INTELLIGENT AIRBAG DEPLOYMENT DETECTION

Submitted to University of Calicut in partial fulfillment of

the requirement for the award of the degree of

B.Sc COMPUTER SCIENCE

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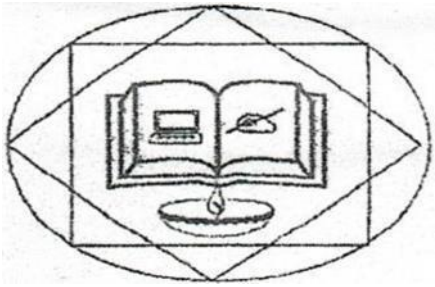

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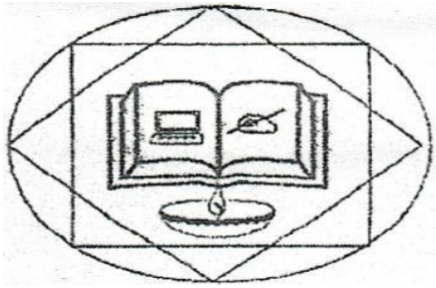

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CERTIFICATE

This is certified to be the bonafide record of work done by ABDULKAREEM.M (TIAVSCS010), ANOOJBASHEER.K.M (TIAVSCS012), ARSHADAHMED.A (TIAVSCS020), SHANIB.H (TIAVSCS023) of B.Sc CS sixth semester for the project work during the period 2023-2024

STAFF IN CHARGE **HEAD OF THE DEPARTMENT**

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EXTERNAL EXAMINER **INTERNAL EXAMINER**

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DECLARATION

We hereby declare that the report of this work entitled "**INTELLIGENT AIRBAG DEPLOYMENT DETECTION"** the record of partial work done by us under the supervision and guidance of Ms. GAYATHRI.R Asst.professor ,Department of Computer Science, Thunchathezhuthachan College, Elavanchery.

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CONTENTS

INTELLIGENT AIRBAG DEPLOYMENT DETECTION

ABSTRACT

ABSTRACT

The use of airbags in vehicles has significantly reduced the risk of injury or death during collisions. However, airbag deployment can go unnoticed, especially when the driver or passengers are unconscious or unable to call for help. This project aims to improve passenger safety by developing an AI camera-based system for airbag detection and automatic email alerts to emergency services. The proposed system uses an AI camera to monitor the vehicle's cabin and detect airbag deployment. The AI camera is trained using machine learning algorithms to recognize specific motion patterns associated with airbag deployment. Once the airbag is detected, the system automatically sends an email alert to the ambulance and police station with the vehicle's location and other relevant information. The system's automatic email alerts will help emergency services to quickly respond to accidents and provide necessary medical assistance to the passengers. The system is designed to be cost-effective, easy to install, and integrate with existing vehicle safety features. The project's outcomes will enhance passenger safety, reduce the risk of injury, and save lives in the event of an accident. The system's automatic email alerts to emergency services will provide faster response times and improve the overall effectiveness of emergency services

INTRODUCTION

1. INTRODUCTION

1.1 SCOPE OF THE PROJECT :

Road accidents are a leading cause of death and injury worldwide, and vehicle safety measures such as airbags have significantly reduced the risk of injury or death during collisions. However, airbag deployment can go unnoticed, especially when the driver or passengers are unconscious or unable to call for help. In such situations, timely medical assistance can mean the difference between life and death. Therefore, there is a need for a system that can detect airbag deployment and alert emergency services automatically.

This project proposes the use of an AI camera-based system for airbag detection and automatic email alerts to emergency services. The system utilizes machine learning algorithms to train an AI camera to recognize specific motion patterns associated with airbag deployment. Once the airbag is detected, the system automatically sends an email alert to the ambulance and police station with the vehicle's location and other relevant information.

The system's automatic email alerts will help emergency services to quickly respond to accidents and provide necessary medical assistance to the passengers. This project has the potential to significantly reduce the time required to respond to accidents and save lives in the event of an accident

1.2 EXISTING SYSTEM:

The existing system for airbag deployment detection and emergency alert primarily relies on manual intervention, where the driver or passengers manually call for emergency services in the event of an accident.

In some vehicles, airbag deployment triggers a light or alarm on the dashboard, alerting the driver or passengers of the airbag deployment. However, this system relies on the driver or passengers being conscious and able to respond quickly.

Some vehicles are equipped with GPS systems that can alert emergency services of the vehicle's location in the event of an accident. However, this system does not provide any information about the status of the passengers or the severity of the accident.

Overall, the existing system for airbag deployment detection and emergency alert relies on manual intervention and does not provide timely or accurate information to emergency services, potentially delaying their response times and reducing the effectiveness of medical assistance provided to passengers. The proposed AI camera-based system for airbag detection and automatic emergency alert aims to address these limitations by automating the detection and notification process and providing timely and accurate information to emergency services

1.3 PROPOSED SYSTEM:

AI camera-based system for airbag detection and automatic emergency alert , it is important to provide a clear and concise description of the system's functionalities and how it works. The following are the key components that should be included in the proposed system section:

System Overview: Provide an overview of the proposed system, including its purpose, objectives, and how it aims to address the limitations of the existing system.

System Architecture: Describe the system architecture, including the hardware and software components, and how they interact to achieve the system's objectives.

Airbag Detection Algorithm: Explain the airbag detection algorithm used in the system, including the machine learning algorithms used to train the AI camera to recognize specific motion patterns associated with airbag deployment.

Automatic Emergency Alert: Describe how the system automatically sends an email alert to emergency services with the vehicle's location and other relevant information once airbag deployment is detected.

Driver Notification: Explain how the system notifies the driver of airbag deployment through a visual or audio alert.

ADVANTAGES :

Improved Passenger Safety: The proposed AI camera-based system for airbag detection and automatic emergency alert can significantly improve passenger safety by detecting airbag deployment and notifying emergency services automatically.

Faster Response Times: The system's automatic email alerts to emergency services can reduce the time required to respond to accidents and provide necessary medical assistance to passengers.

Cost-Effective: The system is designed to be cost-effective and easy to install, making it accessible to a wide range of vehicle owners.

