

Project ID :

TMP-23-034

1. Topic (12 words max)

"Growin'Up" a Mobile Application for primary students with Dyslexia to improve Sinhala language.

2. Research group the project belongs to

Knowledge Inspired Computing (KIC)

3. Research area the project belongs to

Artificial Intelligence (AI)

4. If a continuation of a previous project:

Project ID	
Year	

5. Team member details

Student Name	Student ID	Specialization
Leader: Meddaduwage P.M	IT20127428	IT
Member 2: U.H.A.N Sandeepa	IT20142346	IT
Member 3: L.T.N Liyanage	IT20139094	IT
Member 4: E.N.D.S. Elamaldeniya	IT20088828	IT

6. Brief description of the research problem including references (200 – 500 words max) – references not included in word count.

Dyslexia is an unexpected difficulty in reading in children and adults who otherwise possess the intelligence, motivation, and schooling considered necessary for accurate and fluent reading. Dyslexia (or specific reading disability) is the most common and most carefully studied of the learning disabilities, affecting 80 percent of all those identified as learning-disabled [1].

One in five students, or 15-20% of the population, has a language-based learning disability. Percentages of children at risk for reading failure are much higher in high poverty, language-minority populations who attend ineffective schools. According to the National Assessment of Educational Progress (NAEP), 38% of all fourth-grade students are “below basic” reading skills. They are at or below the 40th percentile for their age group. 80% of children with an IEP have reading difficulty and 85% of those are Dyslexic. 30% of children with Dyslexia also have at least a mild form of AD/HD [2].

In Sri Lanka, minimum attention is paid to specific learning disorders like dyslexia by both health and education sectors. Limited awareness of stakeholders results in very late identification of dyslexia in early school stages due to which it is estimated to range from 5% to 17% among school-aged children. A population-based study in Rochester, Minnesota, reported cumulative incidence rates of reading difficulties to range from 5% to 11% [3].

With major concerns in countries like Sri Lanka even their native language (Sinhala) has been neglected by the dyslexic students where primary school students face several problems related to sounds recognition, reading comprehension, sentence construction, pronunciation, applying grammar rules and insufficient support from family. The results reveal that male students encounter more problems as compared to female students [4].

Even though there are some apps developed in Sri Lanka which are focused on the Sinhala language learning there are many things that are needed to be changed in them as per an example dyslexia for numbers is not much focused in mobile applications, “Hapana” Sinhala learning app, “ARUNALU” Learning ecosystem to overcome reading disabilities in Sinhala language due to Dyslexia are some of the systems that are developed to overcome this gap.

But as per the research is done regarding the current systems used in the Sri Lankan schools to work with dyslexia kids do not match the standards of the technology so with this research, the main objective is trying to make a mobile application which would help the primary kids (age 06-08) to develop their Sinhala language skills.

References

- [1] M. Sally E. Shaywitz, "Dyslexia," *Yale University School of Medicine, 333 Cedar St., New Haven, CT 06510, where reprint requests should be addressed to Dr. Shaywitz.*, January 29, 1998.
- [2] D. C. o. Utah, "Dyslexia Center of Utah," Utah, [Online]. Available:
www.dyslexiacenterofutah.org.
- [3] *. Hettiarachchi1, "An overview of dyslexia," *An overview of dyslexia Sri Lanka Journal of Child Health* , 2021.
- [4] P. M. A. N. T. F. S. Muhammad Dilshad, "Students' Difficulties in Learning English at Primary Level: A Teachers' Perspective," *JOURNAL OF EDUCATIONAL RESEARCH*, vol. VOLUME 19 , no. ISSUE NO 1, 2016.

7. Brief description of the nature of the solution including a conceptual diagram (250 words max)

The application will incorporate various technologies such as artificial intelligence, voice recognition, model training, and image processing to create a dynamic and interactive learning experience. The interface will be designed to be colorful, simple, and intuitive, with a focus on making it accessible for dyslexic students.

