TangiGuru

A Tangible e-Learning Solution for Early Childhood Development

Research Problem

For many years, research on Human-Computer Interaction (HCI) has been focused on Graphical User Interfaces (GUIs), allowing interaction with digital objects through the computer screen, keyboard, and mouse. Recently, a new research field that involves tangible interfaces has fluidly evolved. There is not a clear understanding of this type of tool [1] [2]. More empirical research investigating the possible benefits of TUIs against graphical interfaces is required to determine and clarify the impact of tangible environments in different domains [1] [2] [3].

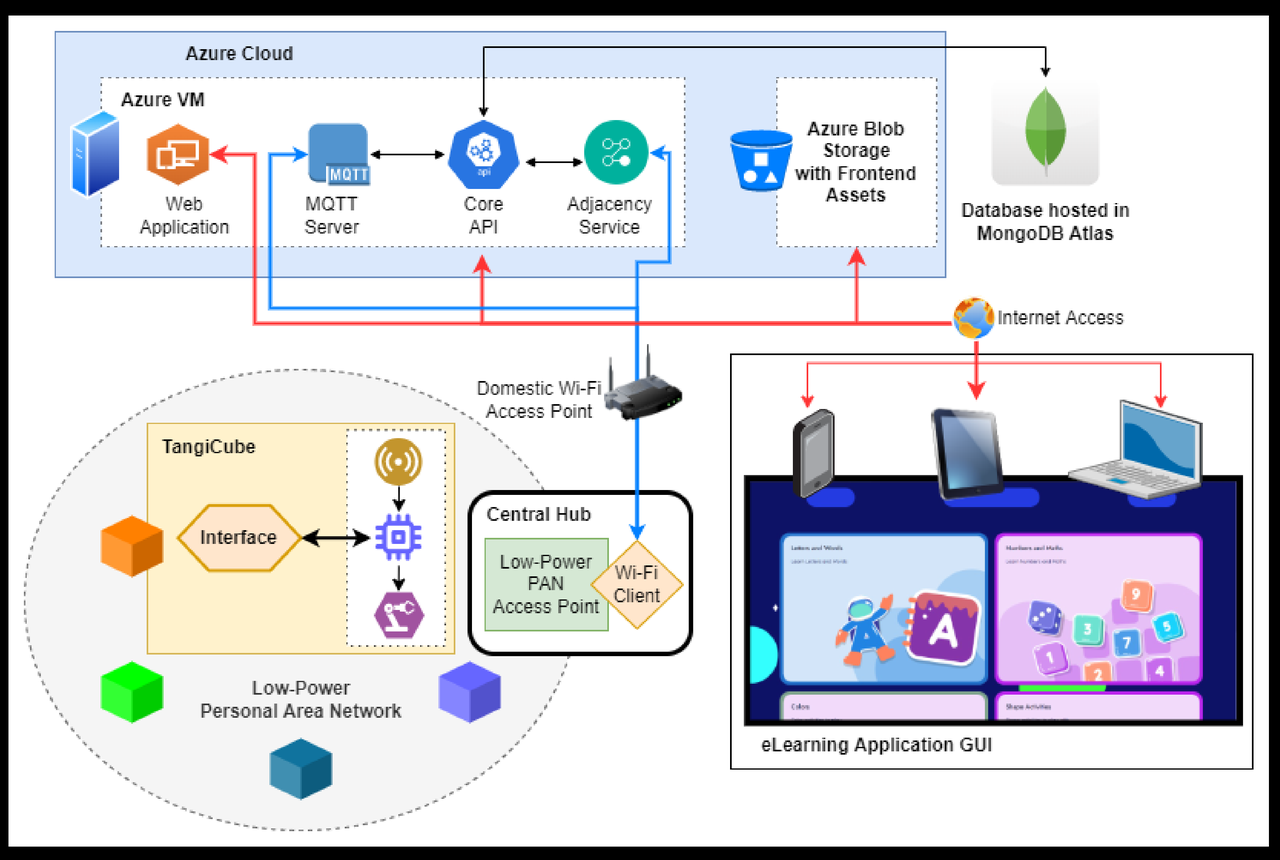
Proposed Solution

For many years, research on Human-Computer Interaction (HCI) has been focused on Graphical User Interfaces (GUIs), allowing interaction with digital objects through the computer screen, keyboard, and mouse. Recently, a new research field that involves tangible interfaces has fluidly evolved. There is not a clear understanding of this type of tool [18] [3]. More empirical research investigating the possible benefits of TUIs against graphical interfaces is required to determine and clarify the impact of tangible environments in different domains [19] [20] [21].

