

## MRI Adventure

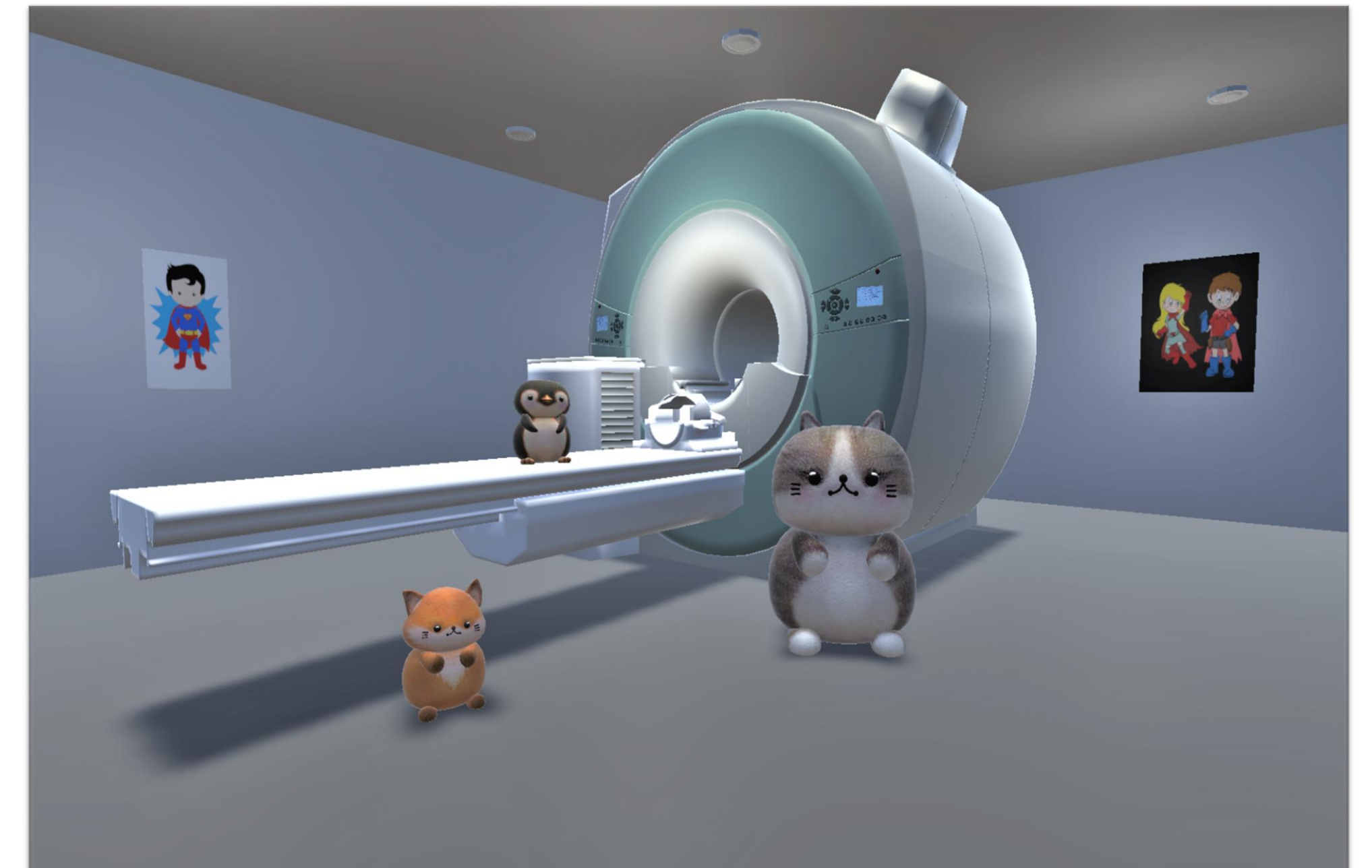
### Prepare children in VR before an MRI scan

**BONET B.<sup>1,2,3</sup>, HADJIAT A.<sup>4</sup>, MERMOUD C.<sup>1,2,3</sup>, GAINOT C.<sup>5</sup>, DELPLANQUE S.<sup>1,2</sup>, MOCCOZET L.<sup>6</sup>, GROUILLER F.<sup>1,2,3</sup>, BADIER E.<sup>1,2,3</sup>**

1. Swiss Center for Affective Sciences (CISA), University of Geneva
2. Brain and Behaviour Laboratory (BBL)
3. Center for Biomedical Imaging (CIBM) MRI UNIGE Section
4. Faculty of Science, Computer Science Department, University of Geneva
5. Haute École de Santé (HES-SO)
6. Centre Universitaire d'Informatique (CUI), University of Geneva

#### BACKGROUND

- ✗ **30% of pediatric MRI scans are unusable** (due to incomplete scans or excessive motion).
- ✗ **50% of pediatric MRI exams are sedated.**
- ✗ **Sedation is risky and scan duration last 2.5 times longer.**
- ✗ **MRI decoration and mock scanners cannot be used in a research context** because of emotional induction.
- ✓ **A VR application is the only way to train anywhere** (at home, research laboratory, hospital) **and to fully prepare children before an MRI scan** (get familiar with MRI environment and security rules, train specifically to avoid head motions).



#### AIMS

MRI Adventure is a **virtual reality (VR) application** allowing children to immerse themselves inside the 3D reproduction of an **MRI scanner in a fun and safe environment.**

The main objectives of the VR application are:

- **Teach children the safety rules** in an MRI environment.
- Allow children to **get familiar with an MRI scanner** in order to control their fears (feelings of anxiety and/or claustrophobia).
- **Teach children to not move their heads** during scans to ensure proper image acquisition.

#### METHODS



- 6x 6-12 years old children were asked to **train in VR during 20 minutes** and then to do an **MRI scan during 5 minutes.**
- The application is divided into **4 different scenarios/games**:
  - 1. Familiarization with medical / laboratory environment
  - 2. Learning MRI safety rules
  - 3. Familiarization with the procedure of an MRI examination
  - 4. Simulation of an MRI examination and training to avoid movements
- Feelings of children (comfort, fears, claustrophobia) before and after the VR training and after the MRI scan were recorded. Head movements and gaze directions were also recorded during the VR training.

#### PRELIMINARY RESULTS

- **None of the children gave up on the mock MRI scan** following the VR simulation.
- The children learned the **MRI safety rules** and how to keep their **heads still** during the examination.



#### CONCLUSION AND PERSPECTIVES

- **Outcome:** children successfully learned MRI security rules and to avoid head motions during scans thanks to the dedicated VR training.
- The **reduction of anxiety and claustrophobia thanks to the VR training** needs to be confirmed with a larger population. Scientific literature already demonstrated VR is helpful to treat many phobias such as claustrophobia.
- A **full version of the VR application** (including a specific task based on eye-tracking to train to avoid head motions) already exists **for hospitals and research laboratories.**
- A **new version of the application for smartphones** is under development to allow children **to train in VR at home without the need of a VR headset.**