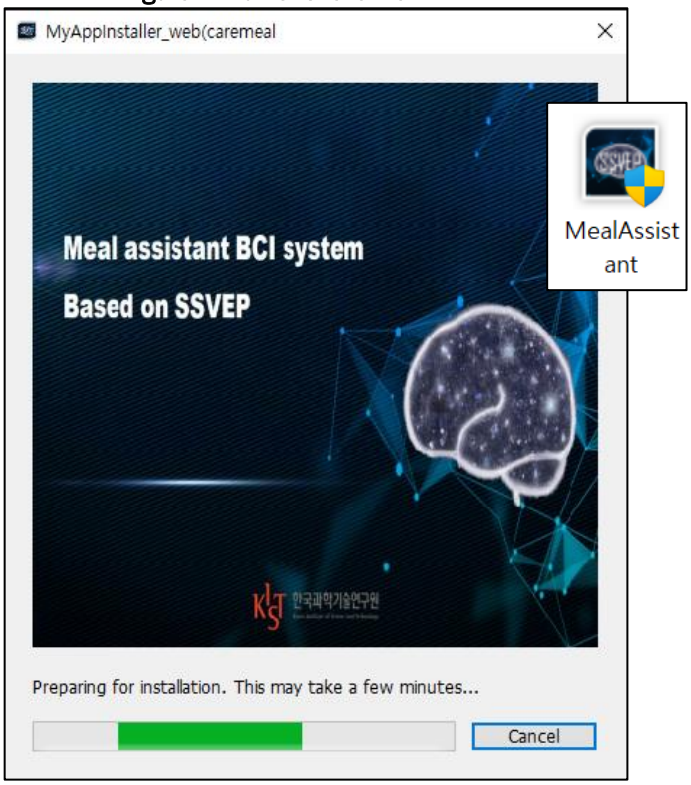
Proceed as follows to install Analyzer under Windows

1 Start Windows

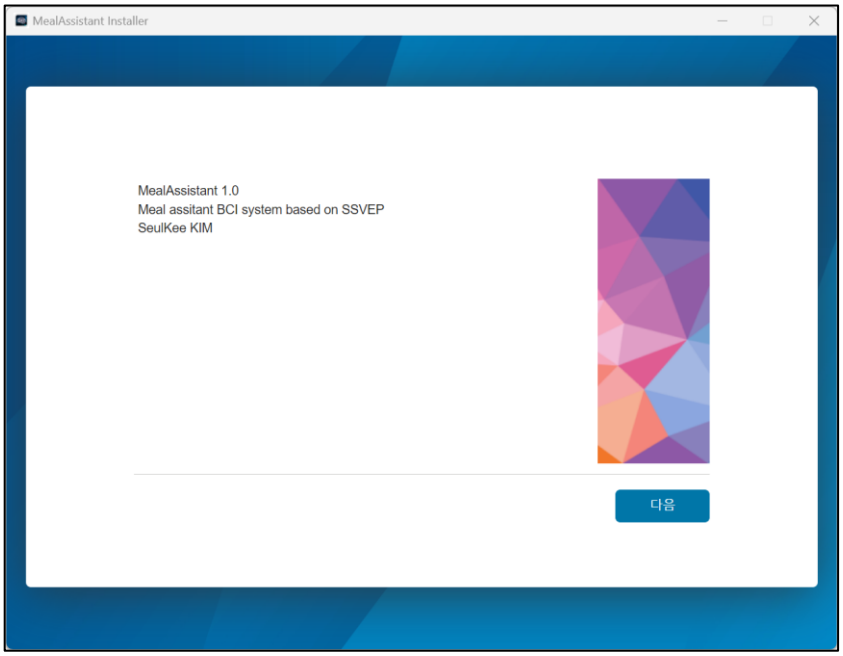
2 Download the program from the link here - NIBCI/IntegrationBCI (github.com) (https://github.com/NIBCI/IntegrationBCI)

