Sri Lanka Institute of Information Technology

PROJECT REGISTRATION FORM

(This form should be completed and uploaded to the Cloud space on or before XXXXXXXXX)

The purpose of this form is to allow final year students of the B.Sc. (Hon) degree program to enlist in the final year project group. Enlisting in a project entails specifying the project title and the details of four members in the group, the internal supervisor (compulsory), external supervisor (may be from the industry) and indicating a brief description of the project. The description of the project entered on this form will not be considered as the formal project proposal. It should however indicate the scope of the project and provide the main potential outcome.

PROJECT TITLE (As per the accepted topic assessment form)	TangiGuru: Tangible Learning Solution for Early Childhood Development.
RESEARCH GROUP **(as per the Topic assessment Form)**	Computing for Inclusive and Equitable Society (CIEC)
PROJECT NUMBER	(will be assigned by the lecture in charge)

PROJECT GROUP MEMBER DETAILS: (Please start with group leader's details)

	STUDENT NAME	STUDENT NO.	CONTACT NO.	EMAIL ADDRESS
Format	Perera C.D.D	ITxxxxxxxx	0712345678	itxxxxxxxx@my.sliit.lk
1	Hettiarachchi T.C.D.S.	IT19206806	0770480725	It19206806@my.sliit.lk
2	Semasinghe L.S.	IT19051130	0715889333	it19051130@my.sliit.lk
3	Ratnasuriya M.M.D.	IT19215716	0773843492	it19215716@my.sliit.lk
4				

SUPERVISOR, CO_ SUPERVISOR Details

SUPERVISOR Name	**CO-SUPERVISOR Name**
Ms. Shashika Lokuliyana	Ms. Narmadha Gamage
Signature	**Signature**
Attach the email as Appendix 1	**Attach the email as Appendix 2**
12.01.2022	12.01.2022
Date	**Date**

EXTERNAL SUPERVISOR Details (if any, may be from the industry)

Mr. Rajitha de Silva	University of Lincoln	rajitha@ieee.org	+94 71 760 55 38	**Attach the email as Appendix 3**
Name	Affiliation	Contact Address	Contact Numbers	Signature/Date

ACCEPTANCE BY CDAP MEMBER (This part will be filled by the RP team)

Name	Signature	Date

PROJECT DETAILS

Brief Description of your Research Problem: (extract from the topic assessment form)

Children who are in early childhood need to teach with supervised learning. Due to the Covid outbreak in early 2020, most of the world's education has been online. These remote online teachings are always virtual and primarily unsupervised or minimally supervised. For children at such a young age, it is impossible to make them focus on a digital screen for more extended periods without addiction. Therefore, such methods are vastly ineffective for children in their early childhood. [1]

Further, this virtual online education causes physical and mental health issues, especially addiction. Due to the rise in screentime, students may acquire terrible posture and vision-related issues. With the electronic devices they use for online education, such as smartphones, children get quickly sidetracked to other unwanted applications in those devices. [2]

Traditional educational toys overcome some of the above problems, but they mostly rely on adult supervision and guidance. Also, such toys only have a limited scope of learning, so it needs a wide variety of toys to cover all the required learning outcomes related to early childhood education. As these young children are already living in a technology conquered world, it is crucial to adapt them to the technology correctly. So, neither traditional educational toys nor smart mobile devices do fulfill them.[3]

[1] J. A. Fails, A. Druin, M. L. Guha, G. Chipman, S. Simms, and W. Churaman, "Child's play: A comparison of desktop and physical interactive environments," *Proc. Interact. Des. Child. 2005, IDC 2005*, pp. 48–55, 2005, doi: 10.1145/1109540.1109547.

[2] M. Sahu, S. Gandhi, and M. K. Sharma, "Mobile Phone Addiction among Children and Adolescents: A Systematic Review," *J. Addict. Nurs.*, vol. 30, no. 4, pp. 261–268, 2019, doi: 10.1097/JAN.0000000000000309.

[3] C. S. González-González, M. D. Guzmán-Franco, and A. Infante-Moro, "Tangible technologies for childhood education: A systematic review," *Sustain.*, vol. 11, no. 10, pp. 1–15, 2019, doi: 10.3390/su11102910.