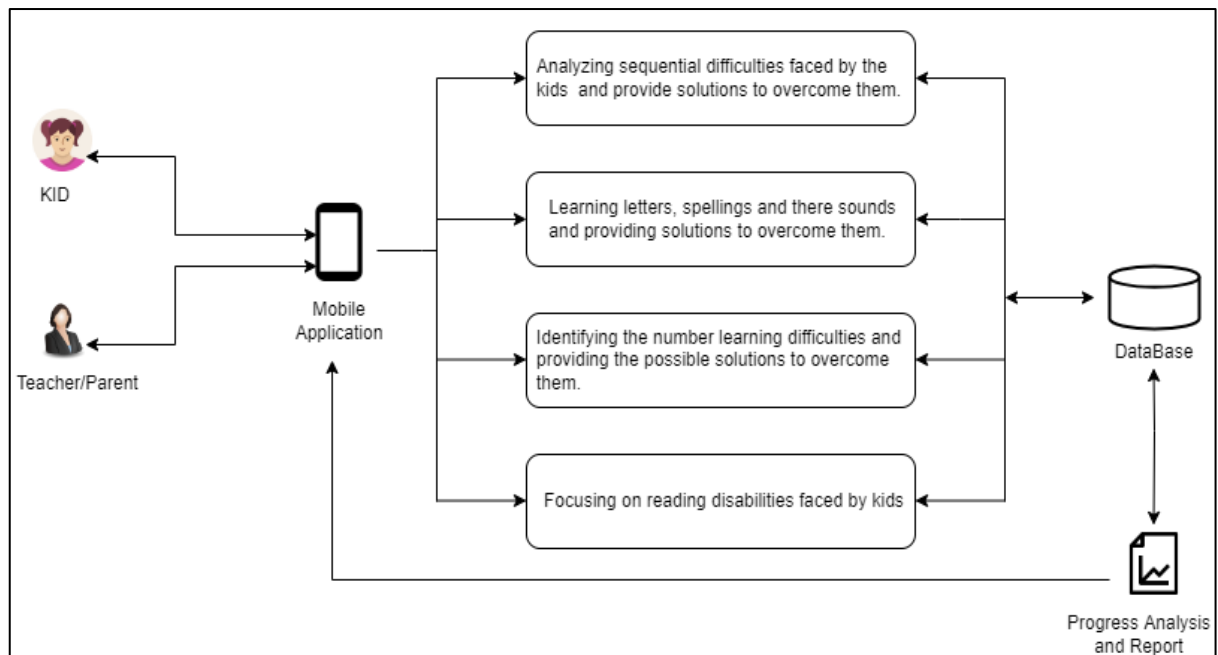
One of the primary features of the application is visual feedback. This will allow students to receive immediate feedback on their progress and help them to identify areas that need improvement. Additionally, the application will incorporate phonics-based text, animations, spoken words, and customizable word lists. This will help students to improve their reading and writing skills by providing them with interactive and engaging content.

Another feature of the application is the use of color overlays. This technique has been shown to be effective in helping dyslexic students to read and write by reducing visual distortions and improving contrast. The application will also include a daily routine with sub-objectives. This will provide students with a structured approach to learning and help them to stay motivated and engaged.

One area of focus for this application is mathematics. Many educational apps focus on reading and writing skills, but neglect mathematics. The proposed application will include a range of mathematical activities, including number recognition, counting, addition, subtraction, multiplication, and division. This will provide students with a well-rounded education and help them to develop important numeracy skills.

To ensure that the application is accessible for dyslexic students, it will use the Open Dyslexic font. This font is specifically designed to be easier to read for dyslexic students, as it incorporates features such as heavier bottom weighting, larger spaces between letters, and unique letter shapes.

Below is the system overview diagram for the proposed system (low-level)



8. Brief description of specialized domain expertise, knowledge, and data requirements (300 words max)

Schools are considered as the primary domain from where the data required are collected for the research. We visited two special education centers, one in Madiwela and the other in the education center in Narahenpita, where we got our basic idea. We met some teachers and other members working with students with dyslexia who can be known as knowledgeable people.

