

TangiGuru

A Tangible eLearning Solution for
Early Childhood Development



Abstract

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- This paper introduced an innovative solution to develop early childhood using Tangible User Interfaces.
- TangiGuru is a novel IoT solution with a set of tangibles that can be used to perform learning activities.
- The solution includes a set of 3D cubes with magnetic sensors, an OLED display, RGB LEDs, an accelerometer, and a gyroscope.
- This solution allows children to perform various learning activities with the same set of tangibles using their own space.
- The study was conducted to confirm the hypothesis that the set of tangibles we developed will highly interact with children.

Introduction

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- The basic terminology for tangible user interfaces (TUIs) was shaped, in the middle 90s, by the work of Fitzmaurice et al. [1], and Ishii and Ulmer [2].
 - In the beginning, the research on tangibles was prototyping oriented and researchers tried to enrich their design innovation by embedding computation in a variety of physical objects like cubes, cards, puzzles.
 - From the first steps of TUIs, there was an underlying aim to support collaboration and social interaction (e.g., [4] [5],[6]),
- The study was conducted after creating the tangible objects by selecting a random sample of 27 students to compare the retention time with the controlled interfaces and normal tangible play kits.

Methodology



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- The developed system consists of a set of 3d shaped cubes developed with the esp 32 controller and a child-friendly user interface and a communication interface between the cubes and the application. The cubes can be used with mobile, laptop, tab to perform the activities.

The Cube and the Hardware

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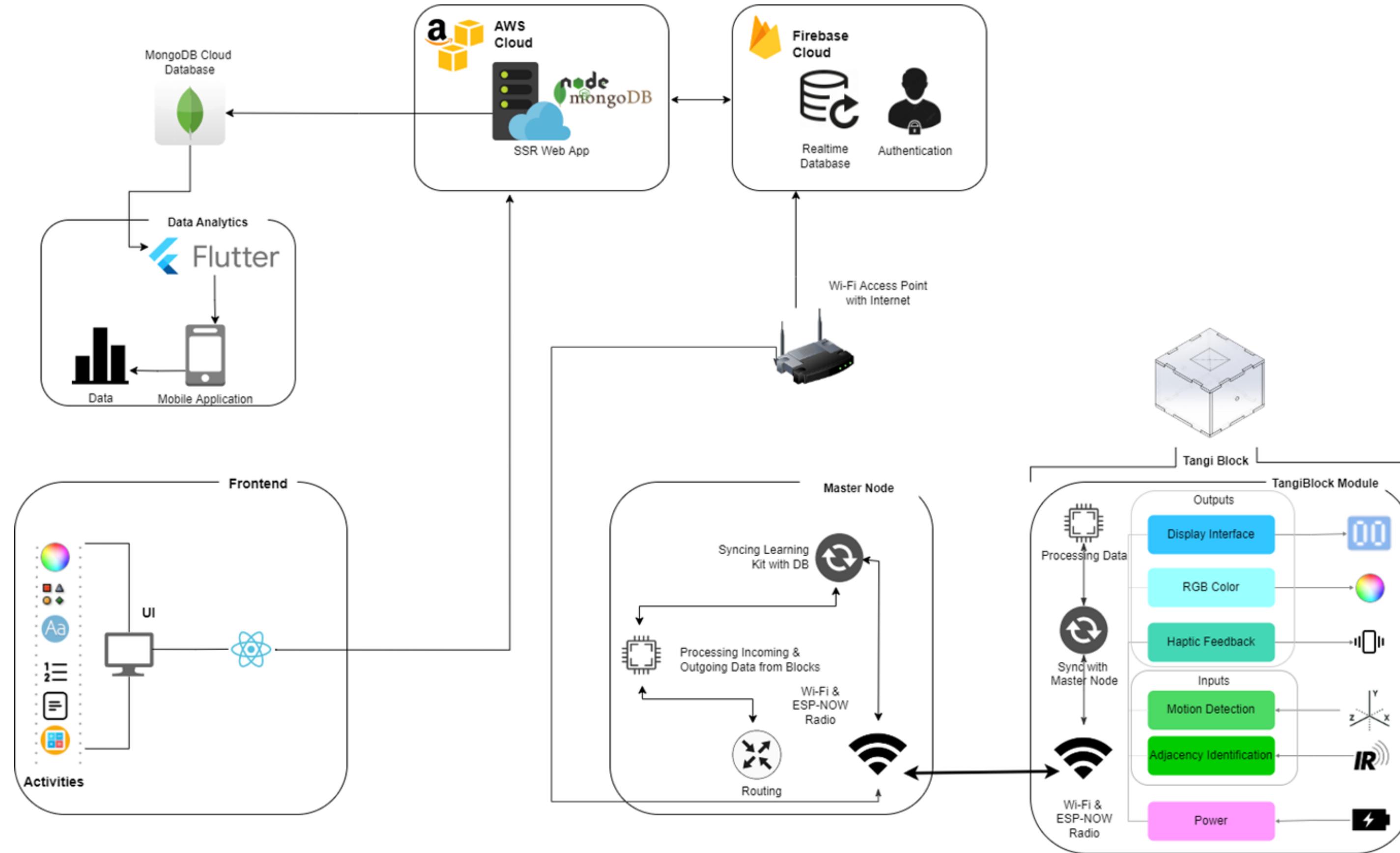
Intermediary Communication

