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 entail 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)	Online Learning Platform for Hearing Impaired People
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
1	Wanasinghe W. A. D. B (GROUP LEADER)	IT19201160	0712574563	it19201160@my.sliit.lk
2	Munasinghe M. W. S. S. M. T. M. B	IT19162706	0756600251	it19162706@my.sliit.lk
3	Maddugoda C. D	IT19153346	0713324369	it19153346@my.sliit.lk
4	Ramawickrama H. N.	IT19174686	0714768467	it19174686@my.sliit.lk

SUPERVISOR, CO_ SUPERVISOR Details

SUPERVISOR Name	CO-SUPERVISOR Name
Dr. Lakmini Abeywardhana	**Mr. Yashas Mallawaarachchi**
Signature	**Signature**
Appendix - 1	**Appendix - 2**
1/12/2022	**1/12/2022**
Date	**Date**

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

				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)

Nine percent of Sri Lankans are hearing impaired or deaf. A study from the Ministry of Health shows that 9% of the total population of Sri Lanka suffer from some sort of hearing disorder [1]. Reading presents a significant challenge for individuals who are born deaf because they cannot hear the language that is encoded by print. Hearing impaired use sign language as method of communication and a way of expressing themselves.
One of the most common misconceptions about sign language is that it's the same wherever you go. That's not the case. In fact, there are somewhere between 138 and 300 different types of sign language used throughout the world today.[2]

The two most widespread sign languages in the English-speaking world are American Sign Language (ASL) and British Sign Language (BSL), which are very different from each other. ASL is widely spoken in the US and Canada, and with variations in a number of other countries. BSL is spoken in the UK, and the sign languages spoken in countries such as Australia, New Zealand, India and Sri Lanka are related to it.[3]. Sri Lankan Sign Language is the visual language used by deaf people in Sri Lanka.

It is essential that a hearing impaired or a person who wishes to work with them learn Sri Lankan sign language in Sri Lanka. With the ongoing pandemic situation and education focusing on e-learning it is necessary that the teaching of sign language adapt to this new normal situation. In doing so it is necessary to teach sign language and to monitor the person learning so that the person learning is able to learn signs in the correct way by monitoring them. Also, these mentioned individual might have issues trying to get information they need as they are mostly unable to understand written words well. Non-hearing impaired people tend to find solutions to their solutions simply by using google but majority of hearing impaired people find this to be challenging.

In addition to this a person who lives in Sri Lanka is exposed to basically learn Sri Lankan sign language and in case it is required for a certain individual to migrate to another country it is necessary for the individual to learn the dialect of the specific country.

A solution to address the mentioned issues can help the Hearing impaired in Sri Lanka or to a person who wishes to learn Sri Lankan sign language to learn it efficiently adapting to the new normal situation and to learn other dialects of the sign language if familiar with the Sri Lankan sign language and a chatbot service who interact with Google search to find solutions of hearing impaired.

[1] Dr. Devanand Jha, (2019, May. 9). Revolutionize your hearing [Online].
Available: https://www.dailynews.lk/2019/05/09/tc/185027/revolutionize-your-hearing

[2] Richard Brooks, (2018, May. 10). A Guide to the Different Types of Sign Language Around the World [Online].
Available: https://www.k-international.com/blog/different-types-of-sign-language-around-the-world/

[3] Michael Meyler, (2021, Feb. 9). Learning Sri Lankan Sign Language[Online].
Available: https://groundviews.org/2021/09/02/learning-sri-lankan-sign-language/

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

The proposed solution for the research problem is a web application which will enable hearing impaired people or who are interested in learning Sri Lankan sign language to learn while being monitored to identify any short incorrect signs. This system will also enable hearing impaired person to seek knowledge they need and will also give them the opportunity to learn a different dialect of sign language if they are familiar with Sri Lankan sign language. The system will be implemented under four main components.

As per the first component, the system will be able to teach Sinhala sign language to people with hearing and verbal impairments by using a 3D avatar model and images. Once taught, a knowledge check would be conducted where a question would be asked by an avatar. The answer to the question will be captured through the webcam and respective sign language answer will be detected using visual computing techniques. The user will be acknowledged if the answer is correct or wrong, what percentage is correct if the sign is partially correct as well as what has to be corrected. The expectation of this is to guarantee the effective learning of the user. We attempt to make the system as interesting as possible with eloquent expressions of the avatar in order to grab the users' interest and attention. Further, it is decided to divide the learning system to levels where the user would be qualified to attempt the next level upon successful completion of the previous level.

