ROBERT GORDON UNIVERSITY ABERDEEN

SCHOOL OF COMPUTING SCIENCE AND DIGITAL MEDIA

MSc Big Data Analytics

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Project Title: Object detection and notification for visually challenged people	
	Start Date: 05/10/2022
	Submission Date: 21 / 08 / 2023

CONSENT

I agree ■
I do not agree □

That the University shall be entitled to use any results, materials or other outcomes arising from my project work for the purposes of non-commercial teaching and research, including collaboration.

DECLARATION

I confirm:

- **That the work contained in this document has been composed solely by myself and that I have not made use of any unauthorised assistance.**
- **That the work has not been accepted in any previous application for a degree.**
- **All sources of information have been specifically acknowledged and all verbatim extracts are distinguished by quotation marks.**

Student Signature: Janaka	Date Signed: 21st Aug 2023

Abstract

As per statistics of the “The International Agency for the Prevention of Blindness” (Ackland, Resnikoff and Bourne 2017) 1.1 billion people live with vision loss and 90% of them can be preventable or treatable. There are few reasons for this vision loss such as muscular degeneration, glaucoma, retinas pigmentosa and diabetes related eye diseases. From this there are 36 million people blind and a further 217 million had Moderate to Severe Visual Impairment (MSVI) (Ackland, Resnikoff and Bourne 2017) but this 36 million could not be recovered and need another person’s support to survive and perform day to day tasks.

There are many manual and technological solutions that exist to support visually impaired people. But they have many drawbacks such as lack of information to user, unable to identity the obstacle correctly, Cost, not flexible to carry and some are not specifically design walking purposes on the road. This project is aimed to help visually challenge people with the help of deep learning and Image recognition technologies with voice notification about the obstacles in front of the person and the distance to it from the origin. It detects the object in front of the person and, based on the dimensions of the object, severity will be categorized. For example, if small bricks are found it will categories this object as “Low Risk” obstacle or minor impacted object and if a wall found it will categories as “High Risk” object.

In this research, developed a solution which can be used by visually impaired people with their mobile. Mobile captures images every 5 seconds and give voice notification to the user. Based on notification he can decide whether he must move front or change the foot path. In the research, a Custom object detection model has been developed for the objects that are not captured by standard model and which was able to achieve overall 55% accuracy. The object classification model has been trained with 83% model accuracy and 62.5% accuracy with the prototype. Voice notification has been developed Azure Cognitive Service called Speech Service. Finally developed prototype has been evaluated by a user as well as by a subject matter expert. Users have ranked the overall solution with 4 / 5 and technical expert with 3 / 5 rate.