3 Open the folder and double click Integration.exe to run the program. (See Figure 1)

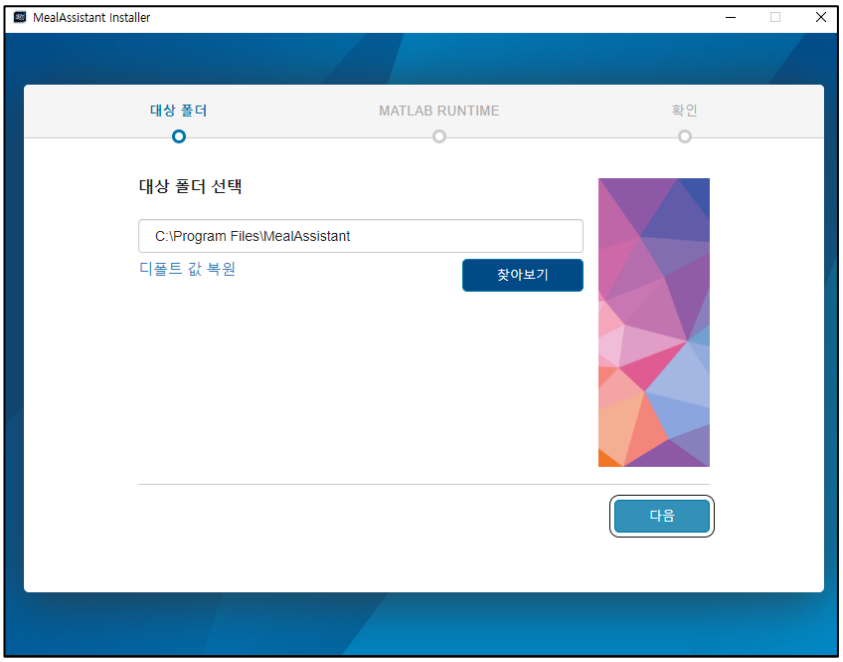
Figure 1. Run this .exe file



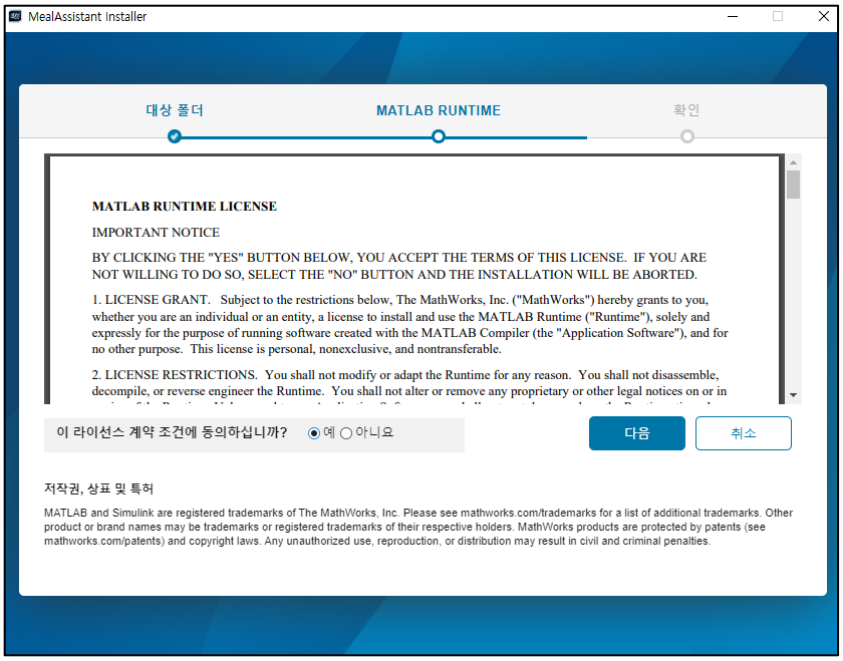
4 Click the Next.



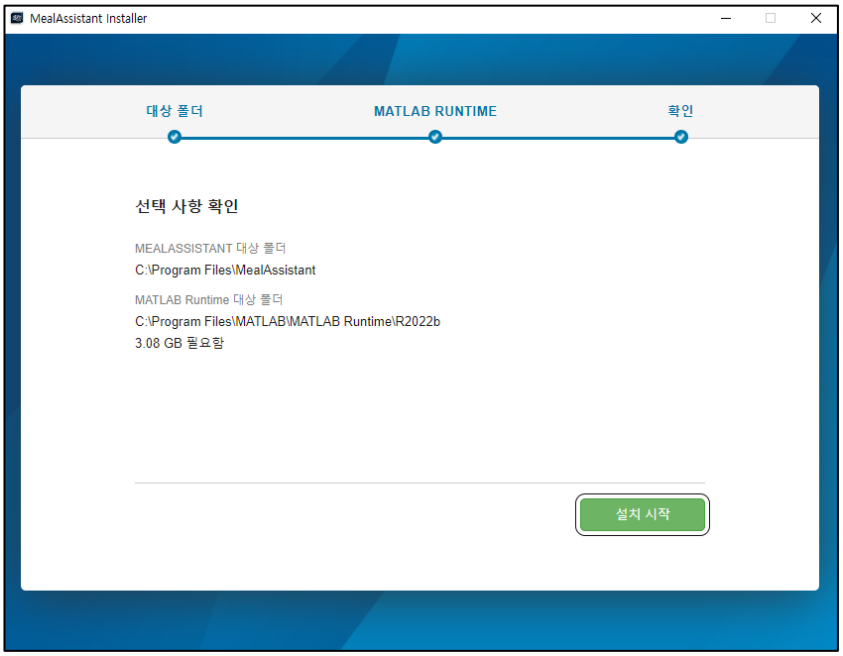
5 After checking the installation path, click Next.



