FYP Proposal Document

Project Title: ASFS (Auto Surveillance For Securtiy)

Project Type: Development

Group Memebers:
Fahad Baig (19I-1883)
Fateh Muhammad (19I-1750)
Adeel Subhan (19I-1869)

Supervisor: Dr. Hasan Mujtaba

1 Group Details

- Fateh Muhammad, 19I-1750 CGPA:2.51
  Degree: BS(AI)
  Email: i191750@nu.edu.pk

- Fahad Baig, 19I-1883 CGPA:2.42
  Degree: BS(AI)
  Email: i191883@nu.edu.pk

- Adeel Subhan, 19I-1869
  CGPA:2.66
  Degree: BS(AI)
  Email: i191869@nu.edu.pk

2 Project Overview

Our Project is about threat detection before it happens. We want to detect any suspicious activity that can cause a threat. So, we'll be looking into both threat detection like detecting some weapon in publicly accessible places or any suspicious activity like unattended luggage left.

The project is about having a customizable application that can detect suspicious activity and threats using auto surveillance. We want to make this application customizable for all kind of users. We have decided to not narrow down our scope of project to some specific area like banking or shopping malls or Universities, because we are concerned about the whole population of Pakistan, as no other framework or application is available in public for commercial use that may be providing services for all individuals and organizations. Instead, we'll provide some common features that are needed for the security of all kind of small and large organizations, and individuals as well.

This auto surveillance system will detect following threats and suspicious activities and warn users about it before any mishap. This system would be detecting such activities on common areas or public areas that could be reception of hospital or university or in front of some private property like houses as well. We are considering following activities as suspicious like

people are fighting, loitering, or snatching of bags. We'll be considering detection of weapons or fighting as a threat. Furthermore, there could be a fire at pubic place followed by any suspicious activity like someone left unattended luggage and then it causes a blast. We'll try to warn authorities about this luggage before any incident which is our strategy about detecting threats and trying to avoid them before they happen at all. User of application will be able to decide and customize who is the authority to be warned in case of any suspicious activity or threat detection.

3 Motivation

A surveillance application for threat detection that uses obvious traits like detecting weapons, aggressive behavior, seems like an appropriate stimulus that can be identified without much difficulty. Now imagine a bit complicated situation, like a luggage or a bag being left alone by an individual, which can result in a catastrophe (e.g., A blast). A harder problem to identify for sure, especially for a surveillance system. Previously, considerable work has been done on detecting threat but not much on suspicious activity, we aim to detect suspicious activities and threats and generate alerts appropriately. Moreover, we want our application to be flexible (so application can be targeted to a large audience i.e bussiness, schools, hospitals, private properties, flats) and easy to use as most of the security solutions in our local market provide hardware support and installation only.

4 Goals/Objectives

Our goal is fairly simple, build a survelliance based security applications which can be used by indivisuals, organizations or any other place which requires security. We've chosen some objective that we'll be working on which we think are crucial for the safety of people. These objectives are as the following:

4.1 Threat Detection

Using visual threats and object detection techniques, we aim to detect any apparent threat like a person holding a gun, a fire nearby or indivisuals fighting.

4.2 Suspicious Activiy Detection

Using behaviour, common patterns, we aim to recognize any suspicious activity happening, like a person roaming around without any reason or an unattended luggage.

4.3 Notifying User and Authorities

Once threat or suspicious activity has been detected, it needs to notified so appropriate action can be taken timely. We want these notifications to be customizable according to preference of user i.e. user will define what authority to call when a specific threat/suspicious activity is detected.

4.4 Simple and Customizable Web Application

This is one of the most important objective for us, as we want to target a large audience with security needs. Building a simple application means that even a layman will be able to use our application without any issue.Customizablility will help us target a larger audience.

5 Expected Outcomes

- Application that timely detects threats and suspicious activities.
- Application notifies the user if there's any danger near(in scope of cameras).
- Application notifies appropriate authority according to guidlines set by user, E.g. User can choose firefighter to call automatically in case of a fire.
- Application has ability to show threats/suspicious activities of the whole day/week.
- Application will ignore and not call local authorities if it detects a threat/suspicious activity from registered users. E.g. guard holding a gun.
- Web Application with live video, analytics, settings to customize and playback support.
- Progressive Web Apps for mobile users.

6 Project scope/High-level features

- An application that can be customized by the user E.g. which specific autority to call in a specific situation, what situation to generate alert for.
- In case of threat or suspicious activity, notification will be sent to the user
- Provide the warning or alertness to the authority, user will define it who is the authority
- Web Application with Analytics dashboard, and playback features.
- A demo page so a new user can upload their footage to test our security solution.
- Saving the previous data of the person in the databases if he/she wanted to see his/her record
- Generating a summary page of statistics and records of that particular person/organization
- History record which can be only deleted by user.