Integration with Existing Vehicle Safety Features: The system can be integrated with existing vehicle safety features, such as seat belts and airbags, to provide an additional layer of safety.

APPLICATION :

This system will detect the Airbag deployment on crash

SYSTEM ANALYSIS

2. SYSTEM ANALYSIS

2.1 FEASIBILITY STUDY :

A feasibility study is an evaluation of a proposal designed to determine the difficulty in carrying out a designated task. Generally, a feasibility study precedes technical development and project implementation. In other words, a feasibility study is an evaluation or analysis of the potential impact of a proposed project. Feasibility Study is performed to choose the system that meets the performance requirements at least cost. The most essential tasks performed by a Feasibility Study are the identification and description of candidate systems, the evaluation of thecandidate systems and the selection of the best of the candidate systems. The best system means the system that meet performance requirements at the least cost. The most difficult part of a Feasibility Study is the identification of the candidate systems and the evaluation of their performances and costs. The new system has no additional expense to implement the system.

The new system has advantages such as we can easily access files from any client in the Network, accurate output for accurate input and this application is more user friendly. We can use this application not only in this organization but also in other firms. So it is worth solving theproblem.

ECONOMICAL FEASIBILITY :

Economical Feasibility Study is the most frequently used method for evaluating the effectivenessof a candidate 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 cost. This analysis phase determines how much cost is needed to produce the proposed system. This system is economically feasible since it does not require any initial setup cost, asthe organization has required machines and supporting programs for the application to executeitself. It does not need additional staffing requirements.

TECHNICAL FEASIBILITY :

Technical Feasibility study is performed to check whether the proposed system is technically feasibleor not. Technical feasibility centres on the existing computer system (hardware, software, etc) and towhat extent it can support the proposed addition. This involves financial consideration to accommodate technical enhancement. This system is technically feasible. All the data are stored in files. The input can be done through dialog boxes which are both interactive and user friendly. Hard copies can be obtained for future use, by diverting the documents to a printer. Windows serves as theplatform for the new system.

OPERATIONAL FEASIBILITY :

Operational Feasibility study is performed to check whether the system is operationally feasible ornot. Using command buttons throughout the application programs enhances operational feasibility. So maintenance and modification is found to be easier.

2.2 SOFTWARE REQUIREMENT SPECIFICATION

The software requirements specification specifies the functional requirements and nonfunctional requirements: Functional requirements refers to how the system is going to react according to the input provided and how it is going to behave in particular situations. Nonfunctional requirements refer to Usability, Reliability, Availability, Performance, Security, Supportability, and Interface.

PYTHON :

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms. The Python interpreter is easily extended with new functions and data types implemented in C or C++ (or other languages callable from C). Python is also suitable as an extension language for customizable applications.

PACKAGES USED IN PYTHON

- **OPENCV**
- **OPENCV PYTHON**
- **TENSORFLOW**
- **KERAS**

2.3 MODULE DESCRIPTION

MODULES:

• Camera

• Machine Learning Algorithm

• Emergency Notification

• User Module

CAMERA MODULE:

Utilizes cameras strategically placed within the vehicle to capture visual data during potential collision events.

It also contains an OpenCV:

The OpenCV Processes the captured visual data, extracts relevant features, and identifies patterns associated with airbag deployment using computer vision techniques.

MACHINE LEARNING ALGORITHMS:

Applies machine learning algorithms to analyze the processed imagery, ensuring high precision in distinguishing genuine airbag deployment incidents from false positives.

EMERGENCY NOTIFICATION MODULE:

Initiates a sequence for emergency notifications upon confirming airbag deployment. This involves communication with emergency services, relevant authorities, and pre-defined emergency contacts.

USER INTERFACE MODULE:

Provides a user-friendly interface for vehicle owners to customize emergency contact preferences, enabling personalized and efficient communication during critical events

2.4 SYSTEM SPECIFICATION

HARDWARE REQUIREMENTS

Processer : Any update processor

Ram : Min 4gb

Hard disk : Min 100gb

SOFTWARE REQUIREMENTS

Operating system :Any windows

Technology :python 3.6

IDE :PyCharm

Front end :pyQt5

Back end :Data Sets

SOFTWARE DESCRIPTION

About the Tool:

FRONT END :

Front end will be a web application developed using the flask module in python. There will be a place to upload an image of the person we want to find using this technology.