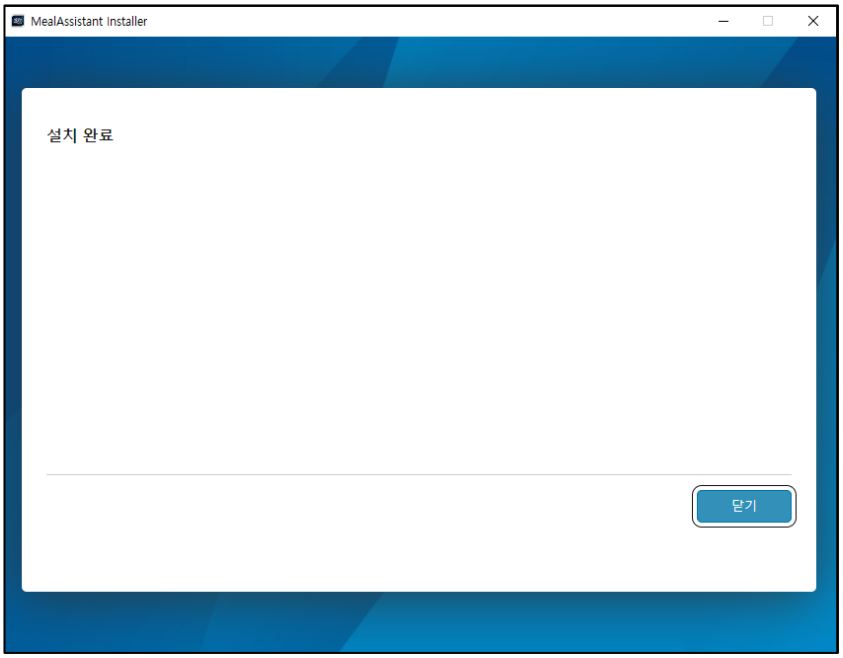
6 This program requires the runtime environment MATLAB. If MATLAB Runtime is not present on your system, then a message is displayed.



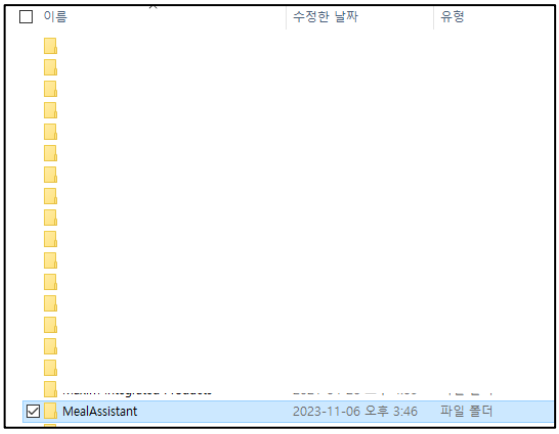
7 After checking the installation environment for MATLAB Runtime, click Start Installation.



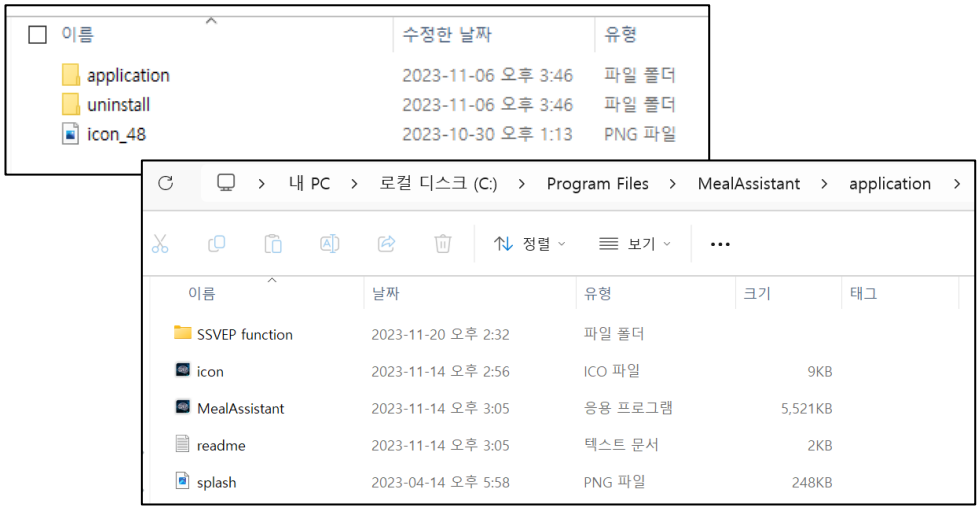
8 When installation is complete, click Close.



