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INSTITUT TOULOUSAIN D'OSTÉOPATHIE

User Guide: Osteo - Android

Projet Long 2019:
Cervical pathology detection thanks to virtual reality

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Version 1.0

Introduction

This paper is the user guide to use the Osteo Android application, developped during the 2019 “Projet Long” by the members named hereinabove. The application allows to launch a virtual reality test with a target moving horizontally, and to record the head movement of the user. The head movements are then saved locally and can be sent by email, the idea being that this data should be used by another piece of software to detect cervical pathologies.

The VR environment consists in following the target, moving in a semi-circle to the right and to the left at a constant speed, pausing at each end of its course.

Prerequisites and Installation

To use the application correctly on one’s own phone, the phone needs to meet these minimum requirements:

- The phone must have an embedded gyroscope
- The phone must have an embedded accelerometer
- The phone must be running Android 4.4 (KitKat) or newer

The user experience will also depend on the compute power of the phone along with the screen resolution. For example, we consider the user experience satisfactory on phones like the Samsung S8 or more powerful.

The user also needs to have a VR headset for his phone, such as a Cardboard or a GearVR to use the VR test environment.

As for the installation, the application is a .apk file and is 32 Mo in size, therefore one needs to have around 80 Mo of free space on the phone. Also, if the application is not on the Google Play Store, you will need to install manually a .apk file, and on Android, installing from another source than the Google Play Store requires to activate the developer mode on the majority of devices.

User Guide

The application is split into 2 parts: the main menu, which gives access to the VR test scene parameters, to the user profile configuration, and to the locally saved data management. There is also the VR test scene, which needs a VR headset, to track the target and save the user head movements.

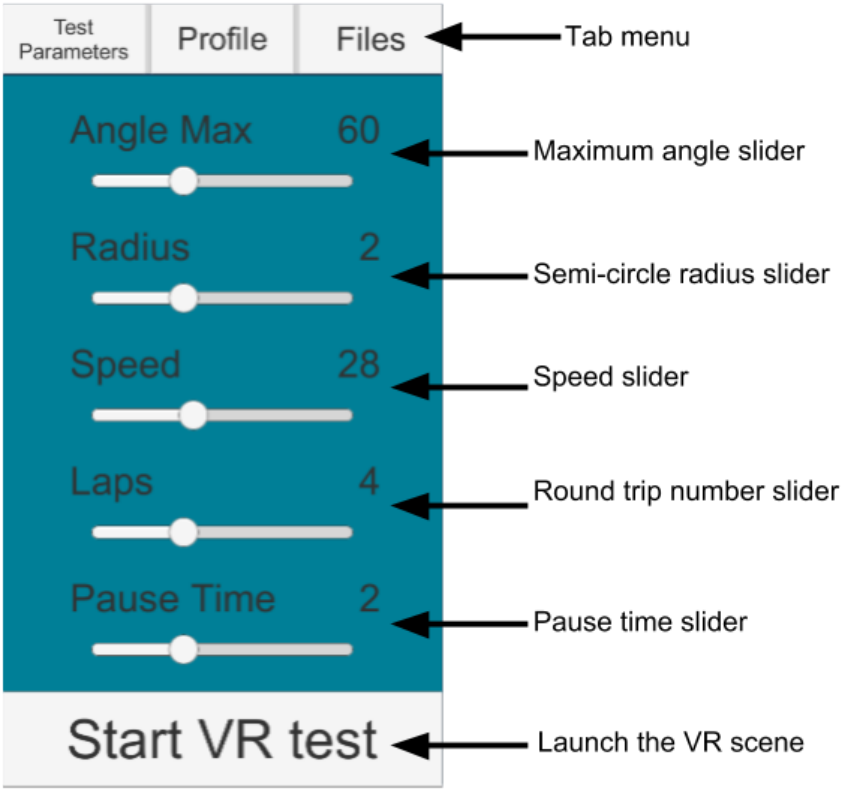
Main Menu

The main menu leads to 3 submenus thanks to the 3 tabs at the top, then to start the test with the button on the bottom: “Start VR Test”.