Description of the Solution: (extract from the topic assessment form)

We propose an interactive tangible learning solution to address these problems by integrating the tangibles with an embedded system. Using this solution, children can independently learn with minimal supervision and guidance.

Tangibles will be developed in an interactive and exciting design to make their learning experience pleasant and exciting. It is more likely to play a game for children rather than learning by staring at a laptop or smartphone and the traditional educational toys. As a result, it is preferable to teach this strategy to little children remotely.

Through this tangible learning solution, children can participate in different learning activities related to elementary mathematics ideas, color identification, similarity recognition, word building, and many more using the tangible blocks in this kit by physically joining them with each other. This outcome hopes to develop the child's social, emotional, and physical development through these activities.

As this requires only minimal guidance and supervision, parents or teachers can still track the children's progress using the mobile application proposed to develop alongside the tangible learning kit.

Main expected outcomes of the project: (extract from the topic assessment form)

Main Objective: To developing a tangible learning solution for children in early childhood to overcome the problems in existing remote learning solutions and traditional educational toys.

Sub Objective 1: To develop tangible blocks with interactive features and components.

Sub Objective 2: To develop a technology to identify the adjacent blocks, and method of communication between blocks and applications.

Sub Objective 3: To develop the interactive, child-friendly UI/UX which is easily understandable for children.

Sub Objective 4: To develop the learning activities suitable for required learning outcomes in the early childhood development.

WORKLOAD ALLOCATION (**extract from the topic assessment form after the correction suggested by the topic assessment panel.**)

(Please provide a brief description about the workload allocation)

MEMBER 1 Hettiarachchi T.C.D.S. IT19206806

- Developing the interacting parts of the cubes and communication between blocks and the center console.
- Developing the console casing with the required hardware.
- Developing power management of the blocks and the console.
- Creating the outgoing API between blocks and application software.

MEMBER 2 Semasinghe L.S. IT19051130

- Implement a mechanism to identify the adjacent blocks.
- Creating the incoming API between blocks and application software.
- Implement the system software for the console.
- Implement the cloud servers to store the user data and software updates.

MEMBER 3 Ratnasuriya M.M.D. IT19215716

- Develop the frontend software application.
- Develop the learning activities for the children aligned with early childhood development milestones and related literature.
- Develop the UI/UX design for the web application to be child friendly.
- Implement the mobile application to view the statistics of the child and control.

MEMBER 4

N/A

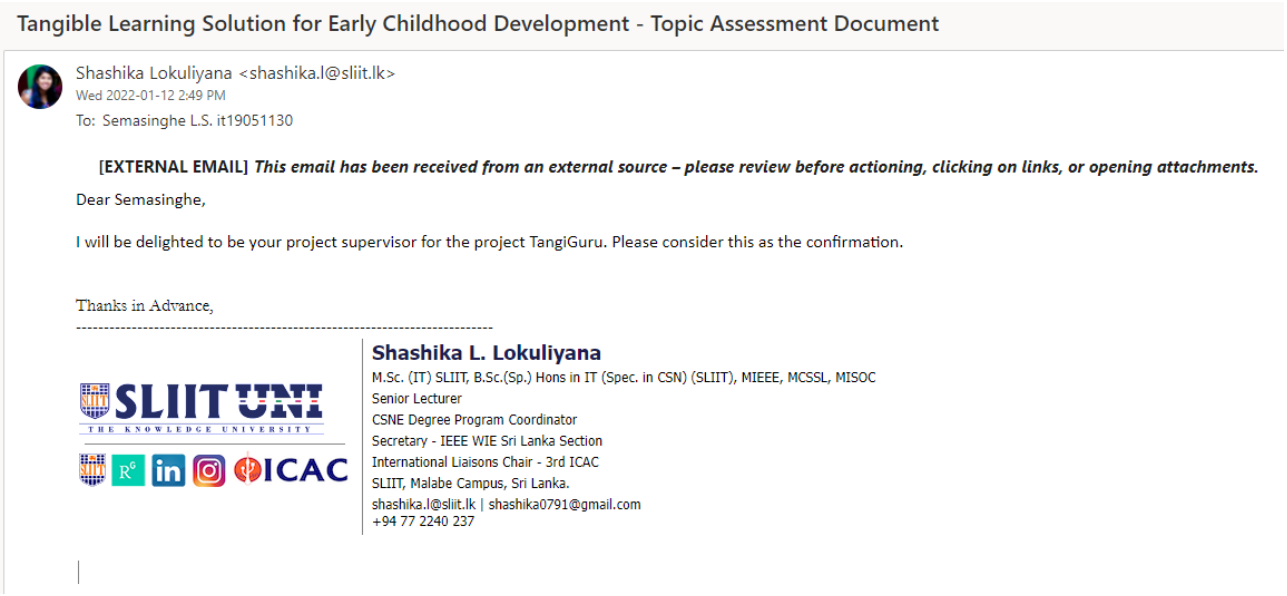
DECLARATION (Students should add the Digital Signature)

