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)	Automated Sinhala Voice Assistant to manage tasks using Natural Language Processing
RESEARCH GROUP **(as per the Topic assessment Form)**	TMP-22-041
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	Senarathne K.H.I.R.	IT19152592	0765494230	it19152592@my.sliit.lk
2	Bandara V.D.	IT19808994	0769438639	it19808994@my.sliit.lk
3	Herath H.M.C.P.	IT19216010	0766698098	It19216010@my.sliit.lk
4	Nirash J.M.I.	IT19159768	0776795183	It19159768@my.sliit.lk

SUPERVISOR, CO_ SUPERVISOR Details

SUPERVISOR Name	CO-SUPERVISOR Name
Ms.Dinuka Wijendra	**Ms. Jenny Krishara**
Signature	**Signature**
Attach the email as Appendix 1	**Attach the email as Appendix 2**
2022.01.12	2022.01.12
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)

When looking at the industry, many people are moving to technical applications. Nevertheless, it is already popular among young people. Because of the lack of technological literacy, some of the Sri Lankans didn't go through with the technology. In Sri Lanka mostly use English more than Sinhala in the technological world. As English is the international language, everyone focuses on it. Many of the tools and applications are developed based on the English language. However, some countries are using applications with their local language. For example, China and Japan. In Sri Lanka, it is available the least number of applications work under Sinhala voice commands. Following are a few issues that came across in research.

- Though some Sri Lankans use smartphones and new technology, others are not interested in technology due to a lack of knowledge about the English language and lack of education.

  Ex – Younger generation uses smartphones more than the older generation.

- Since Sinhala is the local language, international languages are focused. Major vendors in the tech industry are not focused on local languages like Sinhala due to the less popularity and customer base of the country. Sinhala language is not focused on by the majority. This situation would lead to less usage in Sinhala in the future, and it would not be a valuable language for Sri Lankan citizens.

- Covid-19 pandemic has caused the distance between relations and family members. By identifying users' emotions and feelings, applications help users share their feelings and emotions. having a virtual assistant that cares about the user uplifts mental health and a happy mind during this pandemic.

- No mobile app suggests accurate and ideal suggestions to increase users' mental happiness by identifying their facial expressions and tracking users according to real-time situations.

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

The proposed system focuses mainly on making the users' daily activities easier through Sinhala voice commands and making the lifestyle enjoyable and more arranged. With this system, the user can have an assistant like a real-life person. Nevertheless, this application will not do all the natural tasks that real persons do. However, the application will do whatever job the user asks for via the Sinhala voice command. It will avoid the English knowledge of the people. Since the application worked on thoroughly with Sinhala language, it will give the opportunity people who are lack English knowledge. It will avoid the gap between English expertise and make it available to anyone with Sinhala knowledge without age limits.

- Using Sinhala voice commands in daily tasks will make busy users' lives easier. Managing daily tasks by Sri Lanka's mother tongue will be uplift the Sinhala language level within the world.
- Using voice commands in Sinhala, when given voice input, remove background noises and unwanted words. It will filter the input source and get reliable input to the application. Meaningful phrases will be divided from the input.
- The divided phrases break the words into parts and generate phonetics related to each word separately. A trained model will be used to identify phonetics in phrases. Output from the model and Sinhala word will be compared with an acoustic model. Reliable conversion will be given.
- Sinhala voice output should be generated to build a conversation with the application and provide a result to the user. According to the user requests, the voice output will be given in Sinhala by a trained model.
- Recognizing and tracking the emotions of the users will be an added benefit. The application takes care of the user and reminds them of the upcoming tasks in their lives. The application adapts to the user's feelings, preferences, and emotions and offers ideal suggestions.
- The Sinhala language is shallow usage in the technology industry since the international language is English. Building a mobile application using the Sinhala language increase the usage of Sinhala in the technology industry.

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

Main objective is to increase the Sinhala voice commands used with the mobile phone daily and make it more accessible for the user's lifestyle.

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	Senarathne K.H.I.R. – IT19152592

This part tracks users by their facial expressions and voice pattern, assists them accordingly, and makes them enjoy. Suppose users give their permissions to use the camera. Then facial expressions will be identified by the device's camera. The model will identify the user's feelings by the expressions, whether happy, sad, anger, neutral, fearful etc.

Tracking user also consists of a user's preference and interests when interacting with the application. The Model should be trained to track user according to the situations of life. This model tracks users according to their real emotions and the real-time situation via the device's front camera. While identifying the emotions via camera, a live snapshot of the user will be given. It will improve the user's privacy compared to the camera running in the background.

While the user's initial registration, the application users preferences will be asked to better engage with the user; also, users' preferences and mental situation tracked previously given data and their activities from the application, previous usage, and their facial expressions and preferences. When the application identifies the users' emotions, it will generate ideal and accurate suggestions for each user according to their facial expressions. To provide ideal suggestions for users in various moods (happy, stressed, fear), the model should be trained to generate accurate and ideal suggestions for each user.