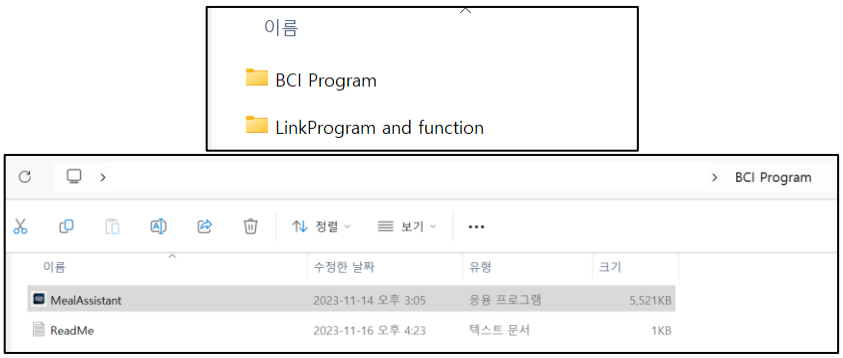
9 If you check the installation path, the **MealAssistant** folder has been created.



10 Enter the folder and enter the application. Find the **MealAssistant.exe** in the Application folder.



11 **Copy “MealAssistant.exe” and “SSVEP function” folder to the BCI Program folder** created after installing BCI Integration. You can run the file by selecting *BCI Program-Meal Assistant* in the BCI Integration program.

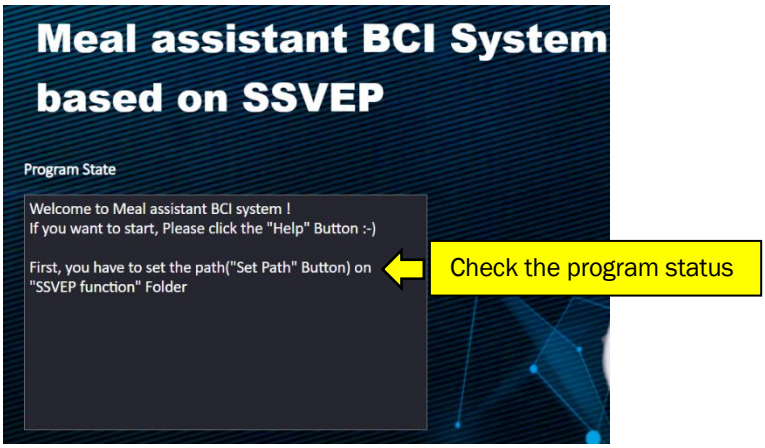


12 The program startup background appears as shown below.

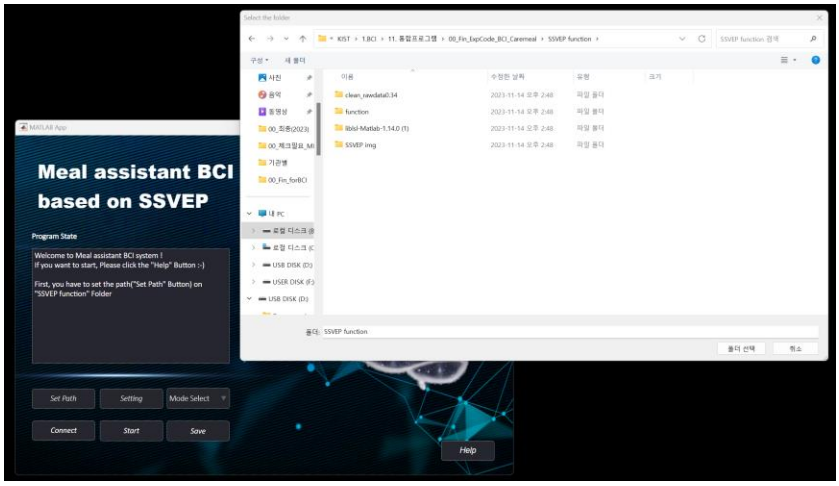
13 If the program runs as follows, you are ready to use Integration for BCI.