"We declare that the project would involve material prepared by the Group members and that it would not fully or partially incorporate any material prepared by other persons for a fee or free of charge or that it would include material previously submitted by a candidate for a Degree or Diploma in any other University or Institute of Higher Learning and that, to the best of our knowledge and belief, it would not incorporate any material previously published or written by another person in relation to another project except with prior written approval from the supervisor and/or the coordinator of such project and that such unauthorized reproductions will construe offences punishable under the SLIIT Regulations.

We are aware, that if we are found guilty for the above mentioned offences or any project related plagiarism, the SLIIT has right to suspend the project at any time and or to suspend us from the examination and or from the Institution for minimum period of one year".

	STUDENT NAME	STUDENT NO.	SIGNATURE
1	Hettiarachchi T.C.D.S. (GROUP LEADER)	IT19206806	
2	Semasinghe L.S.	IT19051130	
3	Ratnasuriya M.M.D.	IT19215716	
4			

Appendix 1 –Supervisor's Email of Consent



Tangible Learning Solution for Early Childhood Development - Topic Assessment Document

Shashika Lokuliyana <shashika.l@sliit.lk>
Wed 2022-01-12 2:49 PM
To: Semasinghe L.S. it19051130

[EXTERNAL EMAIL] ***This email has been received from an external source – please review before actioning, clicking on links, or opening attachments.***

