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)	ASD.AI - Sinhala Dialogue Management Tool to Screen Kids with Autism Spectrum Disorder
RESEARCH GROUP **(as per the Topic assessment Form)**	Artificial Intelligence and Machine Learning
PROJECT NUMBER	TMP-21-221 (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	Gunawardhana M.D.R.T. (GROUP LEADER)	IT16090804	0768779063	it16090804@my.sliit.lk
2	Herath H.M.D.N.	IT18081794	0767566925	it18081794@my.sliit.lk
3	Anjali R.P.D.N.	IT17109536	0755902340	it17109536@my.sliit.lk
4	Sampath G.A.D.M.	IT16061880	0724113606	it16061880@my.sliit.lk

SUPERVISOR, CO_ SUPERVISOR Details

SUPERVISOR Name	CO-SUPERVISOR Name
Prof . Koliya Pulasinghe	**Ms.Vijani piyawardana**
Signature	**Signature**
Attach the email as Appendix 1	**Attach the email as Appendix 2**
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)

Day by day the technology becomes better and better making the life of people easier. But there are some sides which are left untouched. Due to cultural reasons, ASD awareness is low in LMIC like Sri Lanka. Less evidence is available for ASD prevalence estimates here. ASD detection is poor in this region compared with developed countries due to research and funding limitations in LMIC. This is a deeply concerning issue and there is an urgent need for more support and services for these individuals living in Sri Lanka. Resource constraints meant that when ASD is identified, patients are often left untreated for long periods of time. Early identification and

diagnosis are important to improve clinical outcomes of small children with ASD. Smart devices represent an ideal platform for a computer-aided tool, as they are highly accessible and prevalent across the world. As ASD is an inherently biological phenomenon, the symptom checklists are consistent across different ethnic environments. However, the description and interpretation of ASD behavioral symptoms vary across different cultures. Therefore, culture can affect the ability of screening tools to detect ASD. To overcome the challenges described a proper solution should be given.

References

[1] Perera, H, Wijewardena, K, Aluthwelage, R. Screening of 18–24-month-old children for autism in a semi-urban community in Sri Lanka. J Trop Pediatr 2009; 55(6): 402–405

[2] Zwaigenbaum, L, Bauman, ML, Stone, WL, et al. Early identification of autism spectrum disorder: recommendations for practice and research. Pediatrics 2015; 136(Suppl. 1): S10–S40

[3] Wall, DP, Dally, R, Luyster, R, et al. Use of artificial intelligence to shorten the behavioral diagnosis of autism. PLoS ONE 2012; 7(8): e43855

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

To overcome the challenges described above, a tool that predicts ASD from a clinically validated culturally sensitive symptom checklist is proposed. Multiple machine learning algorithms are thoroughly evaluated on clinical PAAS data, and the best performing algorithm is embedded into the application. The proposed application can be administered by non-specialist healthcare workers too, to advise if a clinical referral is recommended. As more data are collected, the application can be refined and improved with software updates. Early identification of ASD in children enables intensive intervention before neuronal pruning is completed. The ASD.AI application embeds an intelligent machine learning model to arrive at a decision. This can be introduced as a novel tool for ASD screening using a culturally sensitive symptom checklist and embedded machine learning model. A variety of supervised learning models were trained on PAAS data collected clinically. The proposed application has shown greater predictive performance than current paper-based methods (PAAS). So, the new application is important to improve ASD awareness and detection which incorporates intelligent decision making in combination with a culturally sensitive and clinically validated screening tool is novel, and this combined approach will reduce the burden of the shortage of mental health services. Furthermore, valuable data can be collected about the prevalence of ASD and resources allocated correctly to decrease treatment delays.

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

The primary objective of the proposed solution is to create a machine learning based automated autism screening tool to reduce or eliminate error-prone, inefficient human intervention in the field. The proposed system's ability to support both English and Sinhala languages. The system with its efficient and robust performance will have a direct implication on the quality of the service.

Sub Objective 1:

Increase availability.
The intelligent agents deployed by the proposed platform can be operational and readily engage with their defined goal 24 hours a day, 365 days a year. As humans are emotional being their current mental status can have a direct implication on the quality of service provided by the human. But with the intelligent agent's probability of this incident occurring is never.

Sub Objective 2:
Handle many requests at a time with the proposed tool.
With the proposed platform intelligent agents will be deployed depending on the current load of requests to be handled and the agents will have the ability to handle multiple conversations simultaneously compared to its human counterpart.

Sub Objective 3:
Decrease cost.
The system is easy to configure to meet different needs from time to time. Once deployed, intelligent agents will ultimately have only little to known maintenance cost compared to current systems. The system will allow easy adaptability across different languages because of the modular platform it was built upon.

Sub Objective 4:
Increase overall productivity of the service.
Intelligent agents once deployed by the proposed platform will be reactive and efficient. Due to the intelligent agent's ability to interact with multiple users at a time, users of the system can gain in productivity, time, and scalability.

WORKLOAD ALLOCATION (**extract from the topic assessment form after correcting the suggestions given by the topic assessment panel.**)
(Please provide a brief description about the workload allocation)

MEMBER 1	

Manages ongoing conversation dialogues with Machine Learning and improves with each conversation based on the feedback provided. Deep Reinforcement Learning will be used to create a self-learning conversation management system which will be pre-trained using existing conversation histories. A knowledge graph like Neo4j will be used to represent knowledge (structured data – entities, intent) and its relationship with each other.

MEMBER 2

Convert Natural Language into structured data by extracting intent, entities, and other structured information. Natural language processing modules will be implemented which support both Sinhala & English. A deep learning neural network will be implemented to extract important keywords like entities, intent, and actions from the given text input. The module will self-learn with each feedback and will be pre-trained.

MEMBER 3

Convert voice sequences received into text format. The system will be implemented based on the Deep Speech 3 implementation by Baidu to support both English and Sinhala languages. Recurrent Neural Network will be trained using existing voice conversations using multiple GPUs. Separate language models will be implemented for each language.

MEMBER 4

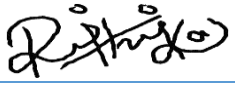
A state-of-the-art neural speech synthesis system: The system will be implemented based on the Deep Voice 3 and Wave NET implementation to support both English and Sinhala Languages. Recurrent Neural Network will be trained with a module containing an Encoder, Decoder & Convertor. The encoder converts textual features to an internal learned representation. Decoder decodes the learned representation while convertor creates the post-processing of audio to enable more human-like voice.

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	Gunawardhana M.D.R.T.	IT16090804	
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