2. Running the program and how to use it

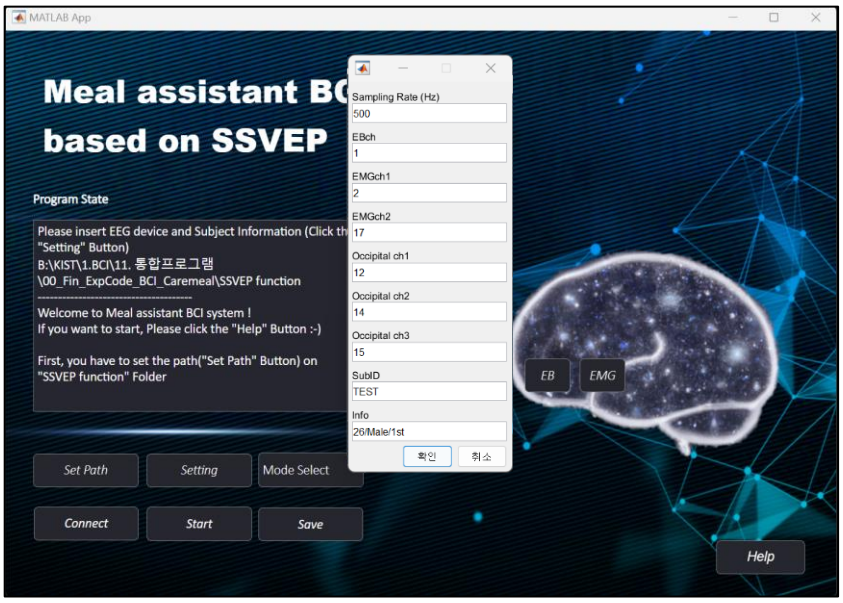
1 Check the program status window as shown below. You can get help on how to perform through the program status window.



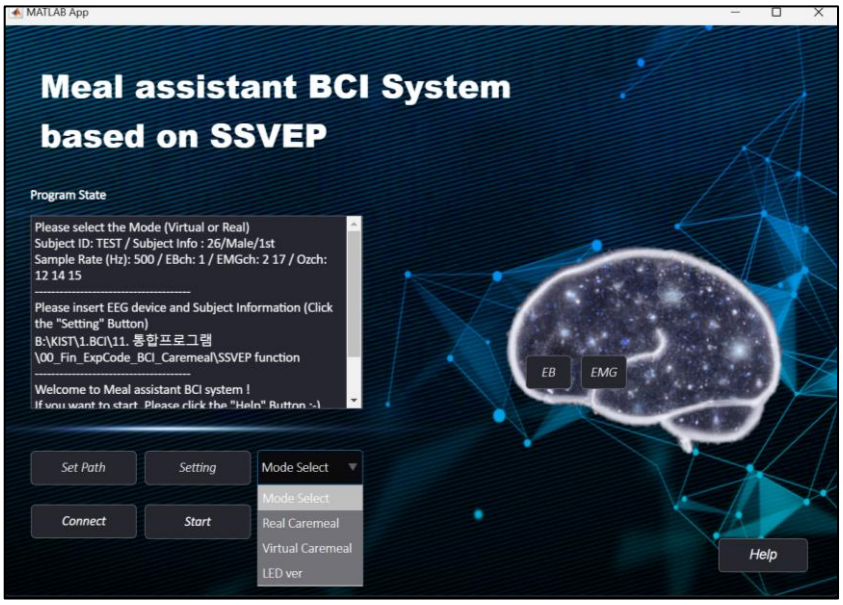
2 Click the “Set Path” button, and select the **“SSVEP function”** folder



3 Press the **"Setting"** button and enter the EEG information such as *sampling rate* and *channel index* you want to measure. *SubID* and *Info* can be ent ered as options.



