Hazard Analysis
Software Engineering

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Table 1: Revision History

Date	**Developer(s)**	**Change**
Oct 17 2022	Jeremy	Added 2 FMEA table entries related to web application hazards
Oct 17 2022	Andrew	Added Camera FMEA table entry
Oct 17 2022	Jeremy	Added 2 more FMEA table entries related to web application
Oct 17 2022	Stanley	Rearranged some FMEA table entries, added computer vision table entries
Oct. 18, 2023	Edward	Added sections 1, 2, 3, 4
Date2	Name(s)	Description of changes
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Contents

1 Introduction

This document aims to outline and analyze the potential hazards of ASLingo. A hazard can be defined as a system state or set of conditions, often arising from inherent risks or software anomalies, that, when coupled with particular worst-case environmental conditions or unexpected interactions, can lead to a loss or adverse outcomes. This embodies potential sources of harm due to software failures, bugs, or undesired system behavior, emphasizing proactive identification and mitigation to ensure software safety and functionality.

2 Scope and Purpose of Hazard Analysis

Hazard analysis is a fundamental aspect of the software development process, crucial for preventing losses or adverse outcomes that are undesirable for any product. It involves identifying areas where hazards may arise and determining steps to either reduce or eliminate their effects, making it an important part of the development journey. This analysis is closely tied to the safety and security requirements of the software. Ensuring these requirements are well met significantly contributes to enhancing the software's reliability, making it a more dependable product in the long run.

3 System Boundaries and Components

ASLingo's system will involve the following components:

1. A camera to allow for user input
2. A web frontend to provide user interface and authenticate user login
3. A backend to process software logic
4. A machine learning model to interpret user hand signs

4 Critical Assumptions

1. Assume users are using ASLingo for its intended purpose
2. Assume users are able and willing to follow safety instructions

5 Failure Mode and Effect Analysis

Table 2: Failure Mode and Effect Analysis

Design Function	Failure Modes	Effects of Failure	Causes of Failure	Recommended Action	SR	Ref.
User authentication error	Invalid credentials	User cannot log in to system	User error or improperly saved data	Reset credentials and inform user	TODO	TODO
Database Access	Database is inaccessible	User cannot view progress or stored personal data	Database connection failure	Display static error page and await database backup/restoration	TODO	TODO
Working Application	Error state	User cannot view any pages, progress, and account	Major system failure due to bugs	Display static error page and await application restoration	TODO	TODO
Camera	Visual feed is unable to be captured	User's sign cannot be perceived by the device	Poor Lighting Conditions	Instruct user to adjust their environment lighting or move to environment with sufficient lighting	HR1	H3-1
	Physical defect that impairs operation		Cracked/Filthy camera lenses	Notify user that camera lenses appear to be inoperable	HR2	H4-1
Machine Learning Model	Model fails to process/recognize camera input	1. User sign input cannot be processed accurately/correctly	a. User skin tone is not within the bounds of the training set data used	a. Broaden training dataset to be more inclusive of all skin tones	DTR1	H5-1
			b. Hand sign motions are too fast/slow	b. Interrupt the user and inform user to adjust hand sign motions accordingly	TODO	TODO
		2. Sign recognition works with group members and stakeholders, but fails when a new user uses the application	a. Model is trained on a specific set of training data and tested on a specific set of people (developers and stakeholders)	a. Rigorous testing on multiple testing sets and on users not affiliated with the project to ensure hands with varying qualities can be recognized	TODO	TODO

6 Safety and Security Requirements

6.1 Hardware Requirements

6.2 Dataset Training Requirements

7 Roadmap