Intermediary communication is the component that connects the user interface and the cubes.

Child Friendly User Interface

This delivers the instructions to the cubes and get the instructions from the cubes

System Overview Diagram



TangiCube Hardware

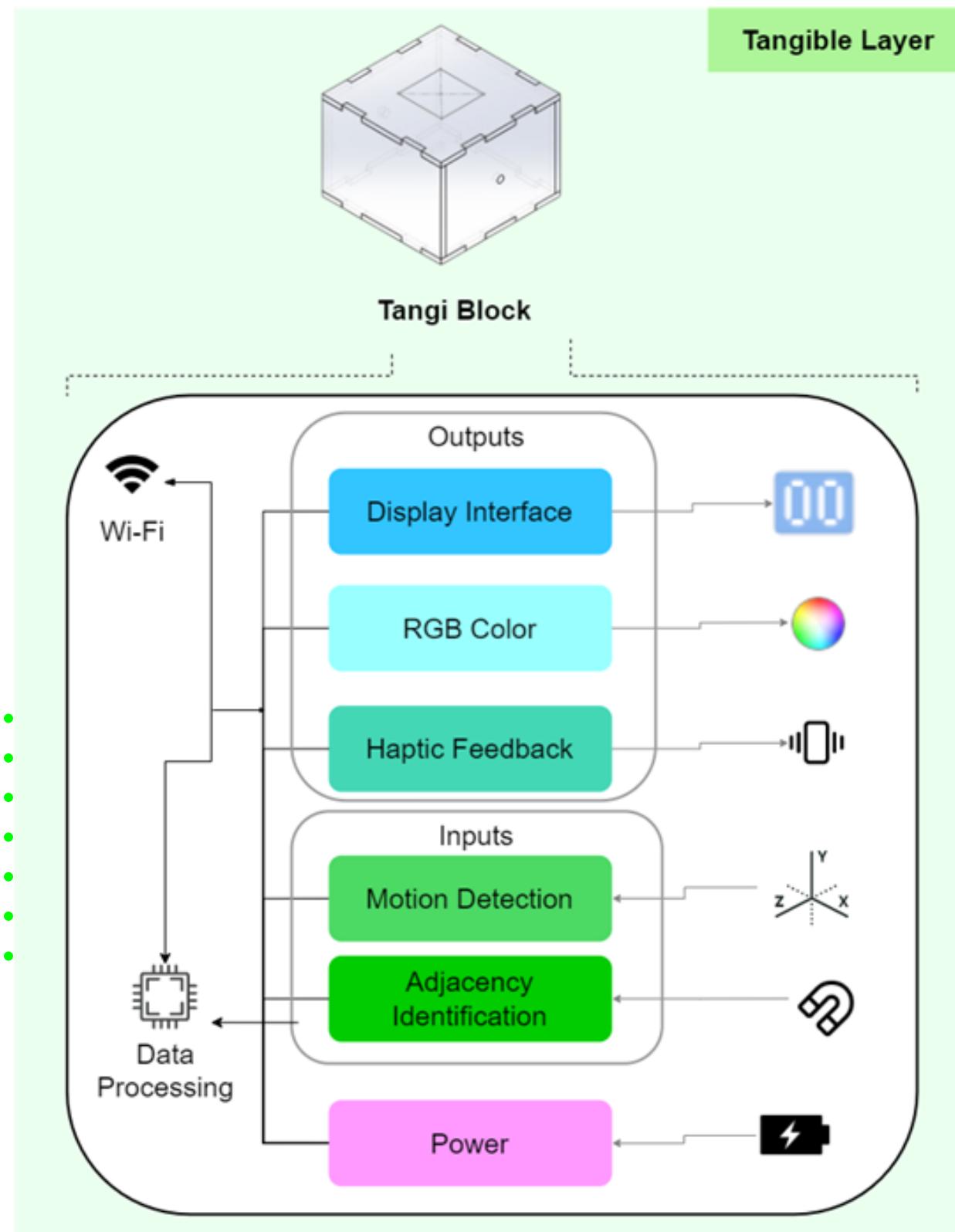


Figure 5: Physical Interface

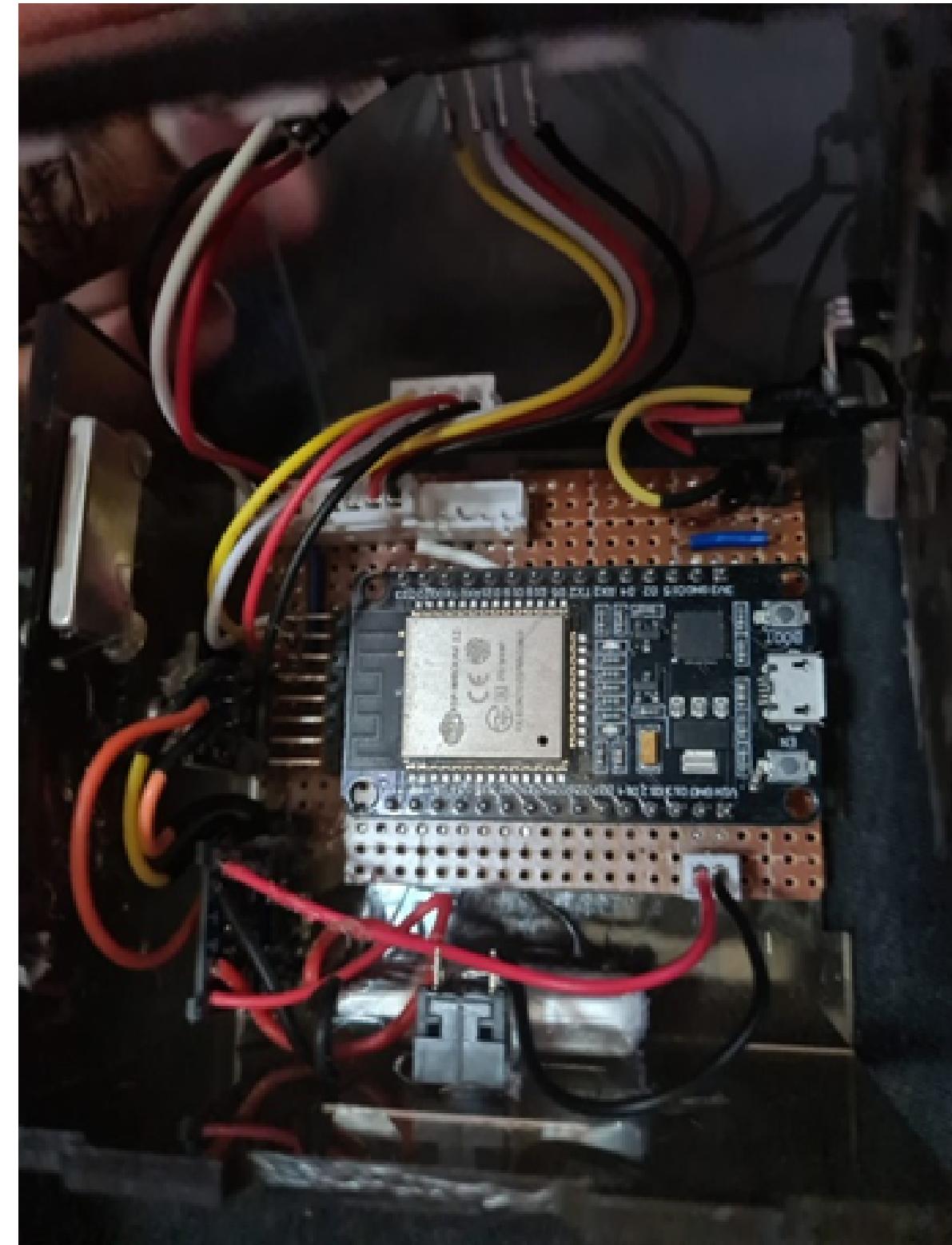
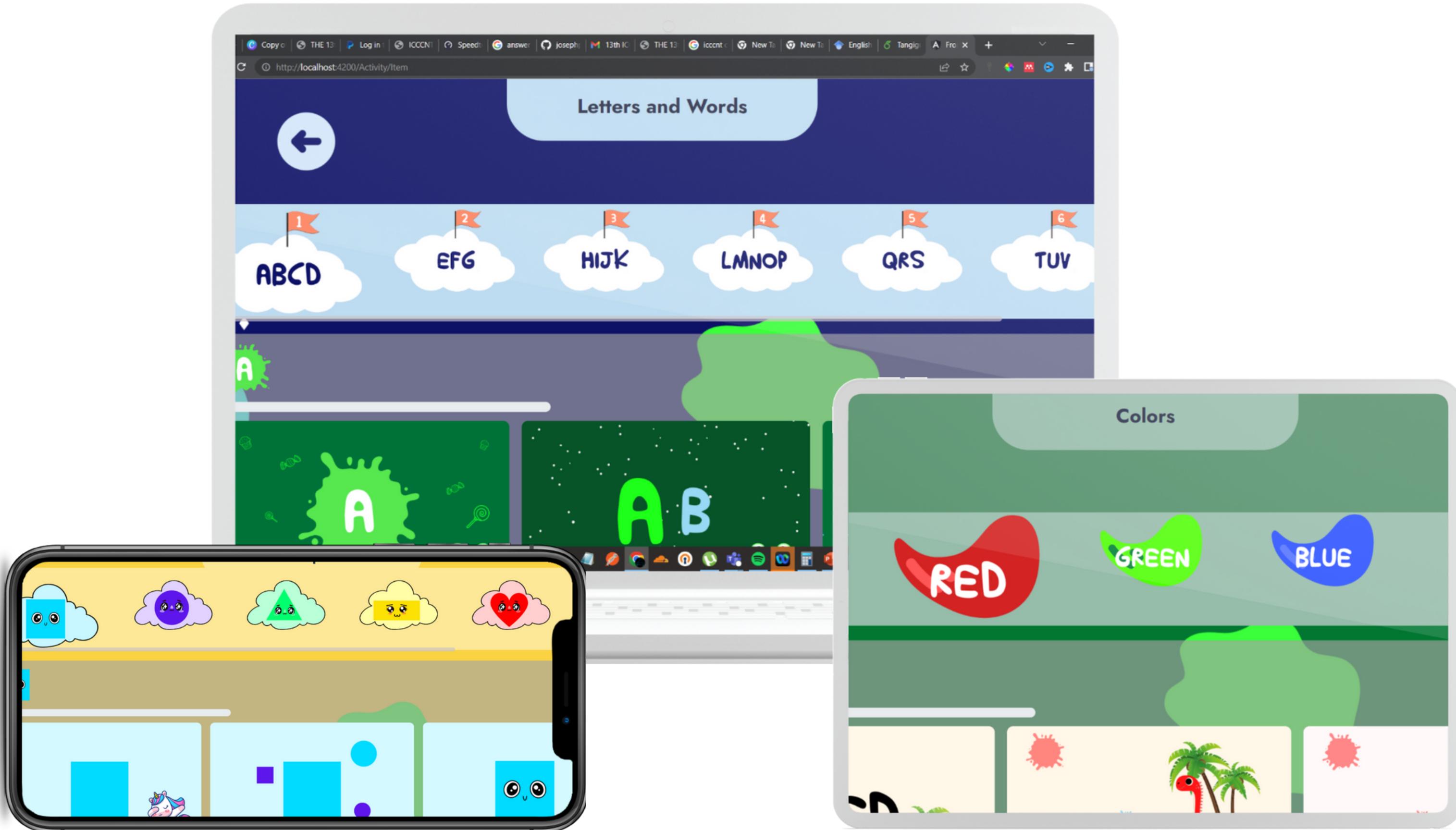