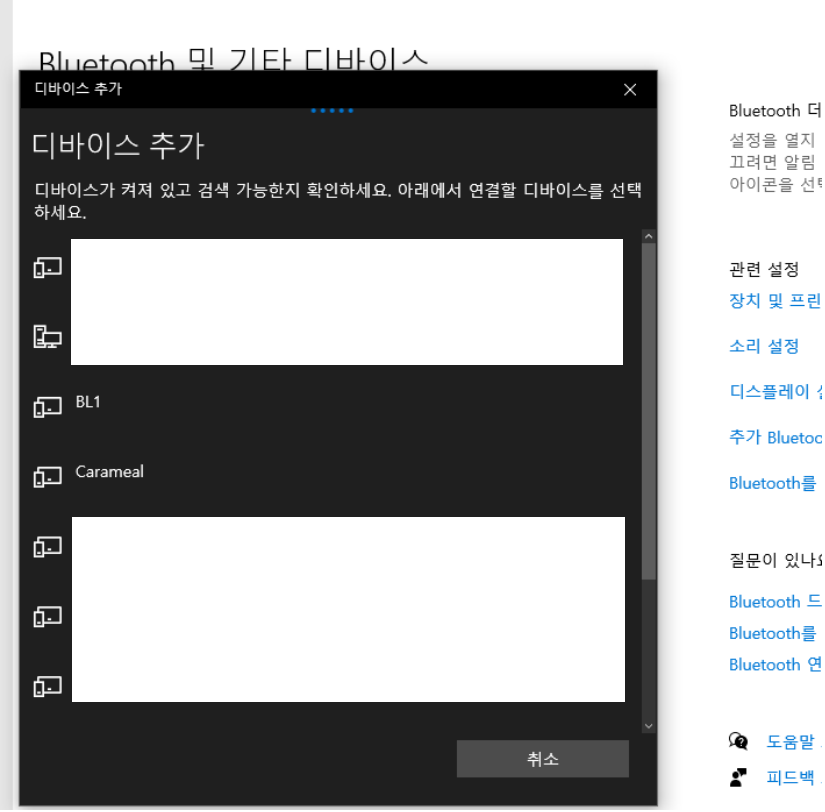
4 Open the *Mode Select toggle* and **select the Meal Assistant Mode** you want to use



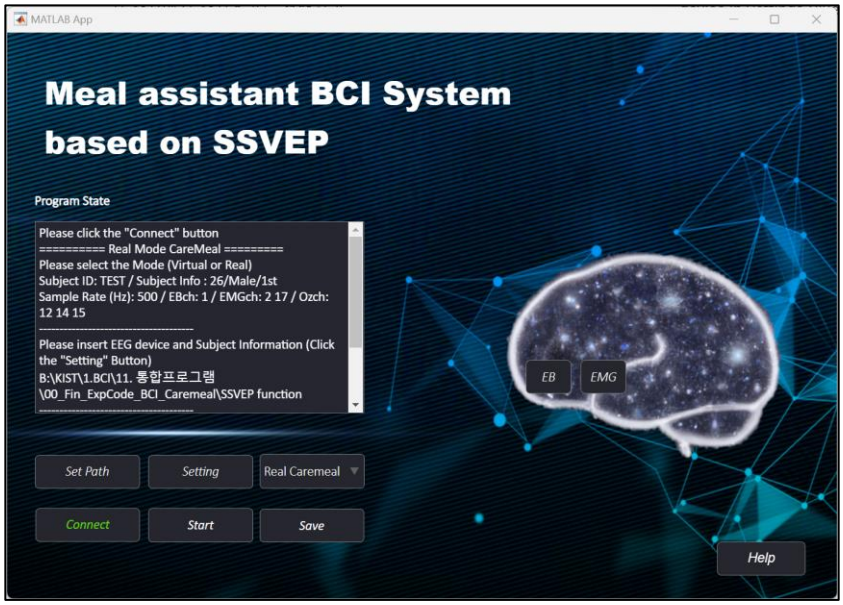
- ***Real Caremeal***: When you want to control the Caremeal robot that will help you with actual meals using EEG.
- ***Virtual Caremeal***: When you want to experience the EEG system through a virtual environment through a monitor without a Caremeal robot to assist with actual meals.
- ***LED ver***: When you want to experience the system with EEG through visual stimulation through LED without a Caremeal robot to help with actual eating.

4-1. If you select ***"Real Caremeal mode"*** *or* ***"LED ver"***, **the meal assistant robot** (only Real Caremeal mode) and **LED arduino**(both Real caremeal and LED ver) must be connected via *Bluetooth communication*.

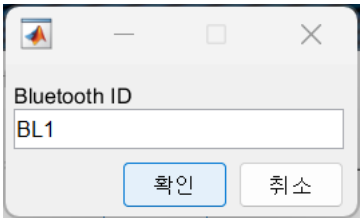
Select **Add device** in *Settings-Bluetooth and Devices-Devices* on your PC.