Test Parameters

The first tab, “Test Parameters”, is where the user can modify some test parameters, before launching the VR test scene:

- Angle Max: allows to edit the maximum angle of the target path. The angle is the same on the right and on the left. It can vary from 45° to 90° and its default value is 60°.
- Radius: allows to edit the semi-circle radius, so the distance between the user and the target. It can vary from 1 to 4 and its default value is 2.
- Speed: allows to edit the speed at which the target moves, in degree per second. It can vary from 11.2 to 56 and its default value is 28.
- Laps: allows to edit the number of round trips done by the target. It can vary from 2 to 8 and its default value is 4.
- Pause Time: allows to edit the time during which the target will not move at the end of its course, in seconds. It can vary from 1 to 4 and its default value is 2.



Profile

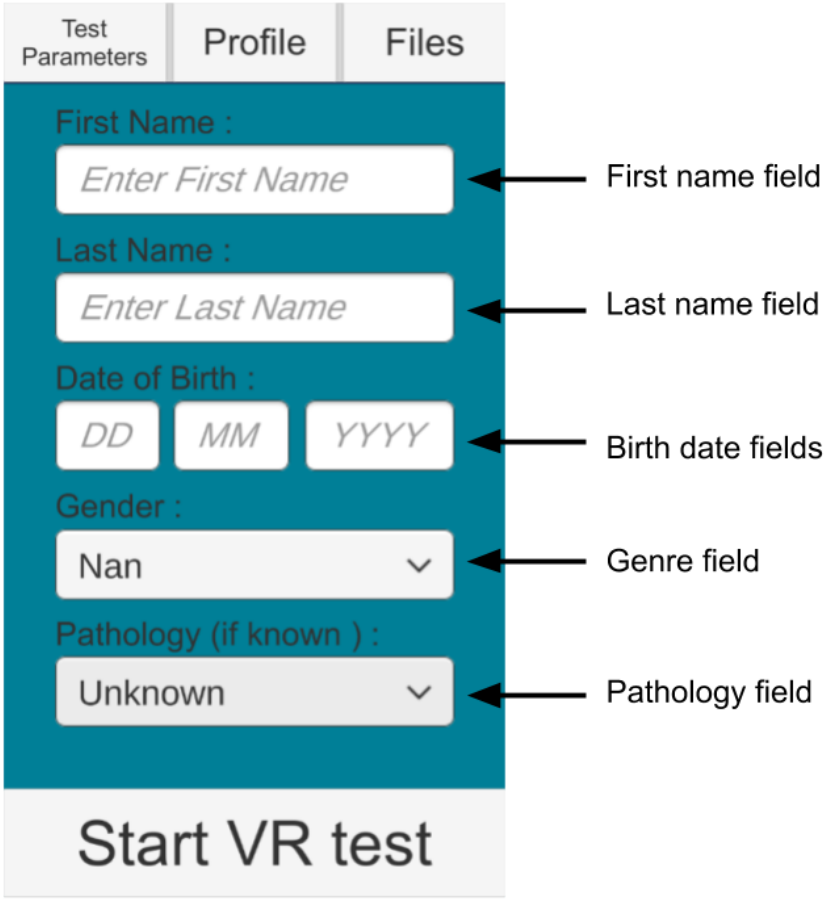
The second tab is for editing user information, all of which are optional, and not collected:

- First name
- Last name
- Birth date
- Gender
- Pathology (if known)

The first and last names and the birth date are used to give a unique hash (a number) to each user using SHA256. This hash is a one-way function: one can have its own hash derived from his personal information, but nobody can retrieve this information based on the hash.

The birth date field will also be used to compute the user age, which will be written in the file with the head movement data. The gender and pathology fields are used in the same way.