Figure 6: Hardware Assembly

User Interface



Results



Interaction Time with Traditional Solutions and TangiGuru

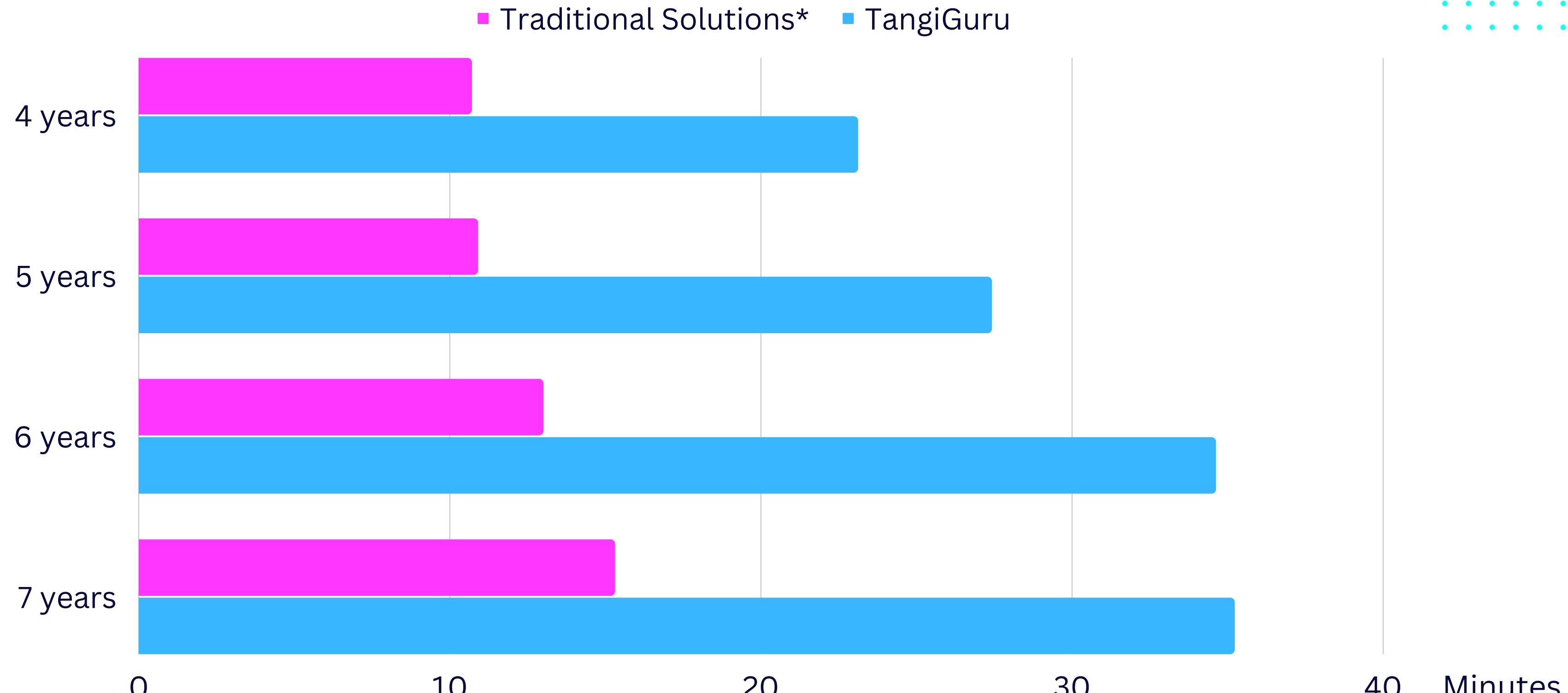


Figure 5: Interaction Time with Traditional Tangible Learning Solutions vs TangiGuru

*Traditional Solutions: Tangible Learning Solutions without any digitalization involved