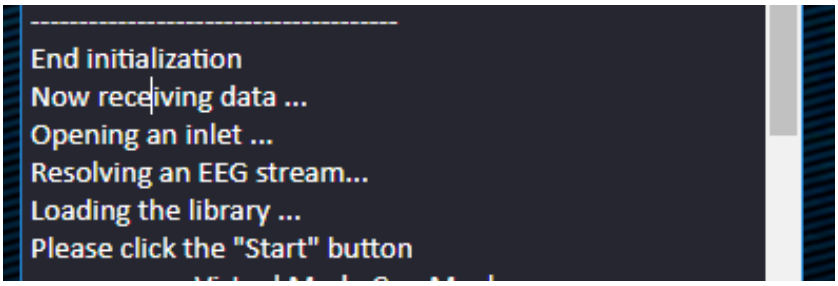
After connecting Bluetooth, click "**Real Care Meal" or "LED ver"** and the "**Connect**" button will change to green.



Press the green 'Connect' button and enter the **bluetooth name of the LED arduino.**



If LSL is installed properly, the program status below appears.



.
Now, you can start the BCI program by pressing the **“Start”** button.

1) The robot is waiting the Start command. If you want to make the LED blink, **blink your eyes twice** or **press the “EB” button** on the right panel of the program.

2) After the 5 LED stimuli blink, **an 'O' mark appears** on the selected result.

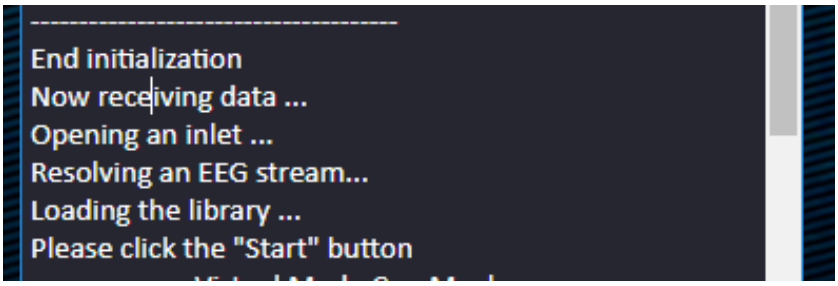
3) In real mode, wait for the robot arm to move to the food.

4) When you chew the food on the spoon, the robot arm goes down automatically. (Or, if 'Try to chewing or Click the EMG button ... ' appears on the program status, you can press the **"EMG"** button.)

5) If you want to try again, **blink twice** or **press the "EB" button**.

6) If you want to stop the system, press the **“STOP”** button.

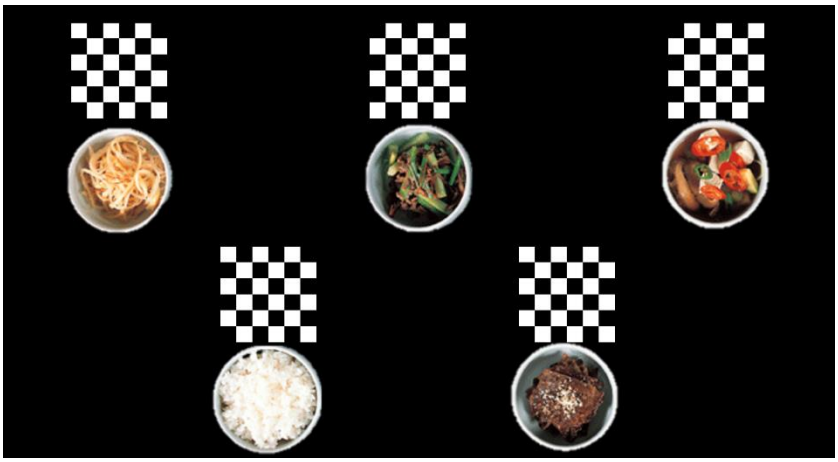
4-2. If you select “**Virtual Caremeal mode**”, do not need to click the “Connect” button. When you click the **"Start" button**, If LSL has been installed properly, the program status below will appear and welcome messages will run.



