

User Manual for TMS TouchPad P4R4 and GUIs



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Introduction

This manual provides instructions for using the TMS Tablet Application designed to interface with Transcranial Magnetic Stimulation (TMS) equipment. The application allows users to control stimulation parameters and run TMS protocols by using a graphical interface. The tablet is composed by a Raspberry Pi4 that run the GUI and control an Arduino R4 minima.

Getting Started

System Requirements

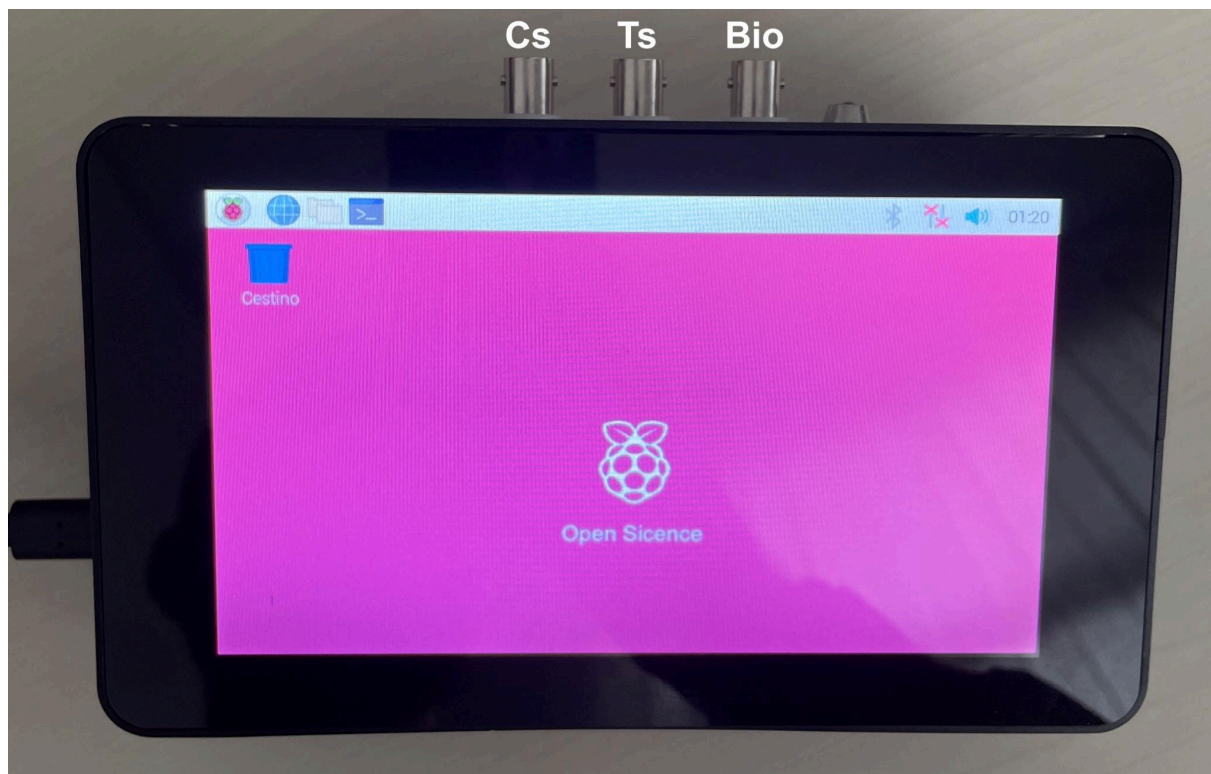
Ensure that the tablet is charged (9v battery is necessary for arduino) or connected to a power source by its USB C plug.



TouchPad Hardware Connection

Connection Overview

To ensure the effective and safe operation of the TouchPad with Transcranial Magnetic Stimulation (TMS), Electroencephalography (EEG), and Electromyography (EMG) equipment, it is crucial to establish the correct connections as per the manufacturer's instructions. The TouchPad is equipped with three BNC connectors, each designated for a specific purpose.



BNC Connectors

Bio BNC:

This connector is primarily used as a marker for EEG or Biopack EMG systems. It provides a way to mark specific events or timestamps in the EEG or EMG data corresponding to the TMS protocol or other relevant activities.

Cs and Ts BNC:

These connectors are used specifically in ccPAS (paired associative stimulation) TMS protocols. The Cs (Conditional Stimulus) and Ts (Test Stimulus) BNC connectors play a crucial role in delivering the correct sequence of stimuli as required by the ccPAS protocol.

Connecting to Equipment

TMS Connection:

Connect the TouchPad to the TMS equipment using the appropriate cables and connectors. Ensure that the connections are secure and correctly aligned with the designated ports on the TMS device.

EEG/EMG Connection:

For EEG or EMG integration, use the Bio BNC connector. Connect this to the corresponding input on your EEG or EMG system. This connection is critical for synchronizing TMS pulses with EEG or EMG recordings.

ccPAS Protocol:

For ccPAS protocols, carefully connect the Cs and Ts BNC connectors to the respective outputs on the TMS device. These connections are vital for the accurate delivery and timing of the conditional and test stimuli.