Interaction Time vs Controlled Interfaces

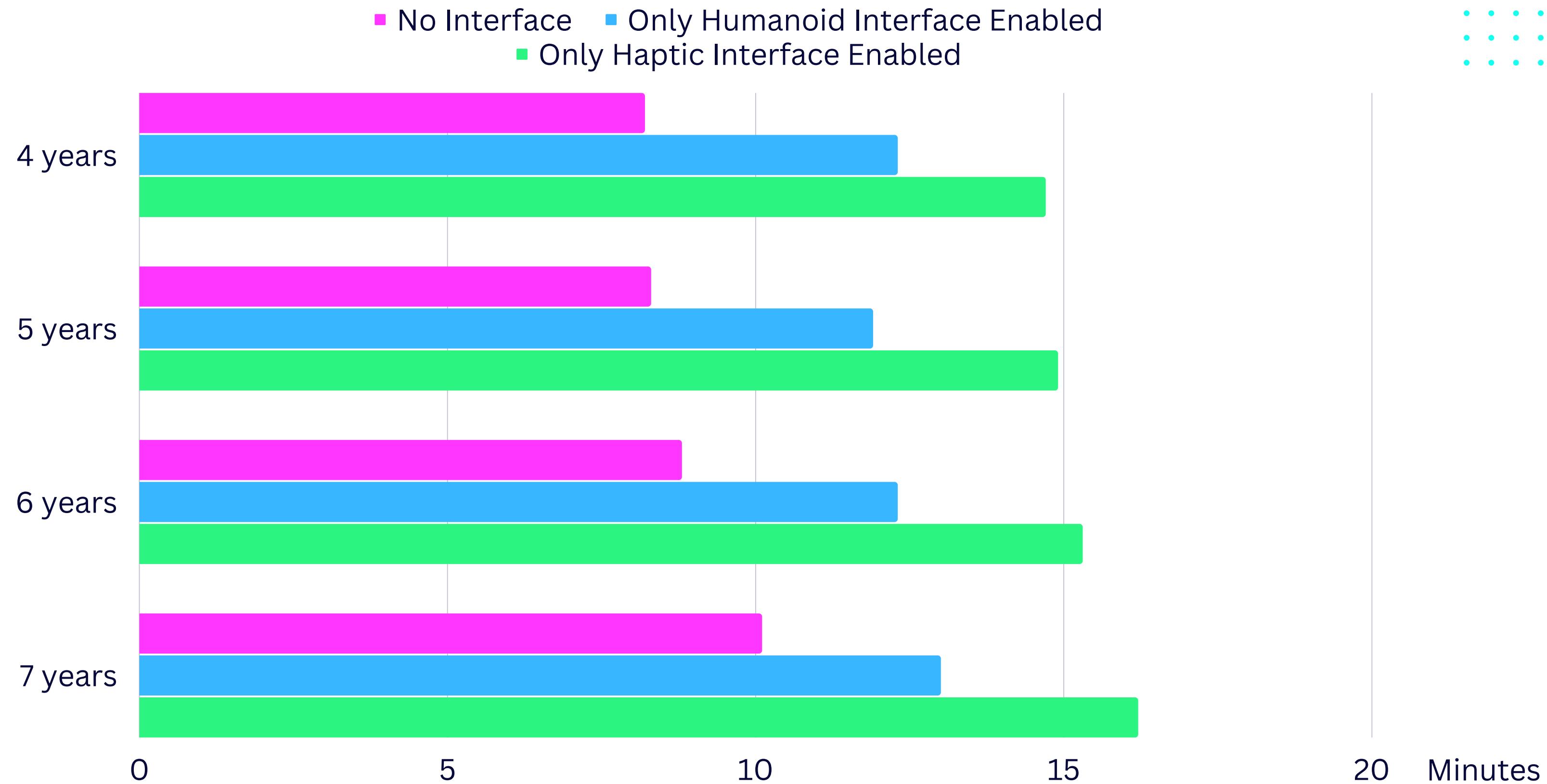


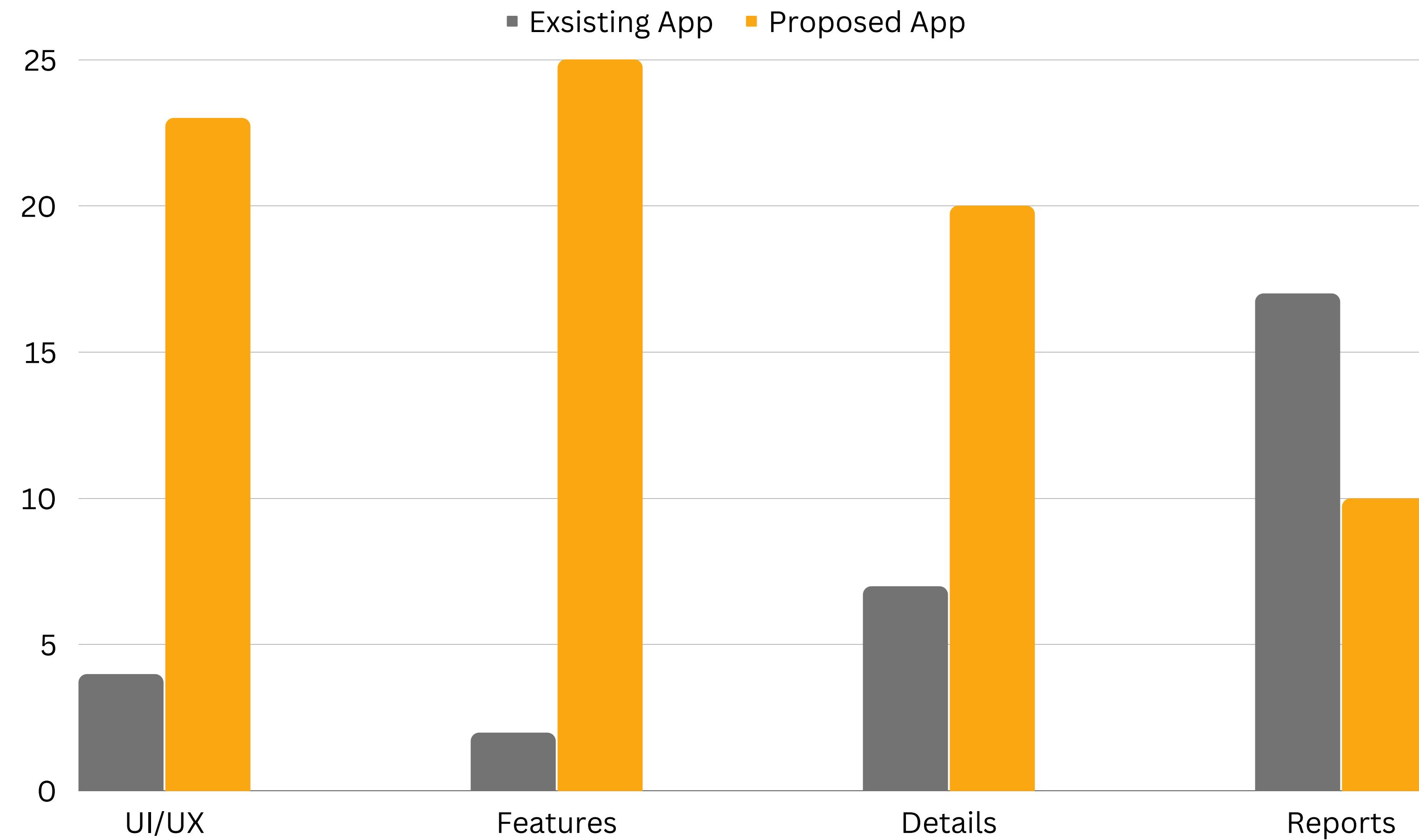
Figure 6: Interaction Time of TangiGuru vs Controlled Interfaces

Conclusion



Conclusion

- This study introduces a tangible learning solution named as TangiGuru which includes 3 manipulative tangibles known as TangiCubes which support children to do cognitive learning by manipulating them.
- TangiGuru consists of various activities to perform with TangiCubes. Therefore, children will not consider the learning platform a traditional learning kit or a typical e-Learning application but rather identify it as an interactive toy.
- TangiGuru can be used to teach children who will get distracted and lose interest quickly when performing the learning activities. They will be motivated to perform the activities more interactively.
- The study confirms that tangible objects could improve the interaction time compared to traditional tangible learning solutions without any digitalization involved.



Message Lengths		

References

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Thank You!

Q&A