**SECURITY SURVEILLANCE OF WIDE – AREA FACILITIES WITH ARTIFICIAL INTELLIGENCE**

**ABSTRACT**

Security Surveillance of wide-area facilities with AI provides a broad set of highly sophisticated video analytics capabilities for enhanced security, safety and business operations, such as real-time detection of events of interest, rapid search and analysis of recorded video, and extraction of statistical data. This software is suitable for large residential areas.

Real-Time rule-based detections for specific, predefined events such as asset protection, crossing a line, unattended object, stopped vehicles, crowd analysis. Its architecture is applicable to installations of all sizes, with any number of cameras across multiple distributed sites. Some key features are

Crowed Analysis: Three processing steps involve in crowd analysis, and these include pre-processing, object detection and event/behavior recognition. This application will give security alert if the crowd is above the allowed number.

Unattended object detection: Intellectual system that functions as an intuitive “robotic eye” for accurate, real-time detection of unattended baggage/objects has become a critical need for security personnel. This system will report all unattended objects and classify its threat level also.

Stopped vehicles detection: Report stopped vehicles in restricted areas and the system would provide sufficient additional safety benefit to warn automatically using microphones.

**CHAPTER 1**

**INTRODUCTION**

**1.1 GENERAL INTRODUCTION**

Artificial Intelligence in security and surveillance is setting a new wave in protecting ourselves as well as our organizations. AI indeed helps organizations in offering security in multiple way that no surveillance cameras alone can give. Hence, one can see any potentially harmful behavior that even a human may miss. AI surveillance technology is not only used by businesses but also by the military. This shows that many countries are active in developing this technology. U.S based tech firms alone are currently supplying this technology to more than 32 countries according to a survey. Human attention spans up to a maximum of 20 minutes when engaged in a mundane task. Later, it starts decreasing paving the way for errors.

The traditional CCTV surveillance method is always reactive as it only aids when an incident occurs. Whereas, the AI in security helps with intelligent analysis of how a threat can occur. Besides, it can predict who can involve in theft while monitoring the people moving around in a retail store. It can also come up with solutions to detect unattended objects and bags in public places and airports. Hence, video analytics can help taking action before it’s too late.

Incorporating AI in security and surveillance offers finer face, object, and event recognition capabilities. This in turn provides real-time security that is also proactive. It helps cops in locating criminals from within a large crowd. Besides, it can pin-point high-net-worth customers from visitors in the stores. Also, it is capable of identifying a person based on their height, weight, build, etc. This eliminates the occurrence of any criminal activities thereby securing the place.

**1.2 GOAL OF THE PROJECT**

Humans can’t monitor a dimly-lit area. However, the AI-based surveillance systems can highlight any abnormal behaviors or movements on the screen. It alerts the security guards instantly avoiding any major threat or loss. This is possible due to the high-quality image processing techniques involved in AI. It can sharpen a low-quality image to draw sensible information. Besides, it enables the security personnel to use even a blurred image for useful analysis.

There is a series of cameras that constantly capture beneficial security footage around many critical locations. Yet, the traditional methods do not let analysts do a sensible analysis of such large volumes of data. This is due to the requirement for special software that can work on such data to generate security alerts. Integrating this AI software helps to interpret big data qualitatively. This allows security officers to take necessary steps to safeguard people as well as valuable assets.

**CHAPTER 2**

**LITERATURE STUDY**

**2.1 STUDY OF SIMILAR WORK**

**2.1.1 Existing System**

Human surveillance is attracting more importance nowadays due to the increasing demand of security and defense in different environments including door access control, border surveillance, immigration control, monitoring employee activities, identifying suspicious people, theft and vandalism deterrence, preventing criminal acts and so on. Several techniques have been developed in last decades for automatic surveillance of people using CCTV cameras and sensors. According to the number of cameras used in these techniques, surveillance systems can be classified into two categories: monocular and multi-camera based system. Most of the conventional surveillance systems widely used for security applications in supermarkets, airports, stations, ATM booths and other public places, employ monocular or single camera. They are limited by their fixed view angles, fixed resolutions and limited depth information. These limitations make it complex to estimate and recover the precise 3D information as well as motion behavior of human objects for accurate and robust tracking.