We will be focusing on the following when collecting datasets, (The below mentioned data will be taken from students and teaches from "Senehasa Education Resource Research & Information Centre" Narahenpita)

- Knowledge of effective teaching methods: To create an effective learning system, it is important to have knowledge of evidence-based teaching methods that have been shown to be effective in helping dyslexic students. This includes phonics-based instruction, multisensory learning, and explicit instruction.
- Data on student performance: To create a personalized learning experience for each student, data on their performance is required. This includes information on their reading and writing abilities, strengths and weaknesses, and progress over time. This data can be collected through assessments, observations, and teacher feedback.
- Understanding of technology: To incorporate technology into the learning system, it is important to understand how it works and how it can be used to support learning. This includes knowledge of artificial intelligence, voice recognition, image processing, and auto-correction algorithms.
- Knowledge of the education system: To ensure that the learning system is aligned with the curriculum and standards, it is important to have knowledge of the education system, including the curriculum, assessment methods, and teacher training.

10. Supervisor checklist (supervisors should fill sections 10 and 11)

a) Is this research problem valid?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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b) Is the proposed research group, correct?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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c) Is the proposed research area, correct?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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d) Do the proposed sub-objectives match the students' specialization?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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e) Is the required domain expertise, knowledge, and the data available?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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f) Is the scope of the solution practical?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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g) Do all sub-objectives have sufficient novelty?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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11. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor	Prof.	Samantha	Thedijsagoda	
Co-Supervisor	Ms.	Jenny	Krishara	Jenny 09/03/2023
External Supervisor				
Summary of external supervisor's (if any) experience and expertise				

9. Objectives and Novelty
Main Objective

To design and implement a mobile application for kids in the age group of 06 to 08 who are facing the learning disability dyslexia, the system will be implemented in the schools of our country because there are many cases where the dyslexic kids have missed even learning their mother language (Sinhala) and also we are trying to focus on the user-friendliness of this app because with the apps that the children are now using there are many problems that they are facing when using them. The proposed mobile application is not only based on an individual kid's reading skills but also on their interpersonal skill development. The system will also track the development of each child using the system, which would help the teachers work efficiently with them. We focus on four screening methods to overcome the difficulties a kid with dyslexia faces when learning the Sinhala language.

Member Name	Sub Objective	Tasks	Novelty
Meddaduwa P.M	Analyzing sequential difficulties faced by the kids of the age limit of 6-8 and the impact of visual dyslexia and provide solutions to overcome them.	<ul style="list-style-type: none"> Do brief research on the specific sub objective. Find the necessary tools and technologies that can be used to develop the solutions proposed. Build up the models and other 	<ul style="list-style-type: none"> Incorporate sound effects and visual feedback to help children understand sequencing. Voice recognition methods will also track correct and incorrect responses. The app will include phonics-based games and activities, such as word jumbling and puzzles, to improve learning. Text editors and auto-correction algorithms will track individual progress. The app will also use text generation through TensorFlow to

		technology-based algorithms. <ul style="list-style-type: none"> Find suitable algorithms and develop them(optional) Find and collect the necessary datasets. 	predict the next letters of the alphabet and help students understand sequencing.
U.H.A.N Sandeepa	Effects of phonological dyslexia, when learning letters, spellings and there sounds and providing solutions to overcome the learning difficulties.	<ul style="list-style-type: none"> Do brief research on the specific sub objective. Find the necessary tools and technologies that can be used to develop the solutions proposed. Build up the models and other technology-based algorithms. Find suitable algorithms and develop them(optional) 	<ul style="list-style-type: none"> Use audible models and voice recognition to help children learn letters and their sounds. The app will incorporate image pre-processing to allow children to upload written letters or words for the app to check. Will use language models in text infilling to help children learn and develop their understanding of letters.

