IEEE UAE

19th IEEE UAE STUDENT DAY COMPETITIONS
Academic year 2024 – 2025
Software Engineering Project (SEP) Competition

VisionAid: Intelligent Assistance for the Visually Impaired

I. Competition Rules

1. Only **IEEE UAE Students Members** are eligible for this competition.
2. Each institution can submit a maximum of two entries in this competition.
3. Each competing team shall have no more than four students.
4. The contestants shall not use any unauthorized or unlicensed software.
5. The source code and all relevant documentation shall be made available to the competition coordinator and the judges on the day of the competition.
6. Salient features of the software shall be documented with the aid of an A1 size Poster. A brief user manual shall also be provided.

II. Project Summary

The **VisionAid** project aims to enhance the independence and quality of life for visually impaired individuals by providing a real-time visual assistance application. The system leverages advanced computer vision and machine learning techniques to recognize objects, read text, and detect hazards, offering audio feedback to users. The application is accessible through mobile applications, ensuring cross-platform availability and convenience.

III. Technical Specifications

Students are required to develop all the following features, accessible through a mobile application. The system should access and store data in an online database, ensuring seamless data synchronization if necessary. Students are free to select the programming language and development framework they prefer to code the mobile app, but cross-platform development is recommended to ensure compatibility across different devices (e.g., Android and iOS).

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1. Object Recognition and Description

1.1. **Real-Time Detection:** The app must detect and identify common objects using the device's camera.

- **Dataset:** Use the Microsoft COCO (Common Objects in Context) dataset to train object recognition models.

1.2. **Audio Feedback:** Provide audible descriptions of recognized objects to the user.

1.3. **Customization:** Users can select categories of interest (e.g., furniture, people, vehicles).

2. Scene Description

2.1. **Contextual Understanding:** Provide brief descriptions of the overall scene (e.g., "You are in a park with trees and benches around").

- **Dataset:** Utilize the Places365-Standard dataset for scene recognition.

2.2. **Audio Feedback:** Provide audible descriptions of recognized scenes to the user.

2.3. This feature should function once the user presses a button (on-click).

3. Text Recognition (OCR)

3.1. **Text Detection**: Detect and extract text from images or live camera feed.

- **Datasets:**
  - ✓ SynthText for English text recognition.

3.2. **Language Support**: Support at least English languages.

3.3. **Reading Mode**: Users can capture documents or signs, and the app reads the text aloud.

4. Safety Alerts

4.1. **Hazard Detection:** Identify and alert users of potential hazards (e.g., stairs, obstacles, moving vehicles).

- **Dataset:** Utilize the KITTI Vision Benchmark Suite for training hazard detection models.

4.2. **Immediate Feedback:** Provide real-time warnings to prevent accidents.

5. User-Friendly Interface

5.1. **Simple Navigation:** Optimized for visually impaired users with large buttons and voice commands.

5.2. **Voice Commands:** Allow users to control the app using voice inputs.

5.3. **Tutorial Mode:** Provide an onboarding tutorial to help users understand app features.

IV. System Overview

Features	Real-time/On-Click
Object Recognition	Real-time
Scene Description	On-Click
Text Recognition (OCR)	On-Click
Safety Alerts	Real-time

V. Poster and User Manual

The students are required to provide:

- **User Manual**: A brief guide explaining how to use the app and its features.
- **A1 Size Poster**: Provides a concise software description and depicts the technical specifications, methodology, tools, and techniques used in the development of the system.

VI. Testing Procedure

Each team must provide:

- **Devices:**
  - A smartphone with the mobile application installed.
  - A laptop to display the developed code and database.
- **Demonstration:**
  - The judges will provide scenarios to test the app's functionalities, such as object recognition, scene description, text reading, and hazard detection.
- **Data Provision:**
  - Input variables such as language settings and customization preferences to demonstrate functionality.

VII. Evaluation

A panel of three judges, to be selected by the IEEE UAE Students Day Steering Committee, will assess the entries of the competition. The competition criteria that will be used for judging the entries are given below:

No.	Evaluation Criteria	Weight Distribution	Weight
1	**Functionality**	• Object Recognition (15%) • Scene Description (15%) • Text Recognition (OCR) (15%) • Safety Alerts (10%)	55%
2	**Theoretical Knowledge**	Understanding of computer vision algorithms, machine learning models, and software engineering principles	10%
3	**User-friendly Interface**	Ease of navigation, accessibility features, and overall user experience	10%
4	**Additional Features**	Implementation of bonus features	15%
5	**Poster and User Manual**	Clarity, completeness, and professionalism of the documentation	10%
	Total		**100%**

VIII. Note to Participants

- **Dataset Usage:** Ensure compliance with the licenses and terms of use for all datasets.
- **Ethical Considerations:** Respect user privacy and data protection regulations.
- **Technical Support:** Teams are encouraged to research and utilize available resources to implement the required features effectively.
- **Creativity:** While meeting the minimum requirements, innovation is highly encouraged and will be rewarded in the evaluation.