A CCTV camera is an analog video camera that transmits signals via coaxial cable to a single central location for monitoring, recording, and video analysis. While the recent trend is a push towards IP network cameras, CCTV cameras are still widely used, and offer a cost-effective answer to many common surveillance scenarios.

CCTV technology has been around since the 1940's, and became a major player in the security industry around 1970. The technology is tried and true, and there are CCTV security camera models for virtually any surveillance application. The two main categories of CCTV cameras are fixed cameras and pan/tilt/zoom models which can rotate horizontally and vertically to cover more area.

**2.1.2 Drawbacks of Existing System**

* A CCTV camera has a limited vision of a particular area, even though it can move up and down, it can’t not cover the whole area.
* A CCTV can’t be like a real guard, catch burglars and prevent break-ins immediately. It only records what it saw and sends email alert to owners.
* Increased stress levels

**CHAPTER 3**

**OVERALL DESCRIPTION**

**3.1 PROPOSED SYSTEM**

Security Surveillance of wide-area facilities with AI provides a broad set of highly sophisticated video analytics capabilities for enhanced security, safety and business operations, such as real-time detection of events of interest, rapid search and analysis of recorded video, and extraction of statistical data. This software is suitable for large residential areas.

Real-Time rule-based detections for specific, predefined events such as asset protection, crossing a line, unattended object, stopped vehicles, crowd analysis. Its architecture is applicable to installations of all sizes, with any number of cameras across multiple distributed sites.

**3.2 FEATURES OF PROPOSED SYSTEM**

* Crowed Analysis
* Unattended object detection
* Stopped vehicles detection

**3.2.1 FUNCTIONS OF PROPOSED SYSTEM**

* This application will give security alert if the crowd is above the allowed number.
* Intellectual system that functions as an intuitive “robotic eye” for accurate, real-time detection of unattended baggage/objects has become a critical need for security personnel. This system will report all unattended objects and classify its threat level also.
* Report stopped vehicles in restricted areas and the system would provide sufficient additional safety benefit to warn automatically using microphones.

**3.4 REQUIREMENT SPECIFICATION**

System analyst tasks to a variety of persons to gather details about the business process and their opinions of why things happen as they do and their ideas for changing the process. These can be done through questionnaires, details investigation, observation, collection of samples etc. As the details are collected, the analyst study the requirements data to identify the features the new system should have, including both the information the system produce and operational features such as processing controls, response times, and input output methods.

Requirement specification simply means, “Figuring out what to make before you make it”. It determines what people need before you start developing a product for them. Requirement definition is the activity of translating the information gathered in to a document that defines a set of requirements. These should accurately reflect what consumer wants. It is an abstract description of the services that the system should provide and the constraints under the system must operate. This document must be written for that the end user and the stake holder can understand it.

The notations used for requirements definition should be based on natural languages, forms and simple intuitive diagrams. The requirements fall into two categories: functional requirements and non-functional requirements.

The requirements of specification of the proposed system are as follows:

* Python
* MySQL

**3.5 FEASIBILITY STUDY**

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

* Technical Feasibility
* Operational Feasibility
* Economic Feasibility
* Behavioral Feasibility

**3.5.1 Technical Feasibility**

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system. Proposed system is developed by using front end as Python and back end as MYSQL. It is technically feasible and has lots of features. It is strong and secure application. It is done in an opensource application Django.

**3.5.2 Operational Feasibility**

It is mainly related to wide-area facilities. This test of feasibility asks if the system will work when it is developed and installed. It also measures how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development. There is no difficulty in implementing the system. This system is operationaly feasible and it can be used in a user friendly way and very effective. To ensure success, desired operational outcomes must be imparted during design and development. These include such design-dependent parameters such as reliability, maintainability, supportability, usability, disposability, sustainability, affordability and others. This software is suitable for large residential areas.

