



## 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)

Smart Navigation Application for Visually Impaired People

RESEARCH GROUP

(as per the Topic  
assessment Form)

Knowledge Inspired Computing (KIC)

PROJECT NUMBER

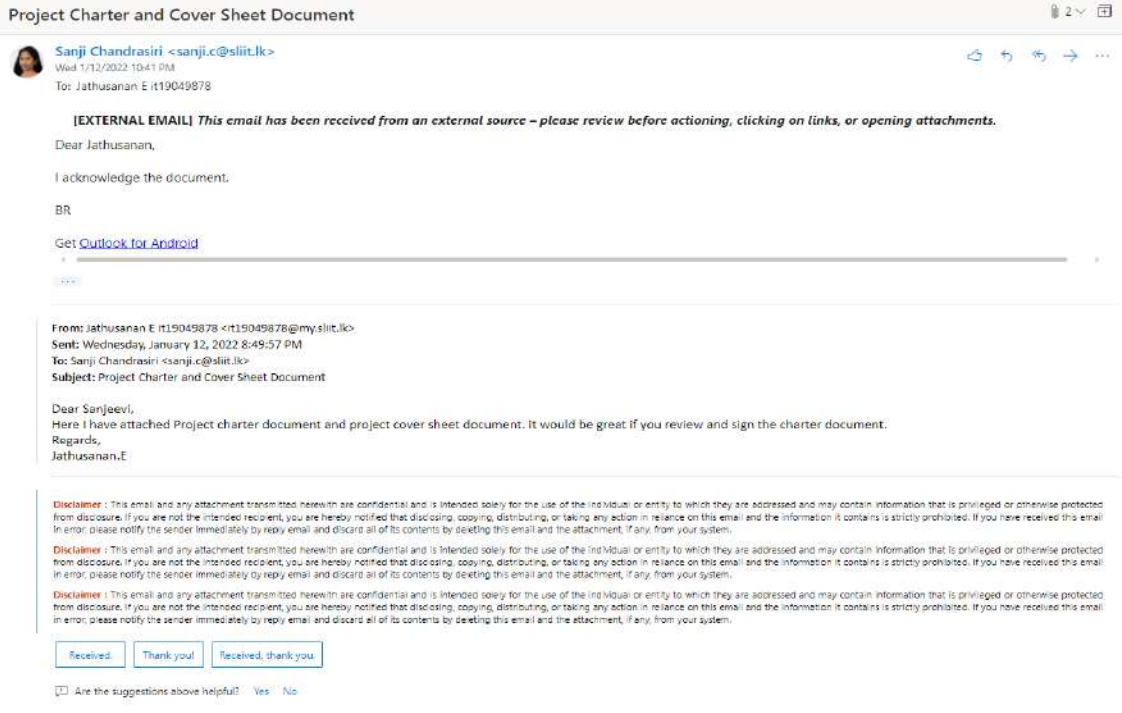
TMP-22-127

(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 | Jathusanan.E           | IT19049878  | 0772001027  | it19049878@my.sliit.lk |
| 2 | W.R.J.M.Weragoda       | IT19008424  | 0715128854  | it19008424@my.sliit.lk |
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**SUPERVISOR, CO\_ SUPERVISOR Details**

|  |                                       |
|--|---------------------------------------|
| <b>SUPERVISOR Name</b>   | <b>CO-SUPERVISOR Name</b>             |
| <b>Ms. Sanjeevi Chandrasiri</b>  |                                       |
| <b>Signature</b>   | <b>Signature</b>                      |
| <b>Appendix 1</b><br> | <b>Attach the email as Appendix 2</b> |
| <b>12.01.2022</b>  | <b>Date</b>                           |

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

|      |             |                 |                 |   |
|------|-------------|-----------------|-----------------|---|
|      |             |                 |                 | <b>Attach the email<br/>as Appendix 3</b> |
| 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)

The survey shows the prevalence of blindness in Sri Lanka as 1.7% among the age 40+ population. Similarly, the survey revealed that 1.6 % and 15.4% had severe visual impairment and visual impairment among the study population [2].

Blindness is crucial, and those visually impaired people should be given their fundamental rights and claims to live in the world. Although there are many problems for visually impaired and blind people in society, they face many types of hurdles in performing everyday routine work. The barrier of low vision does not let them become part of this society. Without visual information, blind people live in various hardships with shopping, reading, finding objects, etc. [4].

The visually impaired/blind people face many challenges and seek help from others, even for their daily routine due to various complications. For example, they find difficulties detecting obstacles in front of them while walking in the street, making it dangerous [1]. They also feel embarrassed many times while performing these tasks when they are unsuccessful in performing or completing them because of their visual impairment deficiency.

Visually impaired people cannot be able to go outside independently, even for their basic needs, and are mentally depressed due to their current inability [3]. In this case, they seek help from the family members, and they need special care. Family members need to spend more time with them to do their daily activities and for family members to do the personal work is an additional burden.

So, considering the overall difficulties and social movement of these people. Many research ideas help them with the most priority of findings. For example, two low technology aids for the blind, the long cane, and the guide dog, have been used by the blind for many years [2].