Label Verification:

Always verify the labels on the BNC connectors before starting a session. Connecting the wrong cable to a port may result in protocol errors or equipment malfunction.

Final Checks

Before starting a session, perform a final check to ensure that all cables are connected to the correct ports and that the equipment settings align with the planned TMS protocol. It is recommended to use the tests buttons to verify the correct connections.

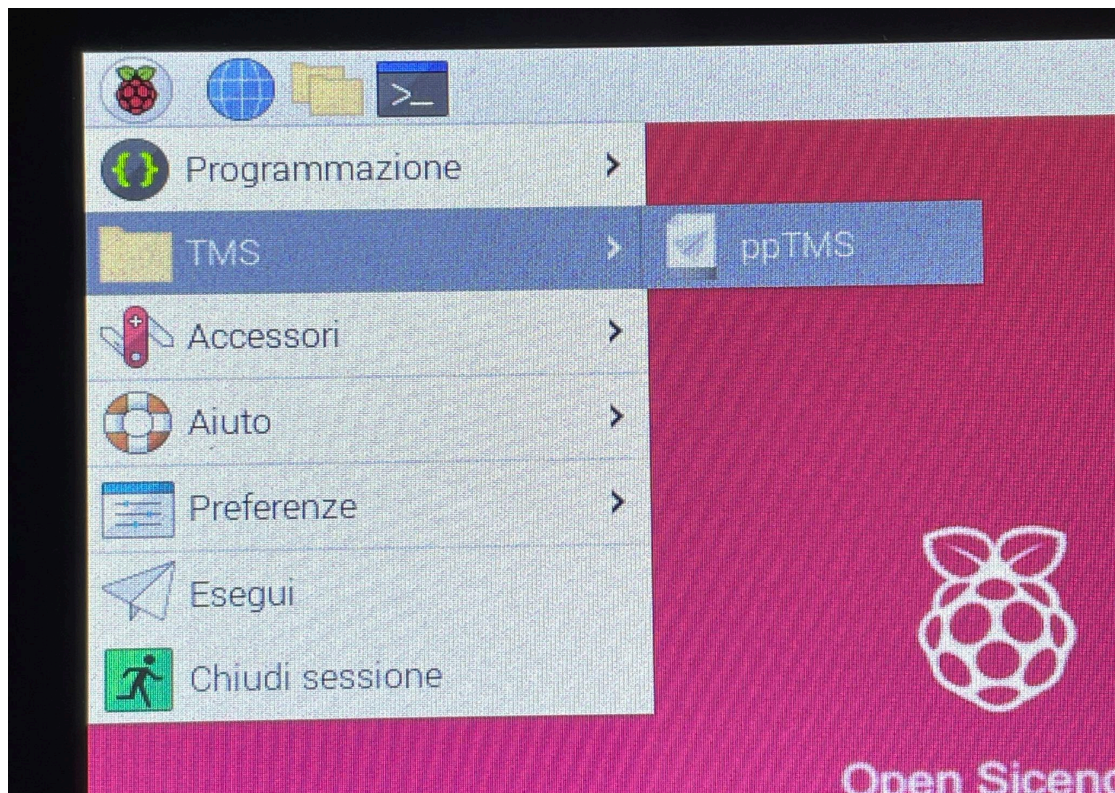
Starting the Application

Tablet power on automatically when connected to the power source.

Open the OS menu by pressing the Up left raspberry icon.

Select TMS folder.

Tap the icon to launch the application corresponding to the TMS protocol you intend to use.



Application Interface

Main Screen

Settings Panel:

Here, you can adjust various parameters for the TMS session.

IPI (Inter-Pulse Interval): Adjusts the time between pulses.

Nrep (Number of Repetitions): Sets the number of pulse repetitions.

ITI (Inter-Trial Interval): Sets the time between trials.

Test Panel:

Contains buttons to test the connection with the TMS equipment.

Cs (Conditional Stimulus): Tests conditional stimulus.

Ts (Test Stimulus): Tests test stimulus.

Bio (Biological Response): Checks the biological response system.

Control Panel:

Start: Begins the TMS session with the specified settings.

Pause: Temporarily halts the ongoing TMS session.

Stop: Completely stops the TMS session.

Running a TMS Session

Set Parameters:

Adjust the IPI, Nrep, and ITI settings as required for the session.

Test Connection:

Use the Test Panel buttons to ensure the equipment is responding correctly.