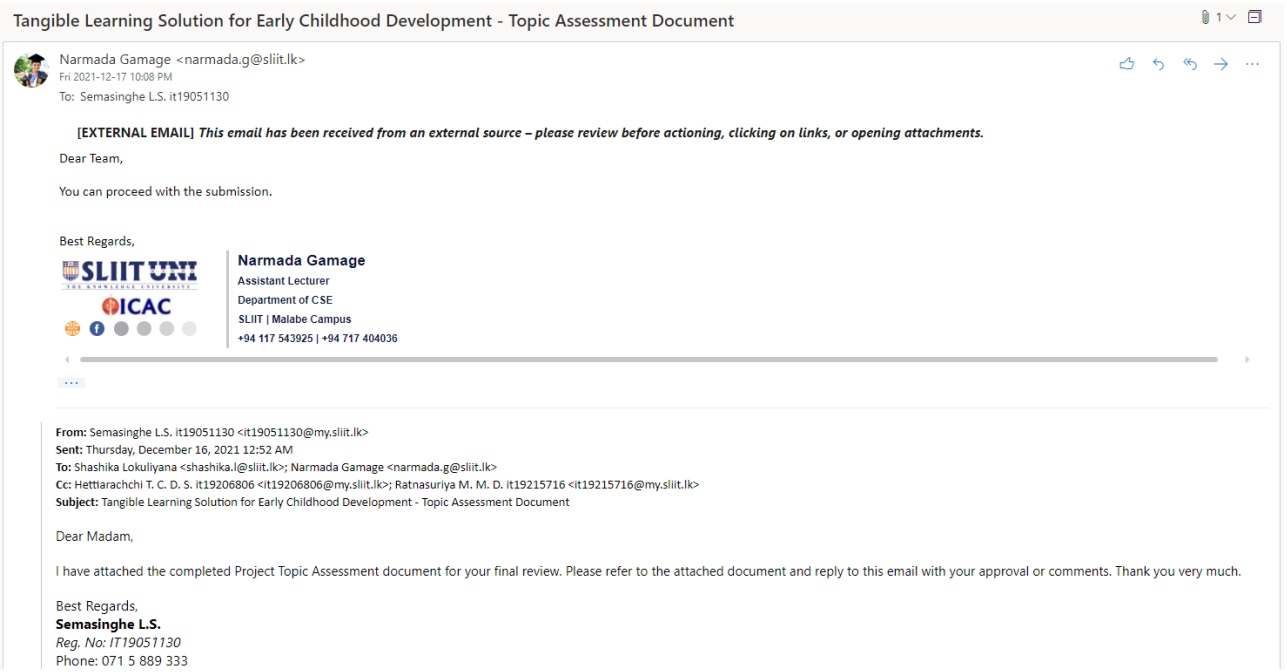
Dear Semasinghe,

I will be delighted to be your project supervisor for the project TangiGuru. Please consider this as the confirmation.

Thanks in Advance,

Shashika L. Lokuliyana
M.Sc. (IT) SLIIT, B.Sc.(Sp.) Hons in IT (Spec. in CSN) (SLIIT), MIEEE, MCSSL, MISOC
Senior Lecturer
CSNE Degree Program Coordinator
Secretary - IEEE WIE Sri Lanka Section
International Liaisons Chair - 3rd ICAC
SLIIT, Malabe Campus, Sri Lanka.
shashika.l@sliit.lk | shashika0791@gmail.com
+94 77 2240 237

Appendix 2 – Co-Supervisor's Email of Consent



Tangible Learning Solution for Early Childhood Development - Topic Assessment Document

Narmada Gamage <narmada.g@sliit.lk>
Fri 2021-12-17 10:08 PM
To: Semasinghe L.S. it19051130

[EXTERNAL EMAIL] ***This email has been received from an external source – please review before actioning, clicking on links, or opening attachments.***

Dear Team,

You can proceed with the submission.

Best Regards,

Narmada Gamage
Assistant Lecturer
Department of CSE
SLIIT | Malabe Campus
+94 117 543925 | +94 717 404036

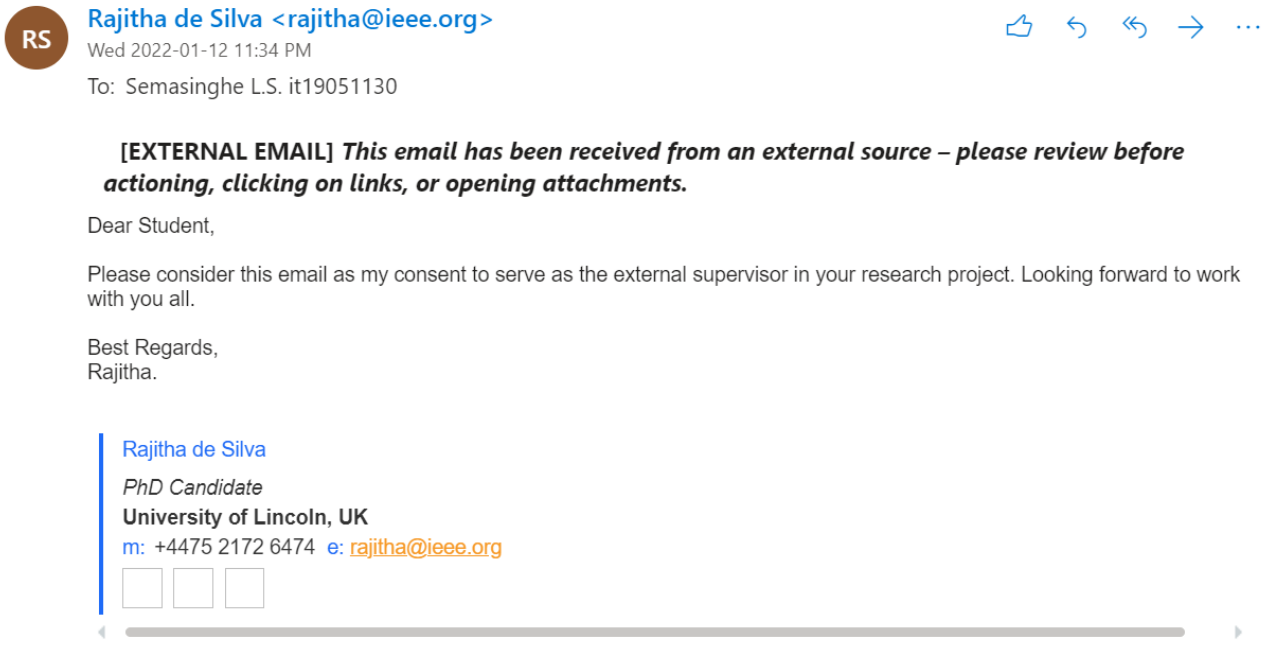
From: Semasinghe L.S. it19051130 <it19051130@my.sliit.lk>
Sent: Thursday, December 16, 2021 12:52 AM
To: Shashika Lokuliyana <shashika.l@sliit.lk>; Narmada Gamage <narmada.g@sliit.lk>
Cc: Hettiarachchi T. C. D. S. it19206806 <it19206806@my.sliit.lk>; Ratnasuriya M. M. D. it19215716 <it19215716@my.sliit.lk>
Subject: Tangible Learning Solution for Early Childhood Development - Topic Assessment Document