As per the second component, the system will be converting the Sinhala sign language into two other commonly spoken languages across the world, i.e., American sign language and British sign language.

Initially an input will be given in the form of a hand gesture that will be captured through the webcam. The dynamic hand gestures made by the user will eventually get converted to a text format. The relevant text form will be translated according to the selected form of sign language by the user and will be displayed through a 3D avatar model with the pertinent hand gestures.

As per the fourth component it is proposed to take user's inquiry through Sinhala Sign Language and system converts it to a text and google search, once it finds the solution, Chatbot will use a 3D model avatar to show top 10 google search results according to the user's inquiry through Sinhala sign language. Then user can react again with Sinhala sign language and chatbot can read the requested result's content and again show in sign language through the 3D avatar. Similarly, it is hoped to work as an intermediate between user who is deaf or muted and google

As per the fourth component, the user will be able to see a translation of a you tube video which will be either a reference material suggested to the user or a video which will be a result of a search. This video will be extracted, and the text will be extracted to be analyzed and to be converted to Sri Lankan sign language. Then using Natural language processing combined with machine learning the text will be analyzed for sentiment which is needed to be incorporated for the avatar which will be showing the translated idea of the video while the video is played.

Feature / **Research**	Sign language recognition using computer vision	Detect accuracy of user input gestures and provide feedback	express a set of chosen words in sign language	express a set of chosen words as sentences	detect the mistake when answering using sign language	Based for Sri Lankan based community (Usage of Sri Lankan sign language)	Based on real time gesture detection
Sign Language Recognition Based on Computer Vision [1]	✓	✗	✗	✗	✗	✗	✗
Learning sign language from a social robot peer by playing an interactive game [2]	✓	✗	✓	✗	✗	✗	✓
Extreme Learning Machine for Real Time Recognition of Brazilian Sign Language [3]	✓	✗	✗	✗	✗	✗	✗
SNAP – eLearning [4]	✓	✓	✗	✗	✓	✗	✓
Our solution	✓	✓	✓	✓	✓	✓	✓

References

[1] Wanbo Li, Hang Pu, Ruijuan Wang, (2021, Aug. 2). Sign Language Recognition Based on Computer Vision [Online].
Available: https/ieeexplore.ieee.org/document/9498024

[2] Pinar Uluer, Neziha Akalin, Hatice Köse, (2015, Feb. 16). Learning sign language from a social robot peer by playing an interactive game [Online].
Available: https/ieeexplore.ieee.org/document/7041397

[3] Fernando M. De Paula Neto, Lucas F. Cambuim, Rafael M. Macieira, Teresa B. Ludermir, Cleber Zanchettin, Edna N. Barros, (2015, Feb. 16). Extreme Learning Machine for Real Time Recognition of Brazilian Sign Language [Online].
Available: https/ieeexplore.ieee.org/document/7379391

[4] Niroshan Krishnamoorthy, Accash Raveendran, Pirathikaran Vadiveswaran, Sangeeth Raj Arulraj, Kalpani Manathunga, Samanthi Siriwardana(2021). E-Learning Platform for Hearing Impaired Students [Online].
Available: https://compassionate-jang-7afe10.netlify.app

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

Main Objective:

Create a web application where people will be able to learn Sign language effectively

Sub Objective 1: Helping hearing impaired to learn Sinhala sign language happily with online fun games.

Sub Objective 2: Create the opportunity for deaf and mute community in Sri Lanka to learn and communicate with different types of sign languages that they are unaware of.

Sub Objective 3: Helping hearing impaired to find solutions and seek answers using the systems support system.

Sub Objective 4: Translation of a given video to Sri Lankan sign language to give the opportunity for a hearing-impaired person to be able to access the video.

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	**Maddugoda C. D - IT19153346**

1. Develop a system to teach sign language using images and a 3D avatar (display images and explain the sign to describe the respective image by avatar for pre-grade children, ask question by avatar itself for primary school and above)

2. Develop a level wise game to check knowledge by asking questions in sign language by the avatar and capture the answer to the question and analyse the posture and detect if the answer is correct or wrong, what percentage is correct if the sign is partially correct as well as what must be corrected.