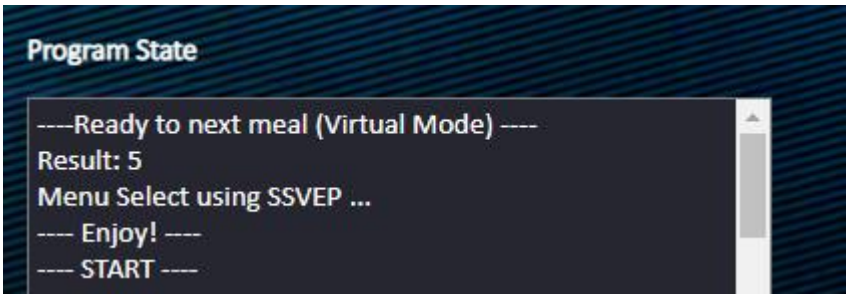
When you **click on the screen**, the virtual environment mode starts.

After waiting a few seconds, you can select one of the five blinking checkboards on the monitor and focus.

Five foods are presented, and stimuli flash at five different frequencies above each food. Focus on the checkerboard above the food you want to choose.
*Stimuli Frequency : 6.6Hz, 7.5Hz, 8.57Hz, 10Hz and 12Hz

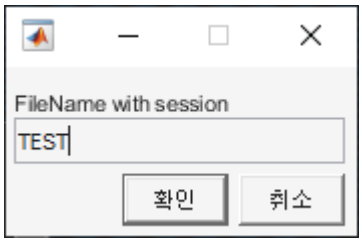


After checking the results**, click the screen** if you want to try again.



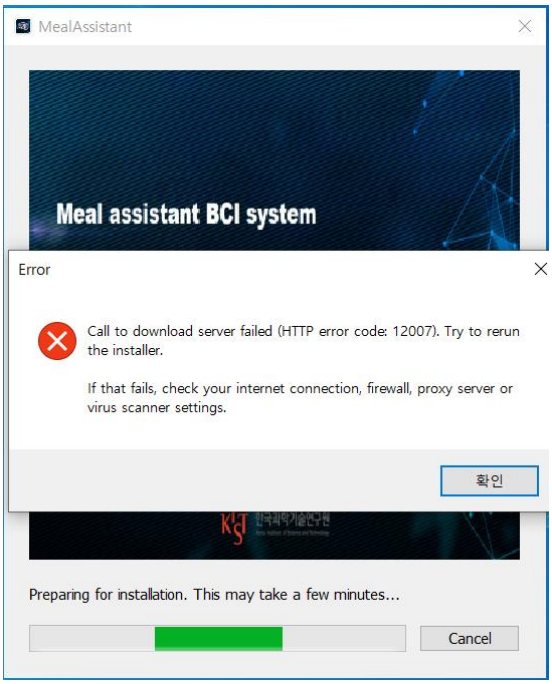
If you want to quit, press the **"STOP"** button.

5 If you want to save the recorded EEG data, click **"SAVE"** button.

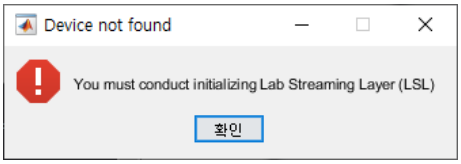


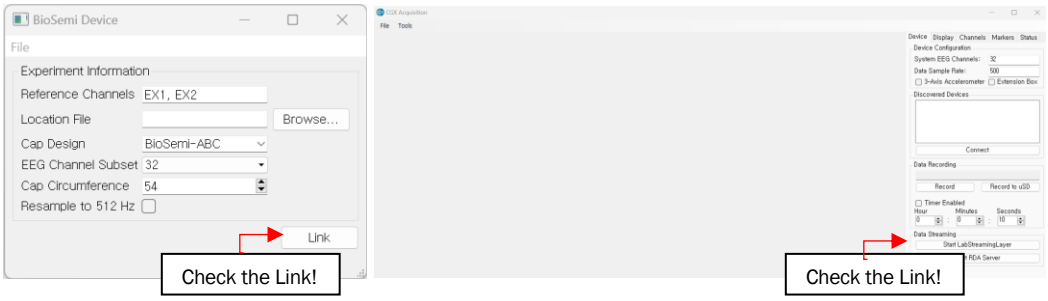
3. If you have some problem with this program

Case 1. When installing an executable file, if the following message appears, check your Internet connection. An Internet connection may be required during initial installation.



Case 2. If Program status is stopped at LSL_loadlib after pressing START, check whether the device you want to use supports LSL. Check whether LSL communication is open through the LSL link program provided by each device.
For more information, please check https://labstreaminglayer.org/#/





Case 3. If the welcome message or the virtual environment does not run after pressing “START”, check whether you have set the path to the **“SSVEP function”** through **“Set path”** button.

For any other problems, please contact us through our website and we will respond as soon as possible.