### References

- [1] Ayat Nada, Samia Mashelley, Mahmoud A Fakhr and Ahmed F Seddik. 2015. Effective Fast Response Smart for Blind People Second International conference in Bioinformatics and environmental engineering.
- [2] Balakrishnan G, Sainarayanan G, Nagarajan R and Yaacob S. 2007. Wearable Real-Time Stereo Vision for the Visually Impaired Engineering.
- [3] K. M. P. N. N. a. V. A. S. B Sumathy, "Smart Guidance System for Blind with Wireless Voice Playback," in IOP Publishing Ltd, 2021.
- [4] Nie M, Ren J and Li Z. 2009. Sound View: an auditory guidance system based on environment understanding for the visually impaired people Proceedings of the 31st Annual International Conference of the IEEE Engineering in Medicine and Biology Society: Engineering the Future of Biomedicine.

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

**A revolutionary solution for the above scenario will be successfully represented through a Mobile Application which will make all the tasks easier using the technology concepts of Image Processing, Machine Learning Algorithms, and deep learning. The application will be used bare hands or attached with the white cane.**

**One of the most significant problems that visually impaired people are facing when they are traveling is, they need to identify the obstacles on their way using the cane. It is a challenging situation to identify the correct obstacle. So, the system will identify the obstacles and inform the user via voice. Also, it is a struggle to understand the road signs for visually impaired people. Therefore, the proposed system will identify and inform them about the signs when they are nearby traffic signs via voice.**

**Then it would be a massive achievement if they could identify their relatives beforehand. Therefore, the proposed system will use facial recognition to identify the relatives and inform the users.**

**When it comes to domestic challenges, searching for objects/equipment is a massive problem for visually impaired people. Most of the time, searching one by one is the only solution. Therefore, the proposed system will solve this issue by identifying things on their table or nearby. Furthermore, the system will notify the user about the existence of the required object.**

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

- Users can easily find their required household objects using our system
- They can get Easily recognize their relatives / friends by using our system
- They can get proper awareness of the obstacles in their way
- Visually impaired people can get the proper awareness regarding Road Signs

**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 | <b>Household Object Detection</b> <p>.....</p> <p>From the captured image by the mobile, they will undergo into several image processing algorithms at the server and determines the proper household object which is needed by the user. The object which is found by the system will be notified via speech engine in the audio manner.</p> <p>The objectives of this functionality look as follows,</p> <ol style="list-style-type: none"> <li>1. Create an Interface to provide the input to the system as video format</li> <li>2. Develop a platform to collect data via voice.</li> <li>3. Data will be collected on a platform via mobile and evaluated using a machine learning model to identify visually impaired people's household objects.</li> <li>4. Provide the output to the user in the speech manner</li> </ol>  |
| MEMBER 2 | <b>Road Sign Detection</b> <p>.....</p> <p>Road signs play a significant role in assisting people when navigating as they provide directional information.</p> <ol style="list-style-type: none"> <li>1). Capture images using a camera.             <ol style="list-style-type: none"> <li>a). The proposed solution can be equipped with a hand-held or wearable device.</li> </ol> </li> <li>2). Detect the presence of a road sign on a given image.             <ol style="list-style-type: none"> <li>a). Detect the shape of the road sign using Shape detection algorithm.</li> </ol> </li> <li>3). Classify the sign by color and shape.             <ol style="list-style-type: none"> <li>a). Unify the colors of the image. (Red, Green, Blue, Yellow) (Using machine learning algorithm called K-means Clustering)                 <ol style="list-style-type: none"> <li>i). Identify prohibiting signs – red</li> <li>ii). Identify common guiding-signs – green</li> <li>iii). Identify caution signs – yellow</li> <li>iv). Identify room-labelling signs - blue</li> </ol> </li> <li>b). Sign Recognition: SURF</li> </ol> </li> <li>4). Mask out the background of the sign.</li> <li>5). If the sign has been recognized, notify the user about the specific sign via voice sounds.</li> <li>6). Otherwise, repeat the first five steps.</li> <li>7). Check the system on volunteers.</li> <li>8). Check, if the system could notify them about the signs.</li> <li>9). Collect the system's user feedback information. (formulating survey)</li> <li>10). Find the usability of the system analyzing collected data.</li> </ol> |

MEMBER 3

**Obstacle Detection**

With the help of this project they can recognize different objects just by pointing the camera around themselves to know the object and their size and relative distance from them.

1). Capture images using a camera.

a). In proposing system objects detection and classification will be done using TensorFlow Lite which detects the object and classifies them into different categories.

b). Masked out the background of the obstacle.

2). After classification, the distance of the object from the camera will be found.

a). After calculating the minimum distance from that is taken because at one time many objects are recognized, and it will create chaos for the user as the user will be hearing about the object and the distance via voice sound.

b). So the minimum distance object is taken into consideration.

3). Different properties like size, name and their relative distance from the user is gathered.

4). All the functionalities are communicated to the user through voice commands.

5). If the object is too, User will get a warning voice command to alert the user for possible collision.

6). Check the system on volunteers.

7). Check, if the system could notify them about the obstacles.

8). Collect the system's user feedback information. (Formulating survey)

9). Find the usability of the system analyzing collected data.

MEMBER 4

**Face detection of relatives and friends through image processing**

Using pre uploaded images of family members and friends, the user will be notified of their presence when they are in the vicinity using real time image processing attached to the navigation support stick. The user will be informed of their presence via a signal sent from the system to the navigation stick along with audio confirmation of the known individual.

1. Pre upload images of family members and friends to the database.

2. Incorporate an image capturing device to the navigation support stick to capture images in real time.

3. Develop a platform to collect the data from the images captured in real time and evaluate using image processing.





4. Using the image data stored in the database and the data captured from real time images, using a machine learning model to identify known individuals to the user.

5. The individual which is found by the system will be notified to the user using a signal and identified via speech engine in the audio manner.

## 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 constitute 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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