

Problem

- Non-touch-enabled spherical displays have been installed in museums and schools¹ (Fig 1-a).
- **Interactive spherical displays** have only recently become commercially available (Fig. 1-b).
- We do not yet fully understand **how adults and children naturally interact with and collaborate around touch-driven spherical displays** (Fig. 1-b), as opposed to non-touch enabled spherical displays.



Figure 1: (a) Non-touch spherical displays. (b) Touch-driven spherical displays. PufferTouch display prototype, courtesy Pufferfish, Ltd.

Methodology

- **16 adults and 9 children (ages 8-13)** interacted with a prototype application (Fig. 2) that allowed them to explore the **Earth's ocean system in small groups** in a public setting.



Figure 2: The sphere prototype application used during our exploratory study, showing Earth's ocean temperature patterns.

Observations

We investigate how adults and children naturally interact with and collaborate around touch-driven spherical displays by understanding users' **gestural patterns** and **group interactions** around the sphere.



Figure 3: Children performing long-hold gestures using both hands.



Figure 5: Group of children working independently in their private areas.

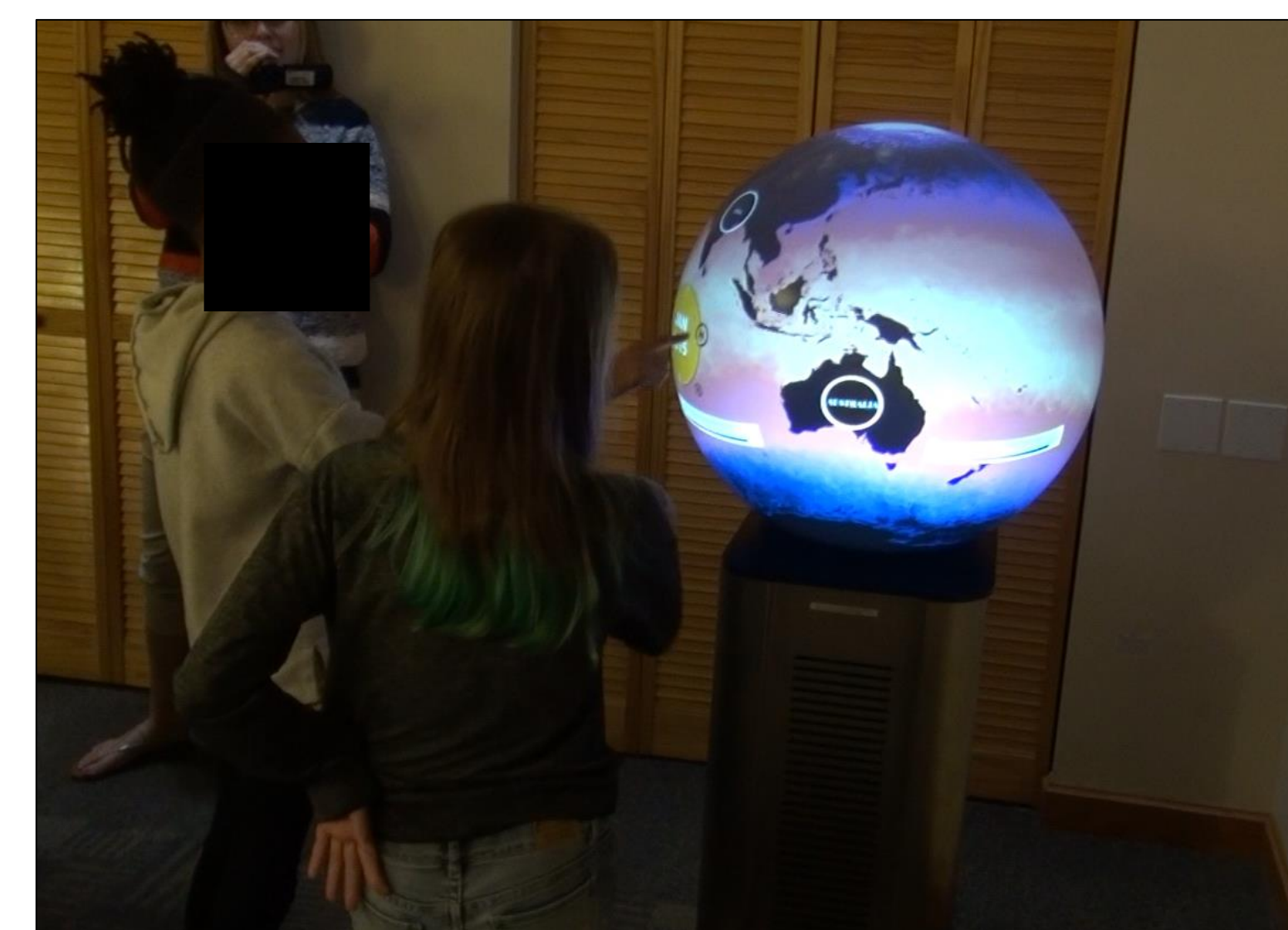


Figure 7: Group of children interacting with the sphere while standing in one location.

(1) Gestures by Children and Adults

- Children moved beyond traditional touchscreen gestures to **explore new interaction opportunities** offered by the spherical form factor (Fig. 3), whereas adults frequently made **standard touchscreen gestures** (e.g., single or multi-finger tap) (Fig. 4).



Figure 4: Adults interacting with the sphere using one- and multi-finger tap gestures.

(2) Group Interaction

- The majority of the child group interactions with the sphere were **independent** of each other. (Fig. 5), whereas adult groups tended to interact collaboratively with the sphere in **driver-navigator mode** (Fig. 6).
- This observation indicates the **collaborative potential of spherical displays** for informal and open-ended environments such as museums.
- Child groups exhibited **negative physical and verbal behaviors** such as fighting for position.



Figure 6: Group of adults working in a driver-navigator mode.

(3) Static Locations

- For both independent and collaborative interactions **participants tended to stand in one location**, as opposed to moving around the sphere to view it from multiple perspectives (Fig. 7 and Fig. 8).



Figure 8: Group of adults interacting with the sphere while standing in one location.

Future Work

- Create a **user-defined gesture set** for spherical displays that caters to all users and age groups.
- Investigate what specific **features of the spherical form factor** can be exploited to support different collaboration styles (e.g., independent and group exploration styles).
- Develop interface design guidelines to decrease **negative collaborative behaviors**.

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²Image courtesy K. Stofer
³Pufferfish. Retrieved December 31, 2018 from <https://pufferfishdisplays.com/>



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