Ain Shams University
Faculty of Computer & Info. Sciences
Computer Science Dept

جامعة عين شمس
كلية الحاسبات و المعلومات
قسم علوم الحاسب

Graduation Project Proposal

Multi Modal Deceit Detection System

Team (3-6): *1st student name is considered the team leader.*

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Introduction

The project addresses the challenge of accurately detecting deceit in human communication. Beyond spoken words, lies often manifest through subtle physiological and behavioral changes. Traditional lie detection methods, such as polygraph machines, have limitations in terms of invasiveness and accuracy. This research aims to leverage modern technology, including computer vision and deep learning, to enhance lie detection. By analyzing video frames, extracting heart rate non-invasively from remote photoplethysmography, and processing behavioral signals from videos and audio, we seek to create a robust multimodal approach to identify deceptive patterns in human behavior.

Motivation

The motivation behind this project stems from the limitations of existing lie detection methods and the potential for advanced technology and AI to significantly improve accuracy. Traditional polygraph machines have been in use for decades, but they are bulky and invasive. By integrating computer vision, deep learning, and multimodal data analysis, we can revolutionize lie detection, making it more accurate and accessible. This project is motivated by the need for a reliable lie detection system with broad applications, from law enforcement to human resources and psychology, and underscores the ethical considerations essential in the development and deployment of such technology.

Objectives

The objectives of this project are as follows:

Develop a robust video-based heart rate measurement system using remote photoplethysmography techniques to extract heart rate from video footage.

Implement behavioral signal analysis algorithms to detect and quantify behavioral indicators of deception from video and audio data.

Train machine learning models and neural networks using existing annotated datasets to recognize patterns associated with truthful and deceptive statements.

Achieve multimodal data fusion by integrating heart rate data, behavioral signals, and audio data to enhance lie detection accuracy.

Main Modules/Functionalities

The main modules/functionalities of the project include:

1. Video-Based Heart Rate Measurement: This module focuses on extracting heart rate non-invasively from video using remote photoplethysmography.

2. Behavioral Signal Analysis: This module involves processing video and audio data to detect behavioral indicators of deception, such as blink rate, gaze changes, and hand movements.

3. Model Training: Here, we train machine learning models and neural networks using annotated datasets to identify deceptive patterns.

4. Multimodal Data Fusion: This module integrates heart rate data, behavioral signals, audio and video data to enhance lie detection accuracy through advanced machine learning and statistical models.

Work Plan

To achieve our objectives, we have outlined the following work plan:

1. Conduct an in-depth literature review to gather insights into the latest advancements in lie detection and multimodal data analysis.

2. Acquire and preprocess the "Bag-Of-Lies" and "Miami University Deception Detection Database" and possibly other datasets for use in training and testing our models.

3. Develop the video-based heart rate measurement system and ensure its robustness.

4. Implement behavioral signal analysis algorithms, incorporating computer vision techniques for accurate signal extraction.

5. Train machine learning models and neural networks on the processed datasets and experiment with transfer learning and fine tuning for improved lie detection.