		<ul style="list-style-type: none"> Find and collect the necessary datasets. 	
L.T.N Liyanage	Identifying the number learning difficulties faced by the dyslexic students with providing the possible solutions to overcome them.	<ul style="list-style-type: none"> Do brief research on the specific sub objective. Find the necessary tools and technologies that can be used to develop the solutions proposed. Build up the models and other technology-based algorithms. Find suitable algorithms and develop them(optional) Find and collect the necessary datasets. 	<ul style="list-style-type: none"> Using Automatic Speech Recognition to create a speech to text calculator by which a child can easily do his/her mathematical operations. Design of Student Assessment Model Based on Intelligence Quotient Using Machine Learning. Creating fun activities and games to improve the logical thinking of the children.

<p>E.N.D.S. Elamaldeniya</p>	<p>Researching on rapid naming dyslexia and focusing on reading disabilities faced by dyslexic students.</p>	<ul style="list-style-type: none"> • Do brief research on the specific sub objective. • Find the necessary tools and technologies that can be used to develop the solutions proposed. • Build up the models and other technology-based algorithms. • Find suitable algorithms and develop them(optional) • Find and collect the necessary datasets. 	<ul style="list-style-type: none"> • Will use Audible to enable listening and reading of text, with voice recognition to identify phrases. • Will feature adjustable audio playback speed settings and contextual text highlighting. • A quiz mode, utilizing voice recognition to test comprehension of the text, will also be included. • The app will provide a personalized dashboard to track progress over time.
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Summary Sheet

The topic evaluation panel will use the summary sheet to evaluate the suitability of the project

1. Brief description of research problem including references (200 – 300 words max)

Dyslexia is an unexpected difficulty in reading in children and adults who otherwise possess the intelligence, motivation, and schooling considered necessary for accurate and fluent reading. Dyslexia (or specific reading disability) is the most common and most carefully studied of the learning disabilities, affecting 80 percent of all those identified as learning-disabled [1].

One in five students, or 15-20% of the population, has a language-based learning disability. Percentages of children at risk for reading failure are much higher in high poverty, language-minority populations who attend ineffective schools. According to the National Assessment of Educational Progress (NAEP), 38% of all fourth-grade students are “below basic” reading skills. They are at or below the 40th percentile for their age group. 80% of children with an IEP have reading difficulty and 85% of those are Dyslexic. 30% of children with Dyslexia also have at least a mild form of AD/HD [2].

In Sri Lanka, minimum attention is paid to specific learning disorders like dyslexia by both health and education sectors. Limited awareness of stakeholders results in very late identification of dyslexia in early school stages due to which it is estimated to range from 5% to 17% among school-aged children. A population-based study in Rochester, Minnesota, reported cumulative incidence rates of reading difficulties to range from 5% to 11% [3].

With major concerns in countries like Sri Lanka even their native language (Sinhala) has been neglected by the dyslexic students where primary school students face several problems related to sounds recognition, reading comprehension, sentence construction, pronunciation, applying grammar rules and insufficient support from family. The results reveal that male students encounter more problems as compared to female students [4].

Even though there are some apps developed in Sri Lanka which are focused on the Sinhala language learning there are many things that are needed to be changed in them as per an example dyslexia for numbers is not much focused in mobile applications, “Hapana” Sinhala learning app, “ARUNALU” Learning ecosystem to overcome reading disabilities in Sinhala language due to Dyslexia are some of the systems that are developed to overcome this gap.