For example,

suppose the user has given their preference or interest in listening to music; when the user is tired because of the workload, the tiredness will be identified by the device's front camera. The application will be said automatically, " ඔබට අද මහන්සි පාටයි." The application suggests some points according to the user's preference with voice output, such as "සින්දුවක් අහමුද?". Suppose the user responds with something like "හා" or "හරි". In that case, the application will allow listening to mind relaxing music to release the tired. If the user responds with something like "දැන් එපා" or "බෑ" the application will suggest other options such as "Movie එකක් බලමුද ?". If the user does not want to respond with Sinhala voice input, there will be an option to give touch input.

MEMBER 2	Bandara V.D.

In this component, the users' voice commands will be taken through their device's microphone in the Sinhala language. Initially, the noise will be removed from the voice command using a noise removal method. Then, sentences will be broken into words and a meaningful phrase will be created out of it. Since there are no existing methods for noise removal for the Sinhala language, an algorithm will be developed for the Sinhala noise removal using the information from existing English noise removal methods.

For example,

if a user asks for a specific place, they could ask it using words that would define their query on-point or using more unnecessary words. A user can ask "Airport එක තියෙන්නෙ කොහෙද?". In this voice command, all the words are necessary. Another user can ask "මට Airport එක තියෙන්නෙ කොහෙද කියල කියන්න පුලුවන්ද?". In this voice command, some words are unnecessary, such as "මට" and "පුලුවන්ද". Hence, in this component, those words will be removed, and a meaningful phase will be created such as "Airport එක තියෙන්නෙ කොහෙද?" Furthermore, since the main purpose of the component is to remove unnecessary words from the user's input and take only the required words, the user's voice command is limited to ten words to do this efficiently. So, If the user says a very long sentence that includes more than ten words, the application will give the voice message "කෙටියෙන් කියන්න".

In order to identify Sinhala words, a model will be trained with mostly used existing Sinhala words. Then the output phrase will be matched with that trained acoustic model. After that, it will be able to predict the meaning of the words.

The created meaningful phrase will be passed to **member 3 '**s phonetics conversion module.

MEMBER 3	Herath H.M.C.P.

After gathering the meaningful phrase from **member 2**, In this part, all the words should be taken from the above function (noise removed words), and here phonetics should be found for each word in each letter. In order to identify the Sinhala phonetics, a model should be trained to convert Sinhala to English phonetics. Then the output Sinhala word should be matched with that trained acoustic model. After that, it could be used to predict the meaning of words. By the model of all the input words which the user gave, it could be converted to phonetics.

For example,
User's Sinhala voice input is given like "අද කවද්ද". The word is separated into parts as letters " අ-a ද-da ක-ka ව-va ද්-d ද-da, and a model should be trained to convert these Sinhala words to phonetics. For converting these words to phonetics support of the Sinhala to an international phonetic alphabet transliteration scheme will be taken. This model will create phonetics for Sinhala vowels, constants and constant clusters. This will provide unique phonetic for each letter.
After finding all the phonetics for each word separately, then that phonetics should be put to the google translator in order to generate English phrase for the given Sinhala voice input. By writing a query to the google translator and connecting that trained model with it, English phrases could be got for those words. **That** English phrase will be passed to **member 4.**

MEMBER 4	Nirash J.M.I.

After gathering the English phrase from **member 3,**

The text-to-speech mechanism will generate Sinhala voice output for the application's users' specific needs. It will translate the text to Sinhala voice output, and the same voice output will be prompted to the user. Generating voice output according to the application results will be done using a model. After the translation it will produce user-specific results accordingly with a Sinhala voice output with a selection of speech types.

For example,

The thing going to do in this section is to answer what the user asks. If the user asks "අද දවසේ මගෙ schedule එක මොකක්ද??," Then the voice command go through the noise removal process and the phonetics generating process, provide English translation of the given voice command. In this section, the English translation will convert and generate the output of the Sinhala voice and the text using a model. Finally, the users' schedules will be said in Sinhala voice and displayed in the mobile application. According to the above example, the application will give voice and text output like "අද ඔයාට උදැසන 10.30 රැස්වීමක් තියෙනවා.". "අද හවස 5 ට ජිම් එකට යන්න තියෙනවා."