**3.5.3 Economical Feasibility**

Economic feasibility analysis is the most frequently used method for evaluating the effectiveness of a new or proposed system. More commonly known as cost/benefit analysis, the procedure is to determine the benefits and savings that are expected from a candidate system and compare them with the costs needed to be spending for implementation and operation. In case, the benefits outweigh costs, the decision is made to design and implement the system. The determination of economic feasibility requires an identification of the potential costs associated with the implementation of the proposed system.

An increase in efficiency, a lower duration of a down time due to increased troubleshooting ability, and a potential for new users are all benefits of the system. The proposed model with thorough cost and risk analysis shows that the system is economically feasible to be implemented as a profitable authentication system with assured security from imposters.

**3.5.4 Behavioral Feasibility**

The behavioral feasibility depends upon whether the system performed in the expected way or not. Behavioral Feasibility study is a test of system proposal according to it workability, impact on organization, ability to meet user’s need and effective use of resources. However, a feasibility study provides a useful starting point for full analysis. This system is behaviorally feasible because of the effective use of the resources and also the system satisfies user needs and is user friendly. There is no issue in testing.

**CHAPTER 4** **OPERATING ENVIRONMENT**

**4.1 Hardware Requirements**

Processor : Intel(R) Core(TM) i3-6006U CPU @ 2.00GHz 2.00GHz

RAM : 4.00 GB

Hard Disk : 100 GB

Drives : 1.44MB Floppy Disk Drive, CD ROM

Display Size : 15” Color Monitor

Screen Resolution : 800\*600 Pixels

Keyboard : Standard PS/2 Keyboard

Mouse : Synaptics SMBus TouchPad

Monitor : Generic PnP Monitor

**4.2 Software Requirements**

Operating System : Windows/ Ubuntu

Programming Language : Python

IDE : Pycharm

Scripting Languages : HTML, CSS, JavaScript

Web Browser : Google Chrome

Front-End : Python, Django

Back-End : My SQL

## 4.3 TOOLS AND PLATFORMS

### 4.3.1 Python

## Python is an [interpreted,](https://en.wikipedia.org/wiki/Interpreted_language) [high-level,](https://en.wikipedia.org/wiki/High-level_programming_language) [general-purpose](https://en.wikipedia.org/wiki/General-purpose_programming_language) [programming language.](https://en.wikipedia.org/wiki/Programming_language) Created by [Guido van Rossum](https://en.wikipedia.org/wiki/Guido_van_Rossum) and first released in 1991, Python's design philosophy emphasizes [code readability](https://en.wikipedia.org/wiki/Code_readability) with its notable use of [significant whitespace.](https://en.wikipedia.org/wiki/Off-side_rule) Its language constructs and [objectoriented](https://en.wikipedia.org/wiki/Object-oriented_programming) approach aim to help programmers write clear, logical code for small and large-scale projects. Python today has multiple implementations including Jython,scripted in Java language for Java Virtual Machine*;* IronPythonwritten in C# for the Common Language Infrastructure, and

## PyPyversionwritten in RPython and translated into C. To be noted, Cpythonwhich is written in C and developed by Python Software Foundation is the default and most popular implementation of Python. While these implementations work in the native language they are written in, they are also capable of interacting with other languages through use of modules. Most of these modules work on community development model and are open-source and free.

## Advantages/Benefits of Python

## The diverse application of the Python language is a result of the combination of features which give this language an edge over others. Some of the benefits of programming in Python include:

## Presence of Third Party Modules:

## o The Python Package Index (PyPI) contains numerous third-party modules that make Python capable of interacting with most of the other languages and platforms.

## Extensive Support Libraries:

## Python provides a large standard library which includes areas like internet protocols, string operations, web services tools and operating system interfaces. Many high use programming tasks have already been scripted into the standard library which reduces length of code to be written significantly.