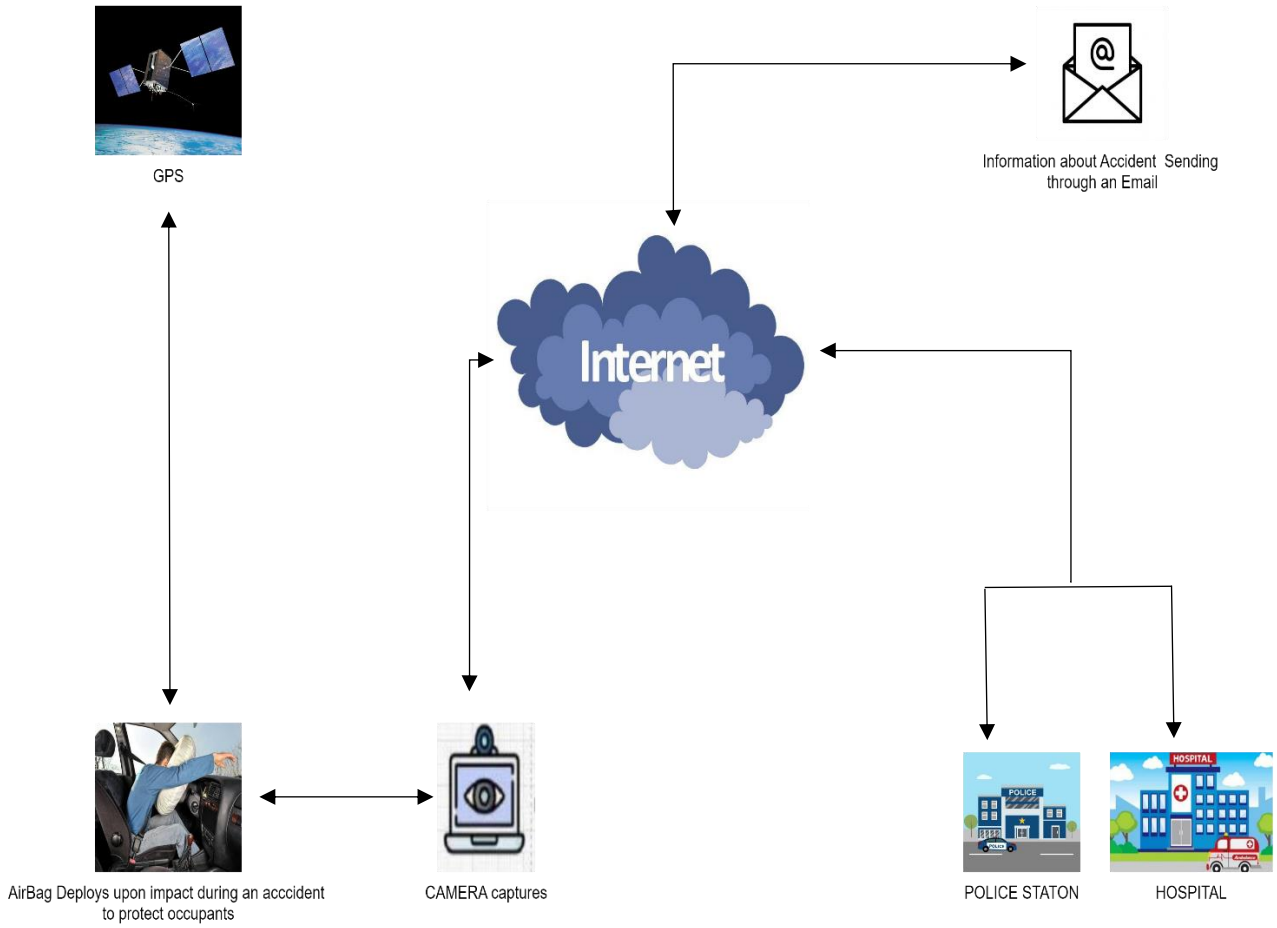
BACK END :

Back end will be a Dataset. Data sets are collections of data, often organized in a structured format, used for various purposes such as analysis, research, or machine learning. They can be stored in databases, spreadsheets, or files, and are crucial for back-end development as they provide the raw material for processing.

DESIGN AND DEVELOPMENT PROCESS

DESIGN AND DEVELOPMENT PROCESS

3.1 SYSTEM ARCHITECTURE :



3.2 USE CASE DIAGRAM

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well. In brief, the purposes of use case diagrams can be said to be as follows

Used to gather the requirements of a system

Used to get an outside view of a system

Identify the external and internal factors influencing the system

Show the interaction among the requirements are actors.

DESIGN NOTATION

Actor

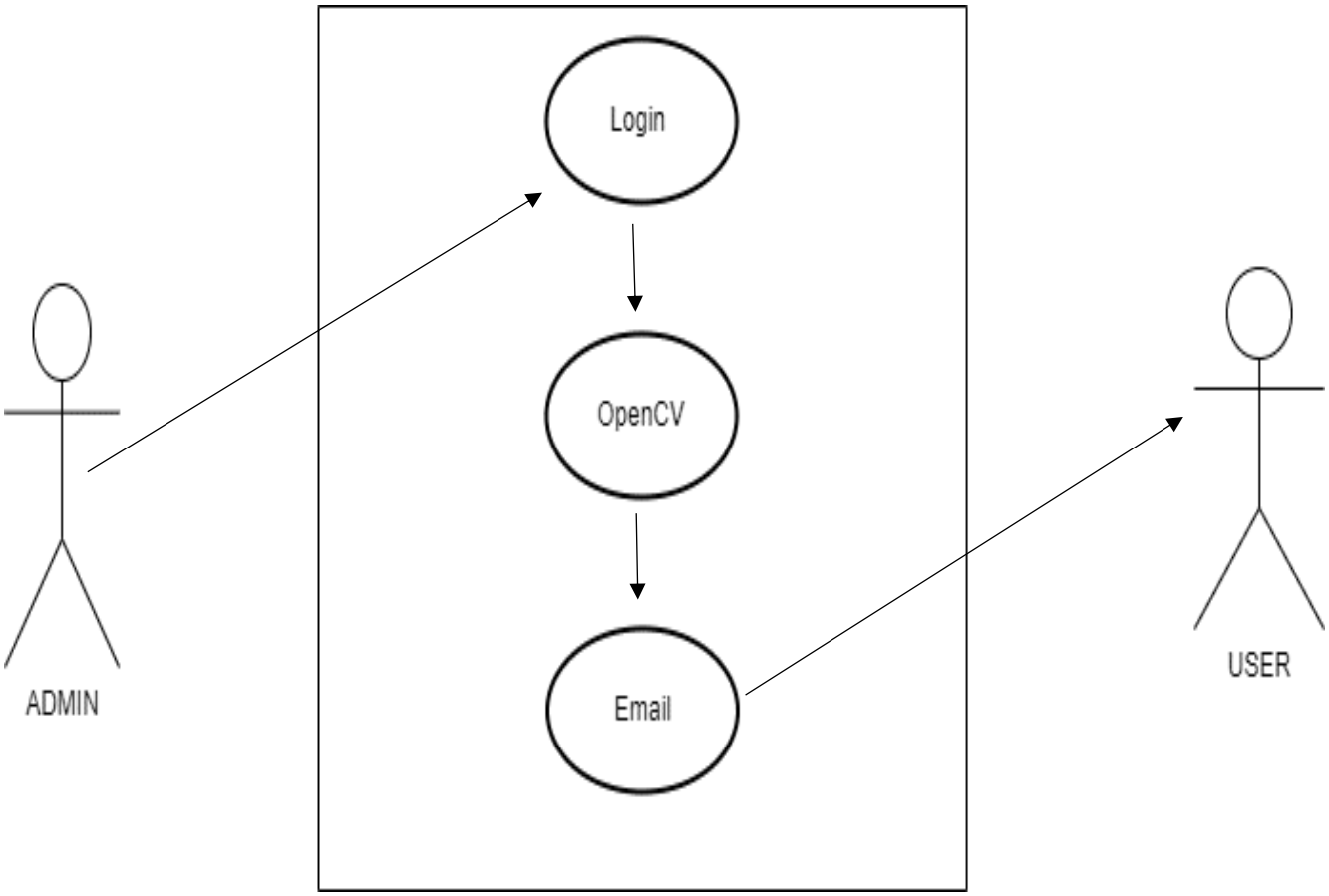
Actors are the entities that interact with a system. Although in most cases, actors are used to represent the users of system, actors can actually be anything that needs to exchange information with the system. So, an actor may be people, computer hardware, other systems, etc.