Start the Session:

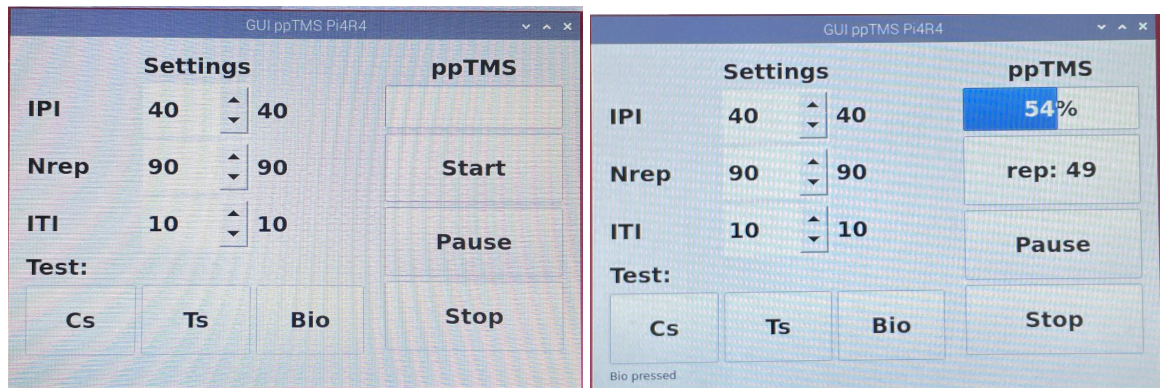
Press the "Start" button to begin.

The progress bar indicates the session's progress.

Pause/Stop the Session:

Use "Pause" to temporarily halt the session.

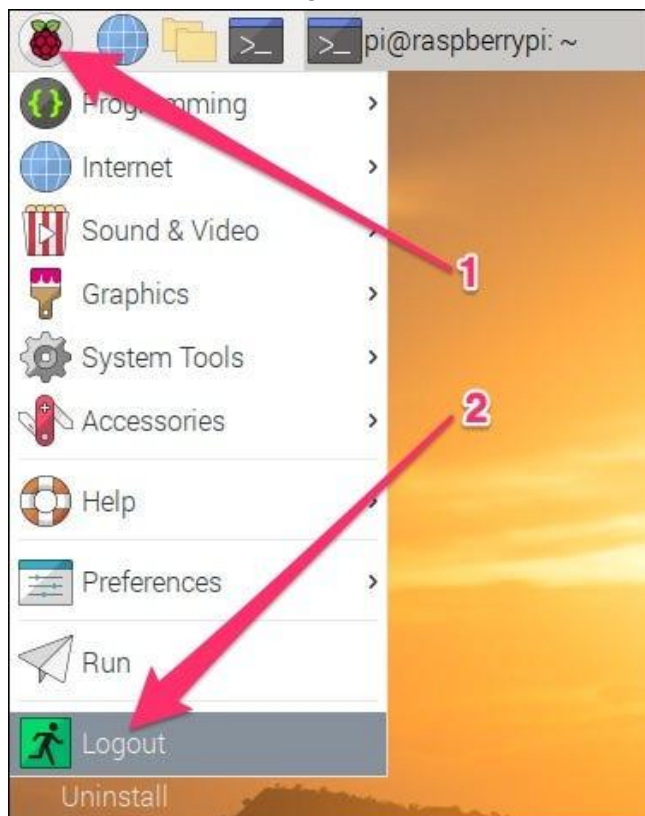
Use "Stop" to end the session.



Stop the Application and TouchPad

No need to close the GUI

Open OS menu then logout/shutdown...



Common Issues:

Ensure that the tablet is properly connected to the TMS equipment.

App Not Responding: Restart the tablet and relaunch the application.

Unexpected Results: Double-check the parameter settings.

Shutdown the GUI may crash debian

Safety Information

Follow all safety guidelines provided by the TMS equipment manufacturer.

Ensure that the patient and operator are wearing appropriate safety equipment.

Responsibility

Disclaimer of Liability

The creator of the TMS Tablet Application ("the Application") assumes no responsibility for any harm or injury that may result from the misuse or improper use of the Application. While every effort has been made to ensure the reliability and safety of the Application, its use is at the operator's own risk.

Operator Responsibility

By using the Application, the operator agrees to the following terms:

Correct Use:

The operator is solely responsible for using the Application in accordance with the instructions provided in this manual and in compliance with all safety guidelines outlined by the TMS equipment manufacturer.

Training and Competence:

The operator should be adequately trained and competent in the operation of TMS equipment and the Application.

Patient Safety:

The operator must prioritize patient safety at all times and adhere to all recommended clinical protocols and safety procedures.

Equipment Maintenance:

The operator is responsible for ensuring that the TMS equipment is in good working condition and is used as intended by the manufacturer.

Reporting Issues:

Any issues, malfunctions, or concerns with the Application should be reported immediately to the support team.

Limitation of Liability

The creator of the Application shall not be liable for any direct, indirect, incidental, special, or consequential damages resulting from the use or the inability to use the Application, including but not limited to damages for loss of profits, data, or other intangible losses.

Acknowledgment of Risks

The operator acknowledges that TMS procedures involve inherent risks and agrees to assume all risks associated with the use of the Application in conjunction with TMS equipment.