Dear Madam,

I have attached the completed Project Topic Assessment document for your final review. Please refer to the attached document and reply to this email with your approval or comments. Thank you very much.

Best Regards,
Semasinghe L.S.
Reg. No: IT19051130
Phone: 071 5 889 333

Appendix 3 – External Supervisor's Email of Consent



RS

Rajitha de Silva <rajitha@ieee.org>
Wed 2022-01-12 11:34 PM

To: Semasinghe L.S. it19051130

[EXTERNAL EMAIL] ***This email has been received from an external source – please review before actioning, clicking on links, or opening attachments.***

Dear Student,

Please consider this email as my consent to serve as the external supervisor in your research project. Looking forward to work with you all.

Best Regards,
Rajitha.

Rajitha de Silva

PhD Candidate
University of Lincoln, UK
m: +4475 2172 6474 e: rajitha@ieee.org

Appendix 4 – Evaluated Topic Assessment Form

Sri Lanka Institute of Information Technology

TMP-22-056

Project Topic Assessment – 2022 (Regular)

Topic

TangiGuru: Tangible Learning Solution for Early Childhood Development.

Abstract (200 Words Max):

Since early 2020, most of the world's education has been online due to the Covid-19 outbreak. It did not affect the elderly students, but students of younger ages, especially from 4 to 7, could not grab the teachings via the online platform. Also, they got addicted to electronic devices such as mobile phones and tablet PCs. Therefore, to improve the learning ability and creativity of the kids while solving the addiction to electronic devices, an interactive tangible learning kit with different activities is proposed to be developed for the children to learn things more interactively and improve their thinking ability and creativity. Children can learn with minimal supervision using the proposed learning kit while having interactive guidance similar to on-premise teachers. Therefore, this proposed Tangible Learning Kit solves most remote teaching activities related to early childhood development.

Keywords: Early Childhood Development, Tangible Learning, Embedded Systems

Project Topic Assessment-Final Year Project-2021 June CDAP-01

Research Group/Area: Select the area by referring to the document uploaded to the Course Web

Computing for Inclusive and Equitable Society (CIEC)

E-learning and Education (ELE)

Supervisor should fill this part

Supervisor and Co-Supervisor endorse the proposed project, and hence, guide the students to acquire required knowledge skills pertaining to above sub domains of their specializations.

Supervisor: **Ms. Shashika Lokuliyana** Signature

Continuation of Previous Year Project? ☐

If yes, state the Project ID

and year

Co-Supervisor: **Ms. Narmadha Gamage** Signature

External Supervisor: Mr. Rajitha De Silva Name

Team Members:

Student Name	Student ID	Specialization
Leader: Hettiarachchi T.C.D.S.	IT19206806	CSN
Member 2: Semasinghe L.S.	IT19051130	CSN
Member 3: Ratnasuriya M.M.D.	IT19215716	CSN

Page | 2

Member 4: N/A	N/A	Select your Specialization

Research Problem:

Children who are in early childhood need to teach with supervised learning. Due to the Covid outbreak in early 2020, most of the world's education has been online. These remote online teachings are always virtual and primarily unsupervised or minimally supervised. For children at such a young age, it is impossible to make them focus on a digital screen for more extended periods without addiction. Therefore, such methods are vastly ineffective for children in their early childhood. [1]