6. Integrate heart rate data, behavioral signals, and audio data to create a multimodal lie detection system.

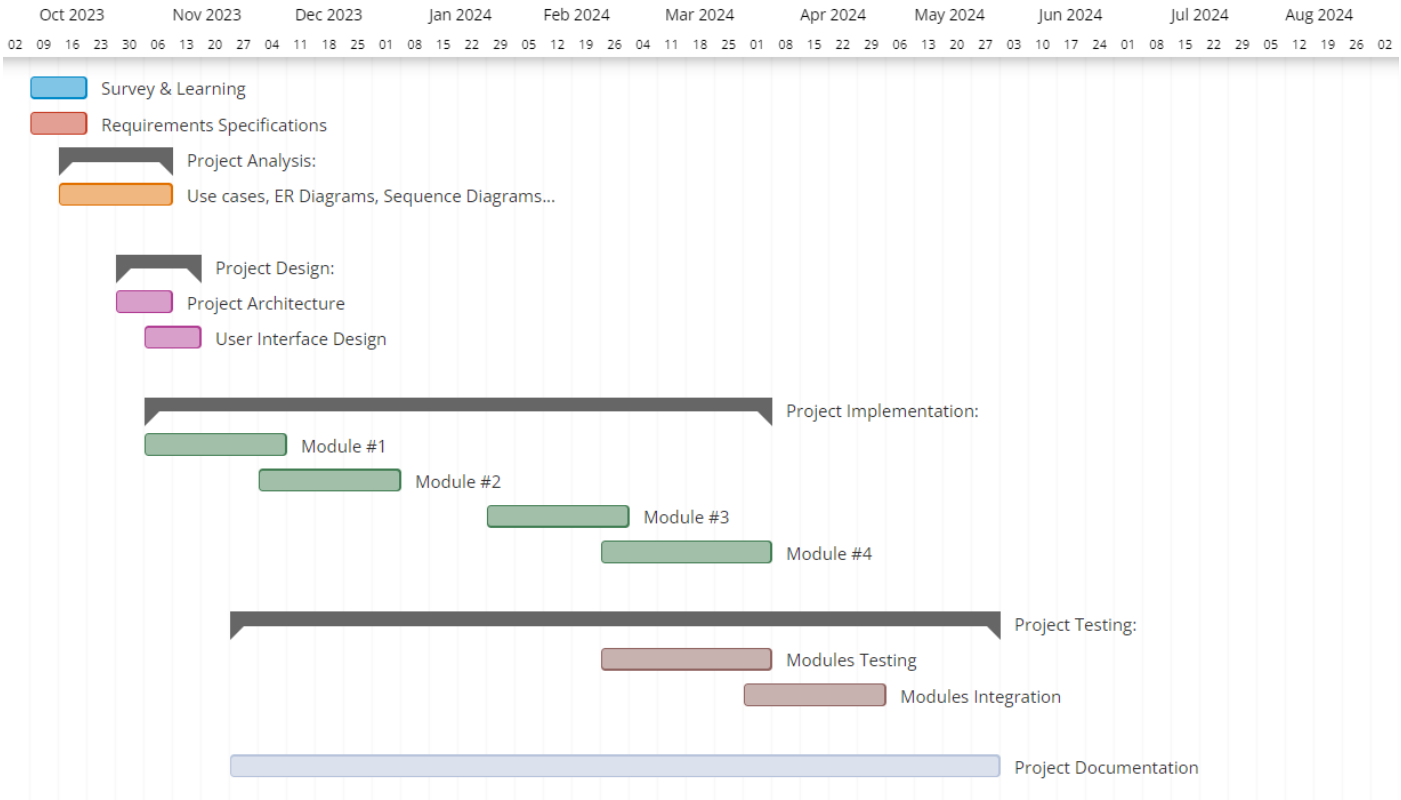
7. Evaluate the performance of the system through rigorous testing and validation.

8. Analyze the ethical implications of the technology and ensure responsible development and deployment.

Project Activities	Start Date	End Date
Survey & Learning	14th Oct 2023	21st Oct 2023
Requirement Specifications	14th Oct 2023	21st Oct 2023
Project Analysis Use cases, ER Diagrams, Sequence Diagram…	 21st Oct 2023	 *7th Nov 2023*
Project Design Project Architecture User Interface Design	 1St Nov 2023 7th Nov 2023	 7th Nov 2023 14th Nov 2023
Project Implementation (according to the specified modules) Module#1: Module#2: Module#3: Module#4:	 7th Nov 2023 7th Dec 2023 1st Feb 2024 1st Mar 2024	 7th Dec 2023 7th Jan 2024 1st Mar 2024 1st Apr 2024

Project Testing Modules Testing Modules Integration	 1st Mar 2024 1st Apr 2024	 1st Apr 2024 1st May 2024
Project Documentation	1st Nov 2023	1st Jun 2024

Gantt Chart



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