Use Case

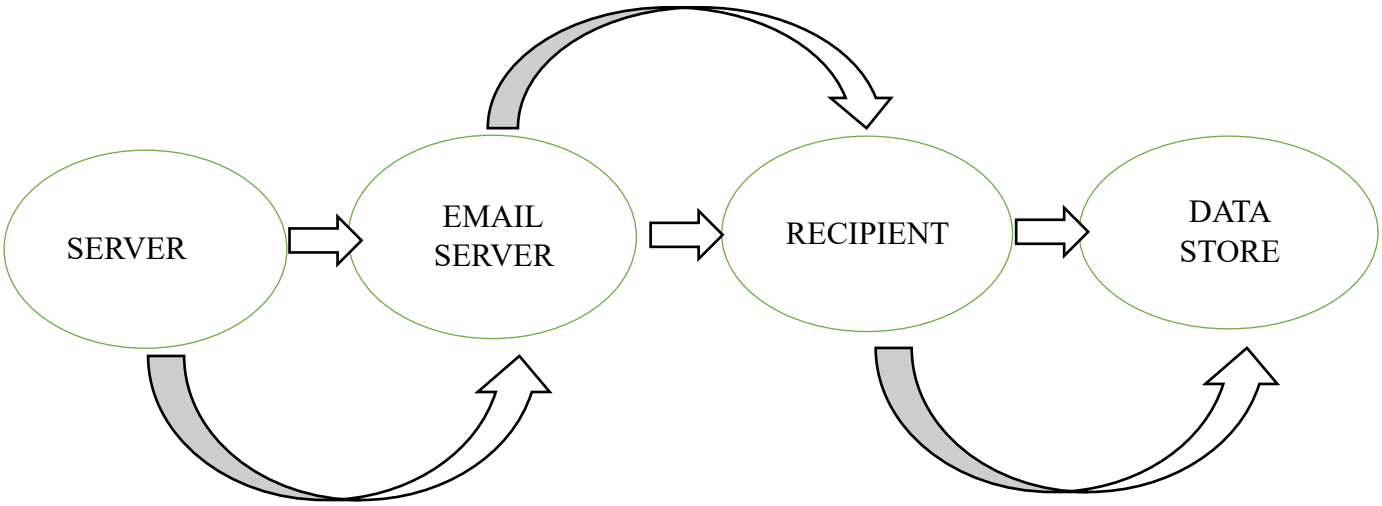
A use case represents a user goal that can be achieved by accessing the system or software application. In Visual Paradigm, you can make use of the sub-diagram feature to describe the interaction between user and system within a use case by creating a sub-sequence diagram under a use case.

Association

Associations between actors and use-cases are indicated in use-case diagrams by solid lines.


Login
OpenCV
Email
ADMIN
USER

3.3 WORKFLOW DIAGRAM



3.4 INPUT AND OUTPUT DESIGN

INPUT DESIGN :

Input design is the process of converting user-oriented input into a computer based format. The goal of designing input is to make data entry as easy and free from error. Inputto the system is entered through forms. A form is –Any surface on which information is to be entered, the nature of which is determined by what is already on that surface‖. If the data going into the system is incorrect, then processing and output will magnify these errors. So design should ensure that form is accessible and understandable by the user.

End users are people who communicate to the system frequently through the user-interface, thedesign of the input screen should be according to their recommendations.

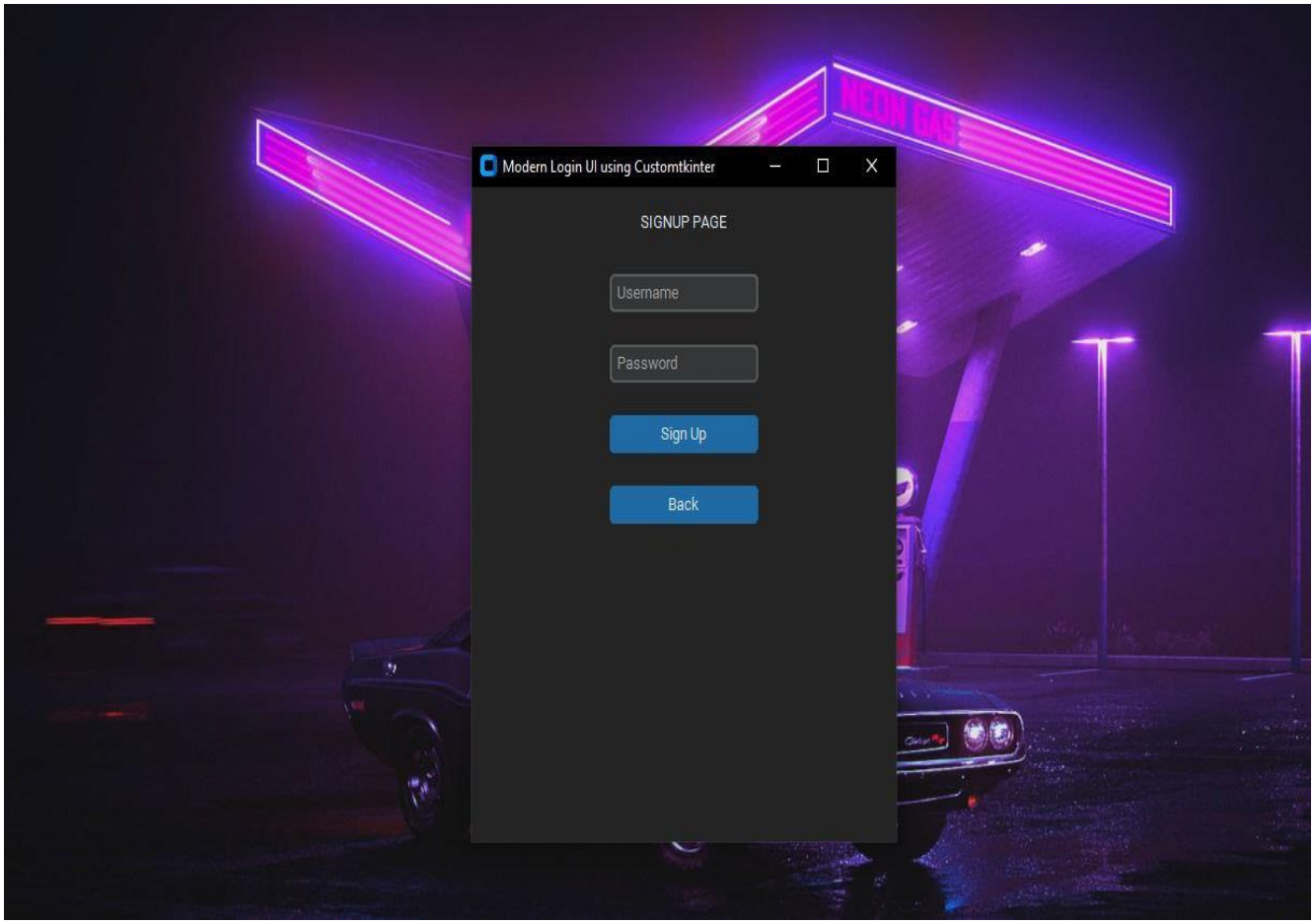
The following are the consideration given by the end-users for input design.The screen should be user-friendly and easy to operate Proper validation of inputs to be provide