Further, this virtual online education causes physical and mental health issues, especially addiction. Due to the rise in screentime, students may acquire terrible posture and vision-related issues. With the electronic devices they use for online education, such as smartphones, children get quickly sidetracked to other unwanted applications in those devices. [2]

Traditional educational toys overcome some of the above problems, but they mostly rely on adult supervision and guidance. Also, such toys only have a limited scope of learning, so it needs a wide variety of toys to cover all the required learning outcomes related to early childhood education. As these young children are already living in a technology conquered world, it is crucial to adapt them to the technology correctly. So neither traditional educational toys nor smart mobile devices do fulfill them.[3]

[1] J. A. Fails, A. Druin, M. L. Guha, G. Chipman, S. Simms, and W. Churaman, "Child's play: A comparison of desktop and physical interactive environments," *Proc. Interact. Des. Child. 2005, IDC 2005*, pp. 48–55, 2005, doi: 10.1145/1109540.1109547.

[2] M. Sahu, S. Gandhi, and M. K. Sharma, "Mobile Phone Addiction among Children and Adolescents: A Systematic Review," *J. Addict. Nurs.*, vol. 30, no. 4, pp. 261–268, 2019, doi: 10.1097/JAN.0000000000000309.

[3] C. S. González-González, M. D. Guzmán-Franco, and A. Infante-Moro, "Tangible technologies for childhood education: A systematic review," *Sustain.*, vol. 11, no. 10, pp. 1–15, 2019, doi: 10.3390/su11102910.

Solution proposed:

We propose an interactive tangible learning solution to address these problems by integrating the tangibles with an embedded system. Using this solution, children can independently learn with minimal supervision and guidance.

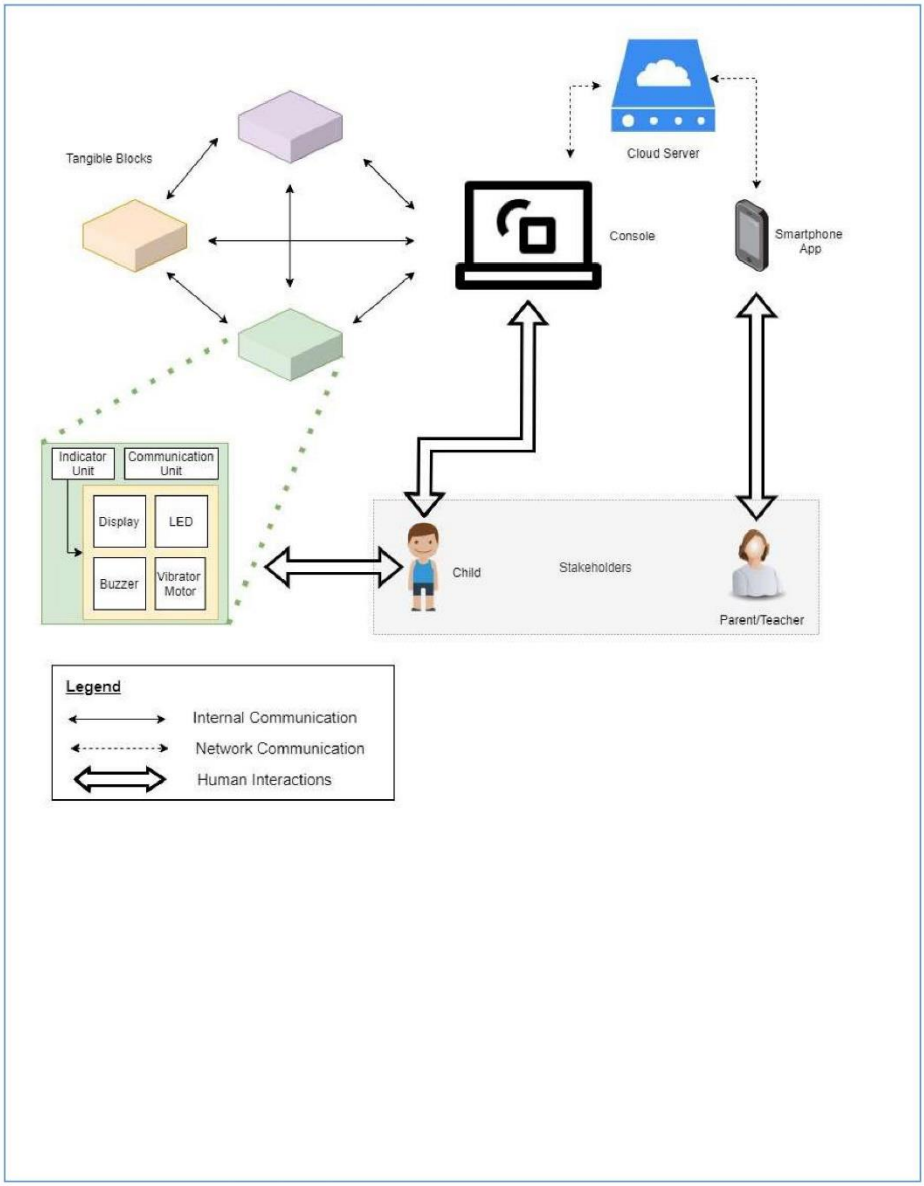
Tangibles will be developed in an interactive and exciting design to make their learning experience pleasant and exciting. It is more likely to play a game for children rather than learning by staring at a laptop or smartphone and the traditional educational toys. As a result, it is preferable to teach this strategy to little children remotely.