3. Improve the avatar with expressive emotions upon answer being correct or wrong as well as for teaching.

4. Integrating with web application using React JS

MEMBER 2	**Ramawickrama H. N - IT19174686**

1. Recognize the hand gestures, given by the user as an input (taken as per the Sinhala sign language)

2. The identified hand gesture will be converted into a text format accordingly. Allow the user to select a sign language to be translated, by giving English (ASL) and English(BSL) as the options.

3. The text will get converted according to the relevant sign language that was chosen by the user and will be displayed through a 3D avatar model by expressing the hand gestures.

MEMBER 3	**Wanasinghe W. A. D. B - IT19201160**

1. Develop a system to identify user's sign language inputs and converts it to a text to search via google.

2. The identifies the title of top 10 search results and it will be converted back again to the Sinhala sign language and present using the 3D avatar model.

3. Develop a system to identify user's selection and go to the specify link and identify the content in it and convert it back to the Sinhala sign and language and present it to the user through the google avatar

MEMBER 4	**Munasinghe M. W. S. S. M. T. M. B - IT19162706**

1. Conversion of the online video content to Sri Lankan sign language using computer vision and image processing
    - Using the youtube-dl library of python the you tube video content is extracted to the system and the audio and the text of the video will be extracted.
    - The extracted text will be analyzed and will be converted to sign language

2. Analyzing the audio of the given video for speech emotion recognition or use text for sentimental analysis by combining machine learning and natural language processing.
    - The extraction of the audio as mentioned above will be used and using Natural language processing or machine learning the sentiments and the emotions of the video will be analyzed and will be recorded.

3. Creation of the 3D avatar to display the translation incorporating the identified emotions
4. Integrating with web application using React JS

DECLARATION (Students should add the Digital Signature)

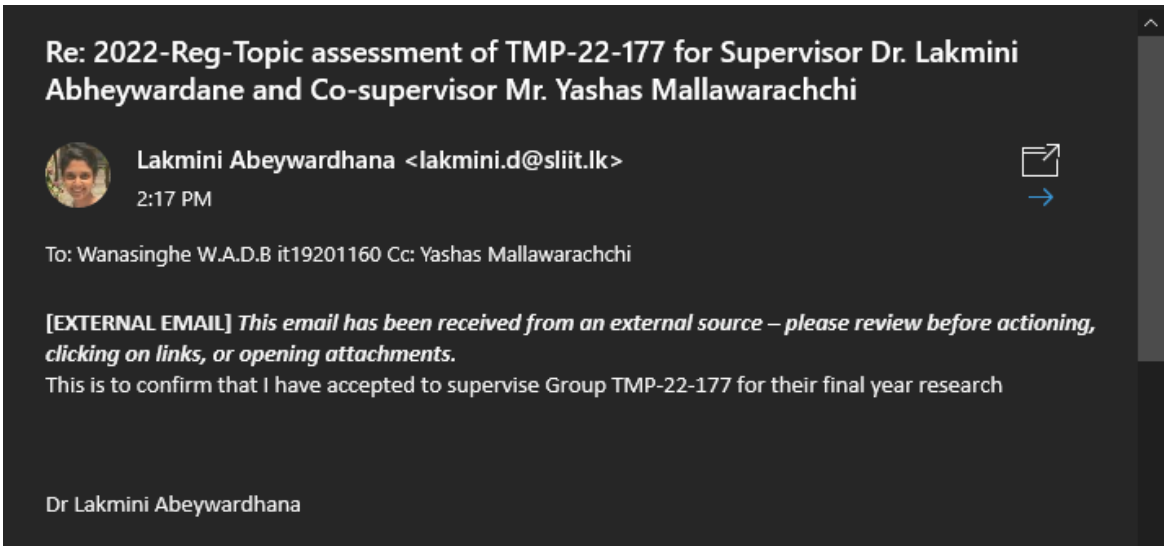
"We declare that the project would involve material prepared by the Group members and that it would not fully or partially incorporate any material prepared by other persons for a fee or free of charge or that it would include material previously submitted by a candidate for a Degree or Diploma in any 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	Wanasinghe W. A. D. B (GROUP LEADER)	IT19201160	
2	Munasinghe M. W. S. S. M. T. M. B	IT19162706	
3	Maddugoda C. D.	IT19153346	
4	Ramawickrama H. N.	IT19174686	