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2. Brief description of the nature of the solution (150 words max)

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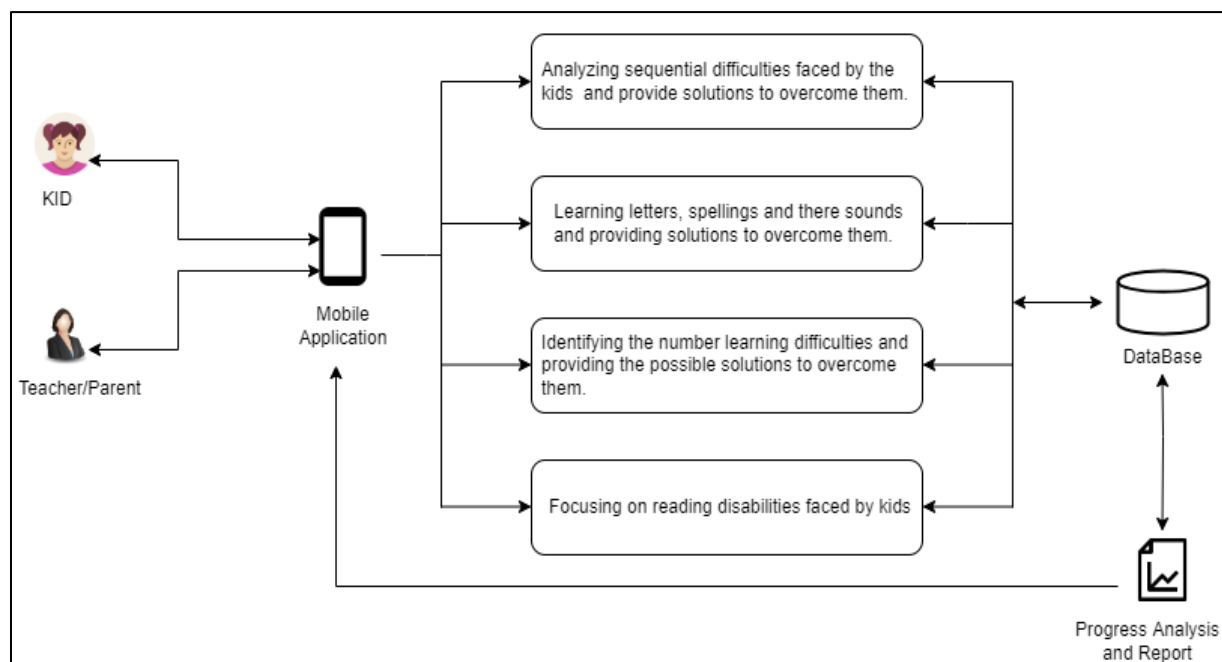
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Below is the system overview diagram for the proposed system (low-level)

We are trying to focus on the subobjectives mentioned in the below part (03 objects and novelty) where we are majorly trying to focus on bring the mathematical part to this application because that has been a lack in many applications.



3. Objectives and novelty

Main Objective

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			<p>do his/her mathematical operations.</p> <ul style="list-style-type: none"> • Design of Student Assessment Model Based on Intelligence Quotient Using Machine Learning. <p>Creating fun activities and games to improve the logical thinking of the children.</p>
E.N.D.S. Elamaldeniya	Researching on rapid naming dyslexia and focusing on reading disabilities faced by dyslexic students.		<ul style="list-style-type: none"> • Will use Audible to enable listening and reading of text, with voice recognition to identify phrases. • Will feature adjustable audio playback speed settings and contextual text highlighting. • A quiz mode, utilizing voice recognition to test comprehension of the text, will also be included. • The app will provide a personalized dashboard to track progress over time.

This part to be filled by the Topic Screening Panel members.

Acceptable: Mark/Select as necessary

Topic Assessment Accepted	
Topic Assessment Accepted with minor changes (should be followed up by the supervisor)*	
Topic Assessment to be Resubmitted with major changes*	
Topic Assessment Rejected. Topic must be changed	

* Detailed comments given below

Comments

The Review Panel Details

Member's Name	Signature

Important:

1. According to the comments given by the panel, do the necessary modifications and get the approval by the **Supervisor** or the **Same Panel**.
2. If the project topic is rejected, identify a new topic, and request the RP Team for a new topic assessment.
3. The form approved by the panel must be attached to the **Project Charter Form**.