## Open Source and Community Development:

## Python language is developed under an OSI-approved open source license, which makes it free to use and distribute, including for commercial purposes.

## Learning Ease and Support Available:

## Python offers excellent readability and uncluttered simple-to-learn syntax which helps beginners to utilize this programming language. The code style guidelines, PEP 8, provide a set of rules to facilitate the formatting of code. Additionally, the wide base of users and active developers has resulted in a rich internet resource bank to encourage development and the continued adoption of the language.

## User-friendly Data Structures:

## Python has built-in list and dictionary data structures which can be used to construct fast runtime data structures. Further, Python also provides the option of dynamic high-level data typing which reduces the length of support code that is needed.

## Productivity and Speed:

## Python has clean object-oriented design, provides enhanced process control capabilities, and possesses strong integration and text processing capabilities and its own unit testing framework, all of which contribute to the increase in its speed and productivity. Python is considered a viable option for building complex multiprotocol network applications.

### 4.3.2 MySQL

MySQL is the most popular Open Source Relational SQL Database Management System. MySQL is one of the best RDBMS being used for developing various web-based software applications. MySQL is developed, marketed and supported by MySQL AB, which is a Swedish company. This tutorial will give you a quick start to MySQL and make you comfortable with MySQL programming. MySQL is a fast, easy-to-use RDBMS being used for many small and big businesses. MySQL is developed, marketed and supported by MySQL AB, which is a Swedish company.

**Features of MySQL**

* **Relational Database Management System (RDBMS):** MySQL is a relational database management system.
* **Easy to use:** MySQL is easy to use. You have to get only the basic knowledge of SQL. You can build and interact with MySQL with only a few simple SQL statements.
* **It is secure:** MySQL consist of a solid data security layer that protects sensitive data from intruders. Passwords are encrypted in MySQL.
* **Client/ Server Architecture:** MySQL follows a client /server architecture. There is a database server (MySQL) and arbitrarily many clients (application programs), which communicate with the server; that is, they query data, save changes, etc.
* **Free to download:** MySQL is free to use and you can download it from MySQL official website.
* **It is scalable:** MySQL can handle almost any amount of data, up to as much as 50 million rows or more. The default file size limit is about 4 GB. However, you can increase this number to a theoretical limit of 8 TB of data.
* **Compatible on many operating systems:** MySQL is compatible to run on many operating systems, like Novell NetWare, Windows\* Linux\*, many varieties of UNIX\* (such as Sun\* Solaris\*, AIX, and DEC\* UNIX), OS/2, FreeBSD\*, and others. MySQL also provides a facility that the clients can run on the same computer as the server or on another computer (communication via a local network or the Internet).
* **Allows roll-back:** MySQL allows transactions to be rolled back, commit and crash recovery.
* **High Performance:** MySQL is faster, more reliable and cheaper because of its unique storage engine architecture.
* **High Flexibility:** MySQL supports a large number of embedded applications which makes MySQL very flexible.
* **High Productivity:** MySQL uses Triggers, Stored procedures and views which allows the developer to give a higher productivity.

### 4.3.3 Django

Django is a Python-based free and open-source web framework that follows the model-template view (MTV) architectural pattern. It is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so you can focus on writing your app without needing to reinvent the wheel.

#### Features of Django

* Ridiculously fast - Django was designed to help developers take applications from concept to completion as quickly as possible.
* Reassuringly secure - Django takes security seriously and helps developers avoid many common security mistakes.
* Framework Support − Django has built-in support for Ajax, RSS, Caching and various other
* frameworks.
* Administration GUI − Django provides a nice ready-to-use user interface for administrative
* activities.
* Development Environment − Django comes with a lightweight web server to facilitate end-to-end application development and testing.

**4.3.5 PyCharm :**

PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It is developed by the Czech company Jet Brains. It provides code analysis, a graphical debugger, an integrated unit tester etc.