Appendix

Appendix-1: Approved Email by Supervisor



Re: 2022-Reg-Topic assessment of TMP-22-177 for Supervisor Dr. Lakmini Abheywardane and Co-supervisor Mr. Yashas Mallawarachchi

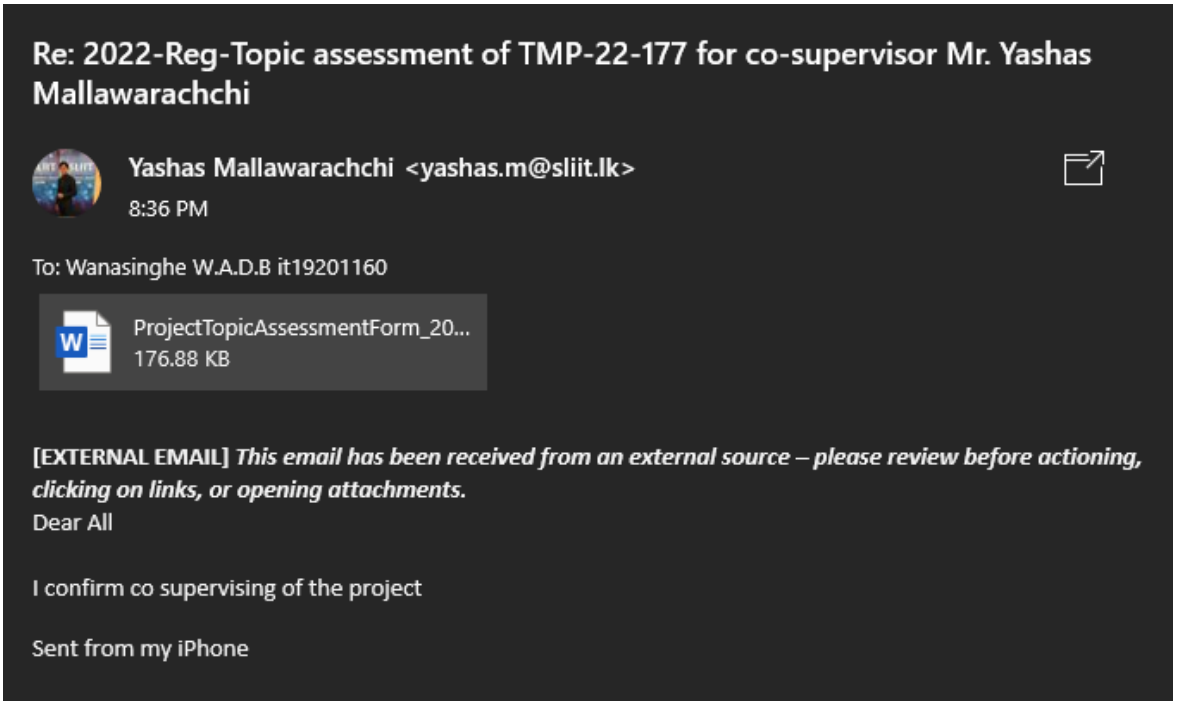
Lakmini Abeywardhana <lakmini.d@sliit.lk>
2:17 PM

To: Wanasinghe W.A.D.B it19201160 Cc: Yashas Mallawarachchi

[EXTERNAL EMAIL] ***This email has been received from an external source – please review before actioning, clicking on links, or opening attachments.***
This is to confirm that I have accepted to supervise Group TMP-22-177 for their final year research

Dr Lakmini Abeywardhana

Appendix-2: Approved Email by Co-Supervisor



Re: 2022-Reg-Topic assessment of TMP-22-177 for co-supervisor Mr. Yashas Mallawarachchi

Yashas Mallawarachchi <yashas.m@sliit.lk>
8:36 PM

To: Wanasinghe W.A.D.B it19201160

ProjectTopicAssessmentForm_20...
176.88 KB

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

I confirm co supervising of the project

Sent from my iPhone