BSc in Computing in Software Development

Year 3

Professional Practice in IT

*Assistive Technology using Raspberry PI*

*G00424657 Louise Deeth*

*G00423921 Rebecca Nolan*

*G00423847 Sarah O’Connor*

Contents

[Introduction 3](file:///C:\Users\GHarrison\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KG3XG0T6\4th%20Yr%20Project%20Proposal.docx#_Toc464117570)

[Reason for Choosing Project 3](file:///C:\Users\GHarrison\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KG3XG0T6\4th%20Yr%20Project%20Proposal.docx#_Toc464117571)

[Technologies you plan to use 3](file:///C:\Users\GHarrison\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KG3XG0T6\4th%20Yr%20Project%20Proposal.docx#_Toc464117572)

[Architecture 3](file:///C:\Users\GHarrison\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KG3XG0T6\4th%20Yr%20Project%20Proposal.docx#_Toc464117573)

[Work Allocation 3](file:///C:\Users\GHarrison\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KG3XG0T6\4th%20Yr%20Project%20Proposal.docx#_Toc464117574)

Student Number(s): G00424657, G00423921, G00423847

Student Name(s): Louise Deeth, Rebecca Nolan & Sarah O’Connor

Supervisor: Daniel Cregg

GitHub Link: [LouiseDeeth/PPIT-Project](https://github.com/LouiseDeeth/PPIT-Project)

# Introduction

This project aims to develop an assistive technology solution using a Raspberry PI, and camera module. The system will be designed to process real-world inputs through computer vision and provide feedback to users. It leverages machine learning and image processing techniques using Python and OpenCV, to enhance accessibility and ease of interaction.

# Reasons for Choosing Project

The motivation behind this project stems from an interest in computer vision and artificial intelligence. Additionally, this project aligns with our goals of gaining hands-on experience with machine learning, and IoT based automation.

# Technologies you plan to use

**Hardware**: Raspberry PI 5, Raspberry PI Camera Module V3

**Programming Language**: Python, JavaScript (React App), Flask

**Libraries & frameworks**:

* **OpenCV** – for computer vision and image processing
* **MediaPipe** – for hand tracking and gesture recognition
* **TensorFlow** – for machine learning
* **gTTS** – for text to speech functionality
* Google’s Gemini API

**Development tools**: GitHub Codespaces, VS Code

**Collaboration & Deployment**: GitHub for version control, Codespaces for remote development.

# Self-Learning

We aim to gain an understanding of:

* **Computer vision** – image processing techniques, object detection and real time recognition.
* **Machine Learning Models** – Training using TensorFlow.
* **Software Development Practices** – Using GitHub for version control and collaboration.

# Architecture

The system architecture consists of:

* **Input**: Raspberry PI camera module captures real-time video.
* **Processing**: OpenCV and MediaPipe handle image analysis and recognition.
* **Machine Learning**: TensorFlow models process image data and extract relevant information.
* **Output**: The system provides audio feedback using Google text to speech.

# Work Allocation

If you are part of a group project, this section should describe the main areas (and lesser areas) of responsibility for each member of the group.