7 Division of Work

Member	Logic Building	OpenCV	TensorFlow/ PyTorch	Flask/Django	PWAs	Critical Thinking	Front-End	Documentation
Adeel	**8**	**7**	**6**	**8**	**6**	**8**	**6**	**6**
Fahad	**7**	**8**	**5**	**6**	**7**	**7**	**8**	**8**
Fateh	**8.5**	**8**	**7**	**7**	**5**	**7**	**7**	**6**

Figure 1: Familiarty with required tools.

	Backend	Frontend	Integration	Solution Design	Training	Testing	Evaluation	Schema	Documentation
Fateh	✓		✓		✓	✓	✓	✓	✓
Adeel	✓	✓	✓	✓	✓			✓	✓
Fahad		✓	✓		✓		✓	✓	✓

Figure 2: Division of work among members.

8 Timeline (Breakdown of Iterations)

Week 1 - 2	Week 3	Week 4 - 7	Week 8 Midterm Evaluation	Week 9 - 14	Week 15 Final Evaluation FYP - 1
Idea Selection Problem Identification with Possible Solution Supervisor Selection Team Selection Proposal Document submission Proposal Defense	Structure Design Behavior Design Database Design and Representation Data Structure Design Algorithm Design Data collection and cleaning for suspicious activities / normal activities Selection of Datasets and Deep Learning Model to be used Installation and setup of tools and technologies	Data Preparation for suspicious activities and normal activities classification and identification Suspicious Activity Identification in a CCTV video using Deep Learning A simple Presentable Web interface to upload video and check if it has suspicious activity or not. If yes, then which time frame have that suspicious activity. Poster Submission on Slate	Comments in code along with documentation Naming Conventions Static Analysis of Code Training and Testing of Model to check how accurate results are. Integration with our Web-App to give demo during mid-evaluation Working Code + Demonstration (for Iteration 1)	Designing Web Application Training and testing multiple models for Suspicious activity Detection from CCTV videos to select best performing model. Implementation of multiple extended features like user can sign-up, and login into browser-based application to check any suspicious activity or threat in a video by uploading a video. This will include Database Design Integration of our best performing model with our web application.	A complete web application for detection of any suspicious activity in a CCTV video by uploading a video on that website. Best Performing model among multiple Deep learning models that were trained to detect suspicious activity will be integrated with web application Working Code + Demonstration Complete Documentation for FYP-1 Testing of our Model on Run Time by accessing Public IP CCTV Cameras

Figure 3: FYP-I Breakdown.

Week 1 - 3	Week 4 - 5	Week 6 – 7 Pre Job-Fair Evaluation	Week 8 - 10	Week 11 – 15 Final FYP-2 Evaluation
Data Preparation for Threat Detection like someone carrying weapon, or house on Fire etc. Threat Identification in CCTV video using Deep Learning Training multiple Deep Learning Models on threat detection Datasets to check which model performs better.	Completing both main features of FYP to provide security to public using auto surveillance. Testing, Validation, and selection of best performing Deep Learning models for both Suspicious activity Detection and Threat Detection. Integration of Our Deep Learning Models with our Web Application	Implementation of all Extended Features for (Auto Surveillance and Security System) Users should be able to have a gallery of all suspicious activities in previous one year. We will provide features like notifying authorities after detection of any suspicious activity or threat. User would be able to define who is the authority. For which kind of threat System should inform him and just generate a warning Providing Final Report + Complete Documentation + Updated Posters	We will make this Auto Surveillance System customizable for Users And which kind of activity or Threat should be notified immediately to institutes like law enforcement agencies or Fire brigade We'll be giving Demo of Auto Surveillance System on Run Time, either Public IP Cameras or We can deploy our own CCTV Cameras (Subject to Hardware availability) Testing & Optimization	A publicly accessible web application will be made for marketing and providing Demo of both threat detection and suspicious activity detection. Visitors of website will be able to unload a video to check any suspicious activity or if there is any threat detected in that video. Complete FYP Report duly signed by the Supervisor adding: Development FYP Package & Deployment Diagrams SVN or GitHub Configuration/ Setup and Tool Manual Any other artifact deemed suitable by Supervisor Working Code + Demonstration

Figure 4: FYP-II Breakdown.

Approved:_____

Supervisor

Dr. Hasan Mujtaba