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
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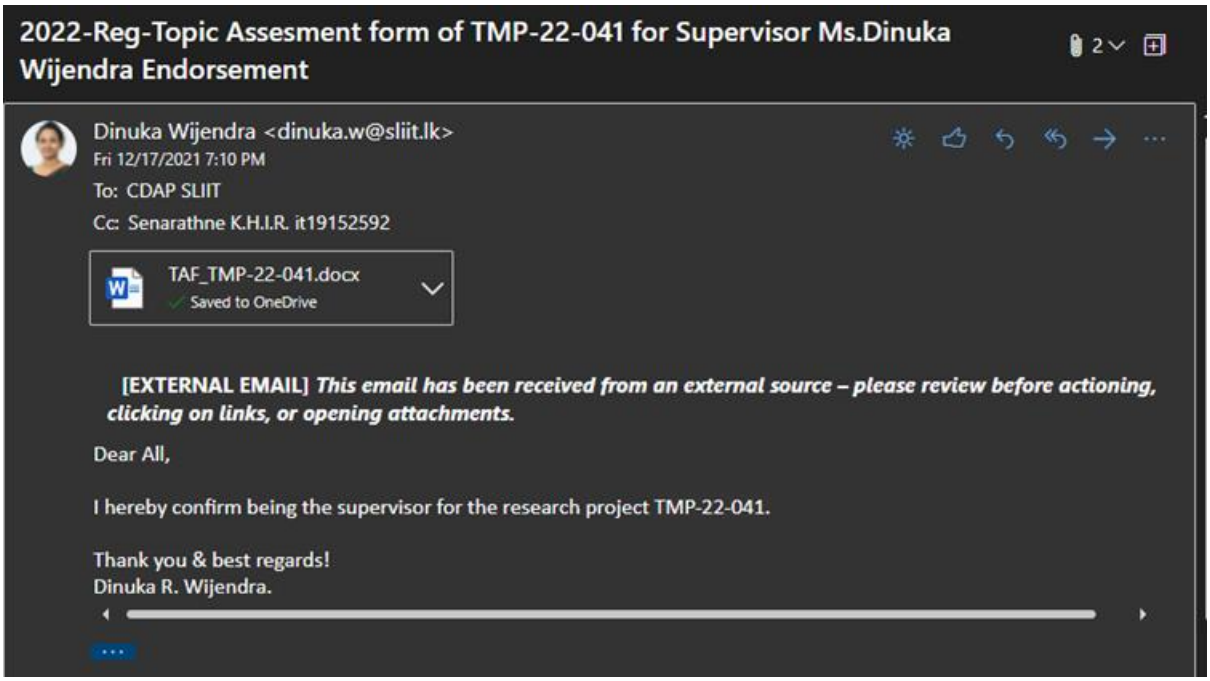
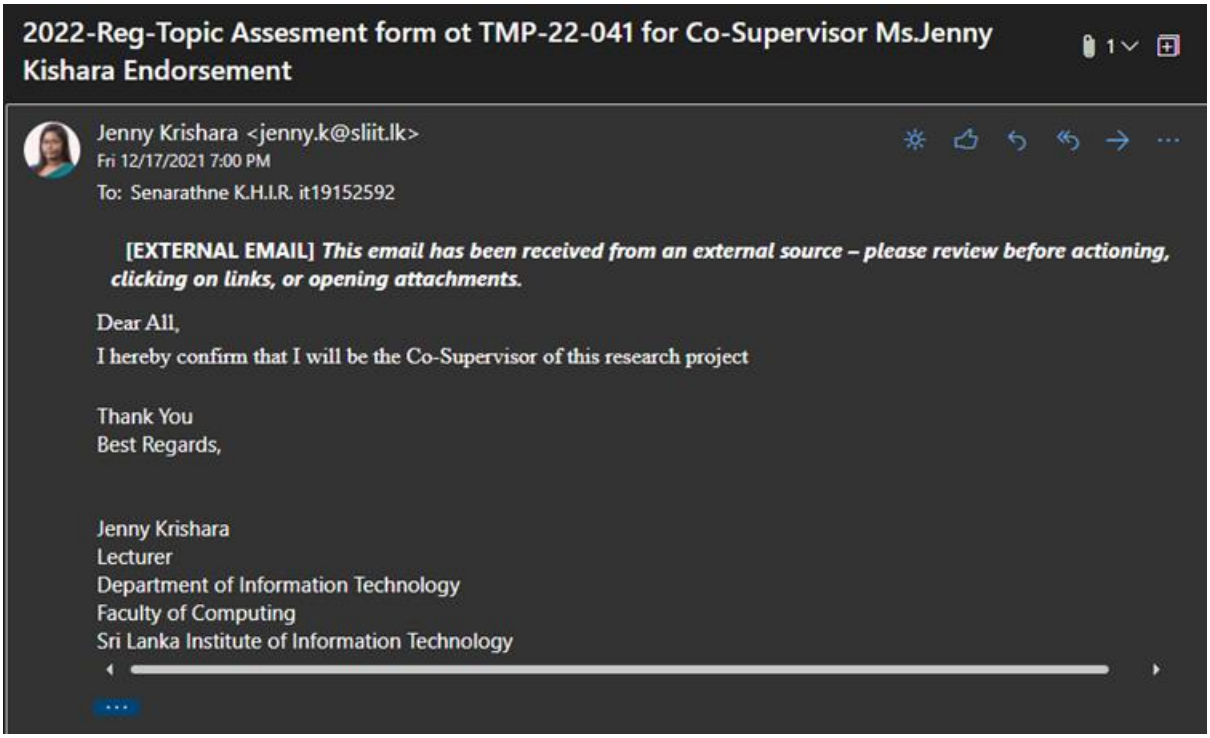
4	Nirash J.M.I.	IT19159768	

Appendix



Reply from the supervisor – Ms. Dinuka Wijendra



Reply from the co-supervisor – Ms. Jenny Krishara