The screen should be clear and enough information should be provided to guide the user to enter correct data.

List of valid values for the field should be provide wherever possible :

The design decisions for handling input specify how data are accepted for computer processing. The design of inputs also includes specifying the means by which End- User and system operators direct the system in which the action to take. The goal of the input design is to make the data entry easier, logical and error free. Errors in the input data are controlled by input design. Complex name, figures etc. are avoided to make it user-friendly. Security is provided in necessary areas.

The application has been developed in a user friendly manner. The system accepts the needs from the user with and understandable dialogs. The screens have been designedin such a way that during the processing the cursor is placed in the position where the data must be entered. The input screens of the design are designed with standard layouts, colors and with appropriate controls like option button, check boxes etc. for making the data entry process error free, fast with less strain. Data validation methods are used to check the data entered and to display appropriate error messages if any errors are found.


Modern Login UI using Customtkinter
SIGNUP PAGE
Username
Password
Sign Up
Back
NEON GAS

OUTPUT DESIGN

The most important thing about any system is what it produces. A System is judged to be a success or failure depending on whether its products are useful or not. So it is critical that we first specify what is required from the system. Once this hadbeen done, we can concentrate on what is required from the system. Once this has been done we can concentrate on what is required to produce this output. In order to agree what results are tobe produced by the system users are consulted to understand exactly what is required.

The main media available:

•Print used for reports and for a permanent listing of the file contents.

•Video display used for temporary output, usually responses to queries.

•Disk used for storing data files. These lies normally used for output and input.

Other factors to be considered when we are designing output are usage, quality and cost. These factors are closely related and we normally seek a compromise involving all three. For instance higher quantity generally cost more and a document to be used by the public needs to be better quality than once used within an organization.

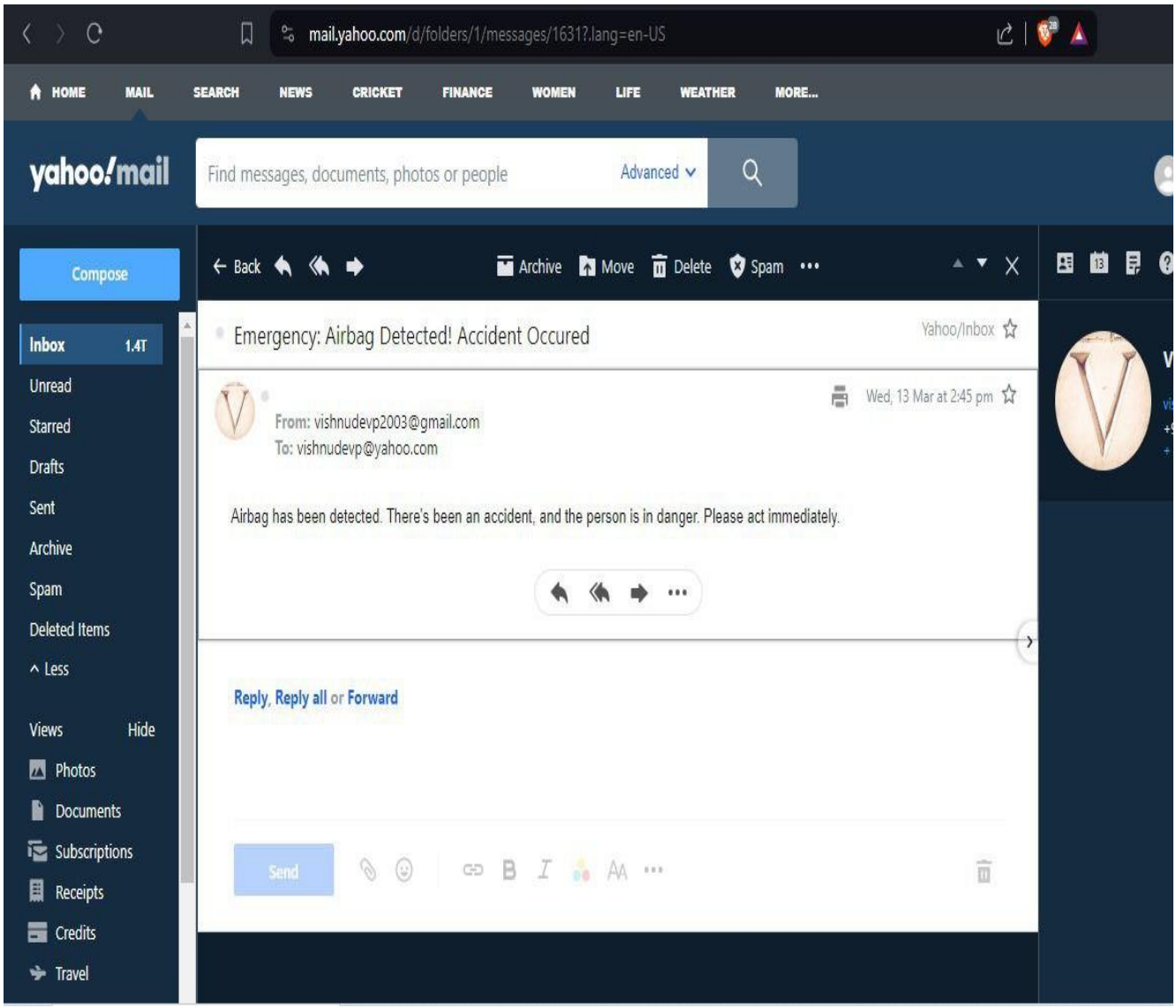
Thus were output is send can be divided into two broad groups internal andexternal. Internal usage refers to use by employees within organization, whereas external output is desired for people outside the organization.