Objectives

Create an engaging tangible e- learning solution which can develop the early childhood of the children.

- Develop interactive tangibles to interact with the User Interface
- Develop intermediary communcation interface between the tangible learning solution and the tangibles.
- Develop chidfriendly interface to deliver the activities the activities.



Features

Dynamic Tangible Cubes
Tangible components can be used to perform the activities with the application

IOT Enabled
Application and the cubes will be connected with IOT for Realtime triggers.

Automated Evaluation
After the activity id performed it will be evaluated by the cubes and the system.

Embedded Electronics
To deliver the best experience controllers and components will work together.

Dynamic Tangible Cubes
Tangible components can be used to perform the activities with the application

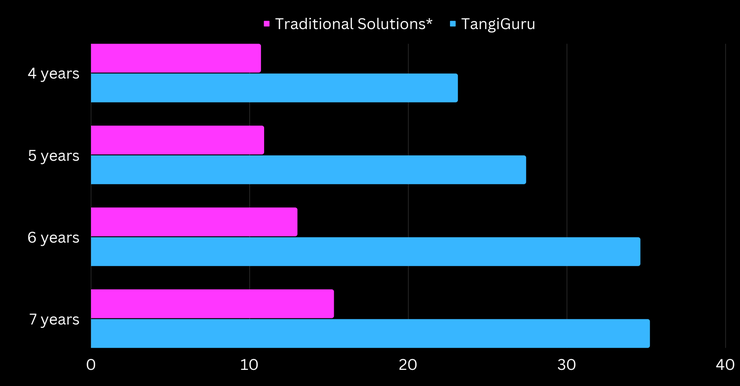
Secured
Tangible components can be used to perform the activities with the application

Responsive Application
Can be used on laptop, tabs, mobile phones.

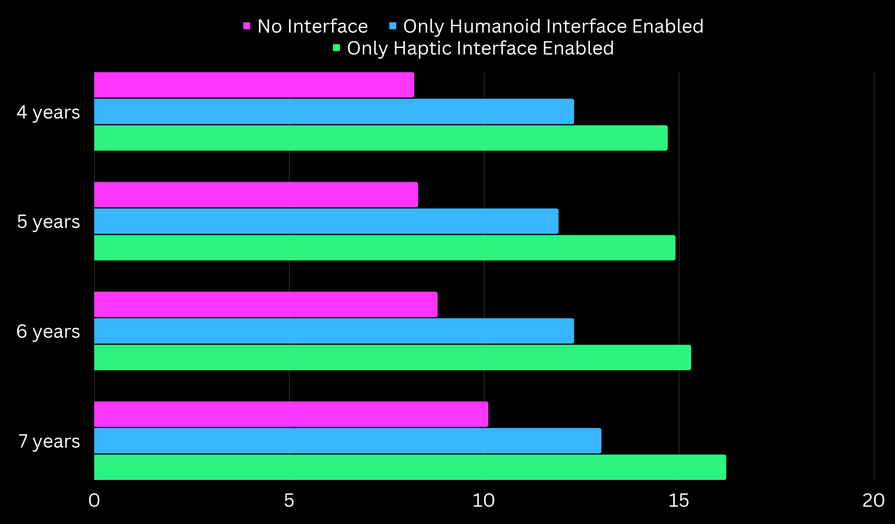
Results and Discussion

The TangiCubes were initially tested with 27 children, and the time they took to part with TangiGuru was measured compared to a traditional tangible learning solution with their parent's consent. There were five 4-year-old children, seven 5-year-old children, seven 6-year-old children, and eight 7-year-old children. The study was done over two weeks, andeach child was given unlimited time to play with a traditional tangible learning kit on a day of the first week. Similarly, each child was given unlimited time to play with TangiGuru on a day of the following week. The time taken by each child at each activity was calculated and analyzed.

Average Interaction time between the traditional interface and TangiGuru



Average Interaction time between the controlled interface and TangiGuru



Conclusion

This study introduces a novel e-Learning appliance called TangiGuru, a tangible learning solution including 12 manip- ulative tangibles known as TangiCubes. Using the shape of a typical cuboid, we were able to implement a platform that will support children to do cognitive learning at their own pace

Referenses

[1] T. Sapounidis, S. Demetriadis, P. M. Papadopoulos, and D. Stamovlasis, "Tangible and graphical programming with experienced children: A mixed methods analysis," International Journal of Child-Computer Interaction, vol. 19, p. 67–78, 2019

[2] "Tangible and graphical programming with experienced children: A mixed methods analysis," International Journal of Child-Computer Interaction, vol. 19, pp. 67–78, 2019