Through this tangible learning solution, children can participate in different learning activities related to elementary mathematics ideas, color identification, similarity recognition, word building, and many more using the tangible blocks in this kit by physically joining them with each other. This outcome hopes to develop the child's social, emotional, and physical development through these activities.

As this requires only minimal guidance and supervision, parents or teachers can still track the children's progress using the mobile application proposed to develop alongside the tangible learning kit.

System Overview Diagram for the solution proposed. Recommended to draw using draw.io. Note: This is not an activity/flow (UML) diagram

1. **Main components including the data sources, stakeholders, interaction among the stakeholders, etc.**
2. **Interconnection among the components**
3. **Major SW and HW components**



Objectives (1 main objective and 4 sub objectives):

Main Objective: To developing a tangible learning solution for children in early childhood to overcome the problems in existing remote learning solutions and traditional educational toys.

Sub Objective 1: To develop tangible blocks with interactive features and components.

Sub Objective 2: To develop a technology to identify the adjacent blocks, and method of communication between blocks and applications.

Sub Objective 3: To develop the interactive, child-friendly UI/UX which is easily understandable for children.

Sub Objective 4: To develop the learning activities suitable for required learning outcomes in the early childhood development.

Task divided among the members

Member 1:

- Developing the interacting parts of the cubes and communication between blocks and the center console.
- Developing the console casing with the required hardware.
- Developing power management of the blocks and the console.
- Creating the outgoing API between blocks and application software.

Member 2:

- Implement a mechanism to identify the adjacent blocks.
- Creating the incoming API between blocks and application software.
- Implment the system software for the console.
- Implment the cloud servers to store the user data and software updates.

Member 3:

- Develop the frontend software application.
- Develop the learning activities for the children.
- Develop the UI/UX design for the web application to be child friendly.
- Implement the mobile application to view the statistics of the child and control.

Member 4: N/A

Technologies to be used:

ESP8266, Raspberry Pi

ESP NOW / Bluetooth Low-Energy, WiFi

MongoDB, Express Js, React Js, Node Js

RethinkDB, Python

If supervisor States that this year is a continuation of previous work, state the further work the students should do compared to the previous years.
(NOTE: This part has to be filled by the supervisor)

Project Topic Assessment-Final Year Project-2021 June CDAP-01

This part will be filled by the Topic Screening Panel members

Acceptable: Mark/select as necessary

Acceptance/ Rejection	Correction State	
	Minor Correction	Major Corrections
Accepted	☐	☐
Resubmit	☐	☐
Rejected	☐	

Corrections (if necessary)

- Member 3 learning activities should be aligned with early childhood development milestones and related literature.

Major changes proposed:

_____

_____

_____

_____

Any other Comments:

_____

_____

_____

Approved by the review panel:

Member's Name	Signature
Dr. Dasuni Nawinna	
Ms. Suranjini Silva	
Mr. Kavinga Yapa	

Important:

1. According to the comments given by the panel, do the necessary modifications and get the approval by the **same panel**.
2. If the project topic is rejected, find out a new topic and inform the CDAP Group for a new topic pre-assessment.
3. A form approved by the panel must be attached to the **Project Charter Form**.