The main requirement of an internal document is that it contains the necessary information for it to be useful. There is no need for fancy document or top quality printing or very high quality paper.

As long as the information is presented in a readable format the most important criterion as been satisfied. External documents, on the other hand, can play an important role in determining the public image of the organization. Thus the emphasis here is a presentation as well as usefulness. Later quality appearances etc. are given prime importance here.

Unfamiliar people use the external documents. So the terminology used must be simple. The higher the level of employee, the lesser the level of the employee, the lesser the details required in the report. How often a given report is needed or referenced can also influence is design.

Some reports must be produced daily while others are less frequentlyrequired, in certain cases reports may be legal requirements. Sometime previous year report may be required so an appropriate output medium is selected for storing such reports.



SYSTEM TESTING AND IMPLEMENTATION

4. SYSTEM TESTING AND IMPLEMENTATION

System testing is the stage of implementation, which is aimed at ensuring that the system works accurately and efficiently before live operation commences. For any software that is newly developed, primary importance is given to testing the system .It is the last opportunity for the developer over to the customers. Testing is the process by which a developer will generatea set of test data, which gives maximum probability of finding all types of errors that can occur in the software. Testing is vital to the success of the system. System testing makes a logical assumption that if all the parts of the system are correct, the goal will be successfully achieved.

The candidate system is subject to a variety of tests: online response, volume, stress, recovery &security and usability tests. A series of testing are performed for the proposed system before thesystem is ready for user acceptance testing.

It is the process of exercising or evaluating a system by manual or automatic means to verify that it satisfies the specified requirements or to identify the difference between expected and actual results. The testing activities are aimed at convincing the customer through demonstration and actual use that the software is a solution to the original problem and that boththe product and the process that created it are of high quality. It is also used to find and eliminateany residual errors from previous stages and the operational reliability of the system.

4.1 PREPARATION OF TEST DATA

Software testing is a crucial element of software quality assurance and represents the ultimate review of specification, design and coding. Testing represents an interesting anomaly forthe software. During earlier definition and development phases, it was attempted to build software from abstract concepts to tangible implementation. The testing responsible for ensure that the product that has built performs the way that the detailed design documentation specifies.

SCOPE OF THE TESTING PROJECT :

The main purpose of testing an information system is to find the errors and correct them.The scope of system testing should include both manual and computerized operations.

System testing is comprehensive evaluation of the programs, manual procedures, computer operations andcontrols. System testing is the process of checking whether the developed system is working according to the objective and requirement. All testing is to be conducted in accordance to the test conditions specified earlier. This will ensure that the test coverage meets the requirements and that testing is done in a systematic manner.

TESTING OBJECTIVES:

- Testing is the process of executing a program, with the intent of finding so many errors aspossible.
- A good test case is one that has a high probability of finding an as-yet-undiscovered error.
- A successful test is one that uncovers an as-yet-undiscovered error.

So, the main objective is to design tests that systematically uncover different classes of errors using minimum time and effort. Successful testing uncovers errors in software. It also shows thatthe software functions are working according to specifications. Also, the data collected during testing provides an indication of software reliability and software quality.

STATEMENT OF SCOPE

The strategy for system testing integrates system test cases and design techniques into a well-planned series of steps that result in the successful construction of software. The testing must co-operate with test planning, test case design, test execution and the resultant data collection and evaluation. A strategy for software testing must accommodate low level test and that are necessary to verify that a small code segment has correctly implemented as well as high level testthat validate major system functions against user requirements. Software testing is a critical element of software quality assurance and represents the ultimate review of specification design and coding. A series of testing is performed for the proposed system before the system is ready for acceptance testing.

4.2 TESTING :

The wide diffusion of Internet has produced a significant growth of the demand of Web-based applications with more and more strict requirements of reliability, usability, inter- operability and security. Due to market pressure and very short time-to-market, the testing of Web-based applications is often neglected by developers, as it is considered too time-consumingand lacking a

significant payoff. This depreciable habit affects negatively the quality of the applications and, therefore triggers the need for adequate, efficient and cost effective testing approaches for verifying and validating them. Though the testing of Web-based applications (Web applications, in the remaining of the paper) shares the same objectives of _traditional‘ application testing, in most cases, traditional testing theories and methods cannot be used just asthey are, because of the peculiarities and complexities of Web applications. Indeed, they have tobe adapted to the specific operational environment, as well as new approaches for testing them are needed.

UNIT TESTING:

Unit testing focuses verification effort on the smallest unit of the software design, the module this is known as module testing. Since the proposed system has modules the testing is individually performed on each module. Using the details design description as a guide, important control paths are tested to uncover errors within the boundary of the module. This testing was carried out during programming stage itself. In this testing step each module is foundto be working satisfactorily as regards to the expected output from the module.