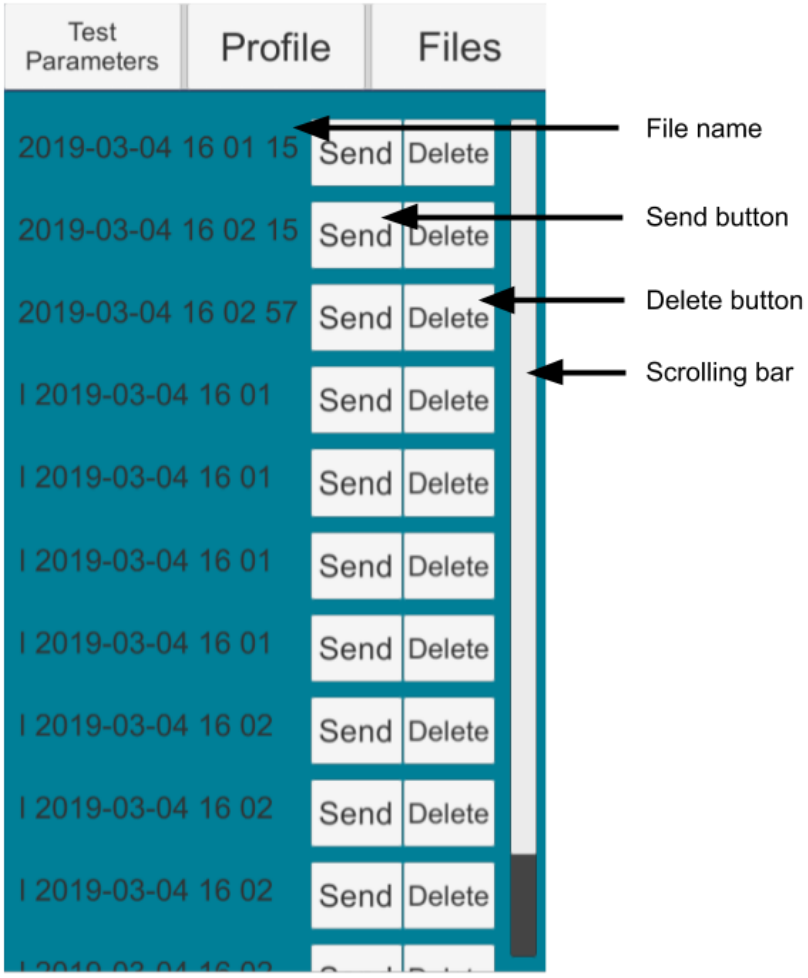
In the 1.0 version, available genders are Nan, Female and Male, and the available pathologies are Unknown, Healthy and Affected.



Files

This tab shows a list of locally stored files, sorted by name. They are labelled by an “I” if the recording was interrupted. The scrolling bar allows to go through all the files if the complete list cannot fit in one screen.

The “Send” button allows to send an email with the recorded data as the email body, and the “Delete” button permanently deletes the data from the phone.

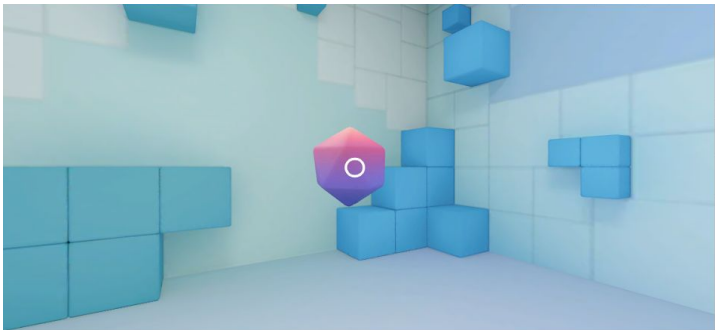


VR Environment

After pressing the “Start VR Test” button, the user must put his phone inside his VR headset, and wear the headset.

It is possible, at any time during the test, to go back to the main menu, simply by looking below the target, on the “Return to Main Menu” button.

The target is in front of the user, at the center of che screen. It starts to move as soon as the user looks at it for 3 seconds, but the actual data recording starts only after the first time the target pauses.



If the user lost the target, the test stops, and the target goes back to its initial position. If this happens before the first time the target reaches an extremity of its path, nothing is saved. However if this happens after the first pause, the data file will be labelled as interrupted.

Notes

- During the data send, an “other:” field is left empty, and the user can enter complementary information in it.
- If the application is closed, even in a brutal manner, no data should be lost.