INTEGRATION TESTING:

Data can be test across an interface; one module can have adverse effect on another, sub function when combined may not produced the desired function. Integration testing is a systematic technique for constructing the program structure while at the same time conducting test to uncover errors associated within the interface.

WHITE-BOX TESTING :

White-box testing is a test case design method that uses the control structure of theprocedural design to derive test cases. White-box testing of software is predicted on close examination of procedural detail.

BLACK-BOX TESTING :

The black-box testing focuses on the functional requirements of the software. It helps tofind out errors in incorrect or missing functions, interface errors, errors in data structures, performance errors and initialization and termination errors. The black-box testing is applied during the later stages for the functional requirement evaluation.

4.3 IMPLEMENTATION :

System implementation is the final phase i.e., putting the utility into action. Implementation is the state in the project where theoretical design turned into working system. The most crucial stage is achieving a new successful system and giving confidence in new system that it will work efficiently and effectively. The system is implemented only after thorough checking is done and if it is found working in according to the specifications.

It involves careful planning, investigation of the current system and constraints on implementation, design of methods to achieve. Two checking is done and if it is found working according to the specification, major task of preparing the implementation are educating, trainingthe users.

The implementation process begins with preparing a plan for the implementation of the system. According to this plan, the activities are to be carried out, discussions made regarding theequipment and resources and the additional equipment has to be acquired to implement the new system. The most important in implementation stage is, gaining the users confidence that the newsystem will work and be effective. The system can be implemented only after through testing is done. This method also offers the greatest security since the existing system can take over if the errors are found or inability to handle certain type of transactions while using the new system.

IMPLEMENTATION METHODS

There are several methods for handling the implementation and consists for changing from the old to the new computerized system. The most secure method for conversion from the old system is to run the old and new system in parallel .In this approach; a person may operate inthe manual processing system as well as start operating the new computerized system.

Another commonly used method is a direct cut over the existing manual system to the computerized system. The change may be within a week or a day. This strategy requires planning. A working version of the system can also be implemented in one part of the organization and the changes can be made as and when required, but this method is less preference due to the loss of entire system. After the system is Implementation, a review

should be conducted to determine whether the system is meeting expecting where improvements are needed.

Implementation is the process of bringing a developed system into operational use and turning it over to the user. Implementation includes all those activities that take place to convertfrom old system to new. At this stage the theoretical design is turned into a working system. Thecrucial stage in achieving a successful new system and giving confidence on the system for the users that will work efficiently and effectively.

- The implementation stage involves the following tasks:
- Careful planning
- Investigation of the current system and its constraints
- Design of methods to achieve the changeover
- Training of staff in the overall procedures
- Evaluation of changeover

IMPLEMENTATION PLAN

Implementation plan includes a description of all activities that must occur to implement the new system and to put into operation. It defines the personal responsible for the activities andprepares a time chart for Implementation the system. The Implementation plan should anticipate possible problems and must be able to deal with them. The usual problem may be missing documents, missed data formats between current and new files, errors in data translation, missingdata etc.

Training plats are an important element of the implementation plan. Their purpose is to ensure that all the persons who are associated with the computer based business system possessthe necessary knowledge and skills.

OPERATOR TRAINING:

Operator training is completed in conjunction with its installation and checkout. Operators must become familiar with operational requirements of the new systems. Wellprepared manual provide a ready reference to specific duties and step by step operation instruction.

USER TRAINING:

After the system is implemented successfully, training of the user is one of the most important subtasks of the developer. Even well designed and technically elegant systems can succeed or fail, because of the way they are operated and used. For this purpose user manuals areprepared and handled over to the user to operate the developed system.

Thus, the users are trained to operate the developed system. Both the hardware and software securities are made to run the developed systems successfully in future. In order to put new application system into use, preparation of user and system documentation, conducting usertraining with demo, test run for some period to ensure smooth switching over the system are to be prepared.

4.4 ALGORITHMS USED FOR IMPLENTATION

SSD-MobileNet and EfficientDet are both object detection algorithms used in computer vision.

- **SSD-MobileNet:**

Single Shot Multibox Detector (SSD) : SSD is a type of object detection algorithm that performs detection in a single forward pass, eliminating the need for multiple passes at different scales.

MobileNet: MobileNet is a lightweight convolutional neural network architecture designed for efficient mobile and embedded vision applications. It uses depthwise separable convolutions to reduce computational complexity while maintaining accuracy.

Integration: SSD-MobileNet combines the SSD architecture with MobileNet as its base feature extractor. This union allows for real-time object detection on resource-constrained devices, making it suitable for applications like mobile devices and embedded systems.

Advantages: SSD-MobileNet achieves a good balance between speed and accuracy, making it suitable for applications where real-time processing is crucial.

- **EFFICIENTDET:**

EfficientDet: EfficientDet is an object detection algorithm that aims to optimize both accuracy and efficiency. It leverages a compound scaling method that uniformly scales resolution, depth, and width of the neural network to achieve a balance between model size and performance.

Backbone Network: EfficientDet utilizes a more powerful backbone network compared to MobileNet, often using variations of the EfficientNet architecture, which itself is designed for efficient scaling.

Objectives: The primary goals of EfficientDet include achieving state-of-the-art performance on object detection benchmarks while minimizing the computational cost and model size.

Scalability: The compound scaling strategy allows EfficientDet to be scalable, making it adaptable to various resource constraints and application requirements.

In summary, SSD-MobileNet is a combination of SSD and the lightweight MobileNet architecture, offering a good compromise between speed and accuracy for real-time applications on resource-constrained devices. On the other hand, EfficientDet focuses on achieving optimal performance by using a more advanced backbone network and a scalable architecture, making it suitable for a wide range of applications with varying computational resources.

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CONCLUSION AND FUTURE ENHANCEMENT

CONCLUSION AND FUTURE ENHANCEMENT

CONCLUSION:

In conclusion, the AI camera-based system for airbag detection and automatic emergency alert is a promising solution to improve passenger safety during vehicle accidents. The system uses machine learning algorithms to recognize specific motion patterns associated with airbag deployment, and sends an automatic email alert to emergency services with the vehicle's location and other relevant information. This can lead to faster response times and improved medical treatment for passengers. The proposed system is designed to be cost-effective, easy to install, and integrate with existing vehicle safety features. While there are some potential disadvantages, such as false positives and privacy concerns, these can be addressed through ongoing development and refinement of the system. Overall, the AI camera-based system for airbag detection and automatic emergency alert has the potential to save lives and reduce the risk of injury during vehicle accidents. With ongoing research and development, this technology can continue to improve and evolve to provide even greater safety benefits for drivers and passengers

FUTURE ENHANCEMENT:

There are several potential future enhancements for the AI camera-based system for airbag detection and automatic emergency alert. These include: Integration with other vehicle safety features: The proposed system can be further enhanced by integrating it with other vehicle safety features, such as collision detection, blind spot monitoring, and lane departure warning systems. This integration can provide a more comprehensive safety system that can detect and alert drivers and passengers to potential hazards. Integration with mobile devices: The system can be further enhanced by integrating it with mobile devices, such as smartphones and smartwatches. This integration can provide passengers with real-time updates and notifications about the status of the emergency response and their medical treatment. Improved accuracy of the airbag detection algorithm: The airbag detection algorithm can be further improved to increase its accuracy and reduce the risk of false positives. This improvement can be achieved by incorporating additional sensor data, such as accelerometers and gyroscopes, to improve the algorithm's ability to detect airbag deployment. Automatic emergency response: The system can be enhanced to provide automatic emergency response by integrating it with autonomous driving

technology. This integration can enable the vehicle to automatically pull over and call emergency services in the event of an accident, even if the driver or passengers are unconscious. Privacy and security features: The system can be enhanced by incorporating privacy and security features, such as encryption and authentication, to ensure the confidentiality of the data collected and transmitted by the system. Overall, these future enhancements can further improve the effectiveness and accuracy of the AI camera-based system for airbag detection and automatic emergency alert, and provide a more comprehensive safety system for drivers and passengers.

Involving location access, we could integrate a permission system that prompts users to grant access to their location data when needed. Additionally, consider implementing geolocation services or APIs that allow you to retrieve location information from users who have granted permission. This groundwork will provide a solid foundation for future features that leverage location data.

Integrating an SMS module for future enhancement can greatly expand the functionality and engagement of your application. This module could enable features like two-factor authentication, notifications, reminders, or even customer support via SMS. Ensure to prioritize user privacy and compliance with regulations such as GDPR or CCPA when handling sensitive user data like phone numbers and message content. Additionally, consider implementing a robust error-handling mechanism to deal with issues like message delivery failures or network issues.

BIBLIOGRAPHY

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2.Patel, R., & Gupta, S. (2019). "Real-Time Airbag Deployment Prediction Using Convolutional Neural Networks." International Conference on Artificial Intelligence and Pattern Recognition, 45-56.

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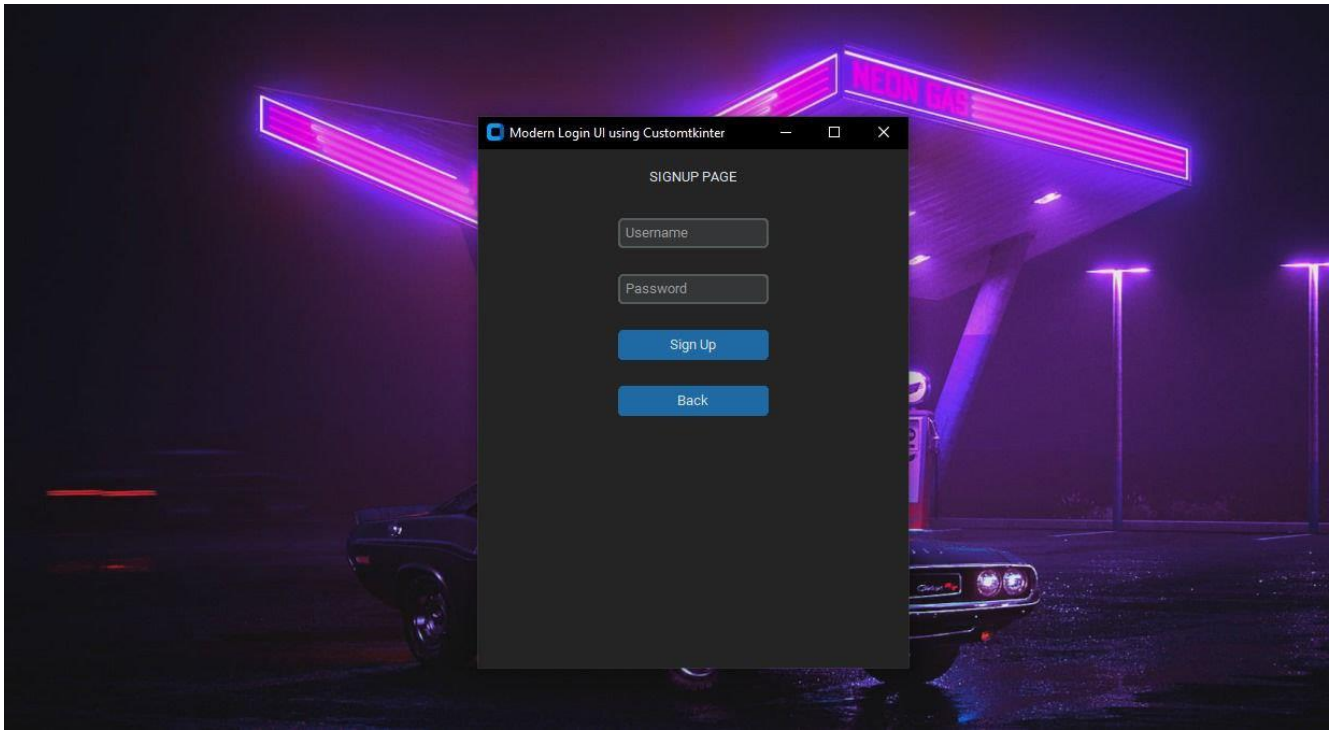
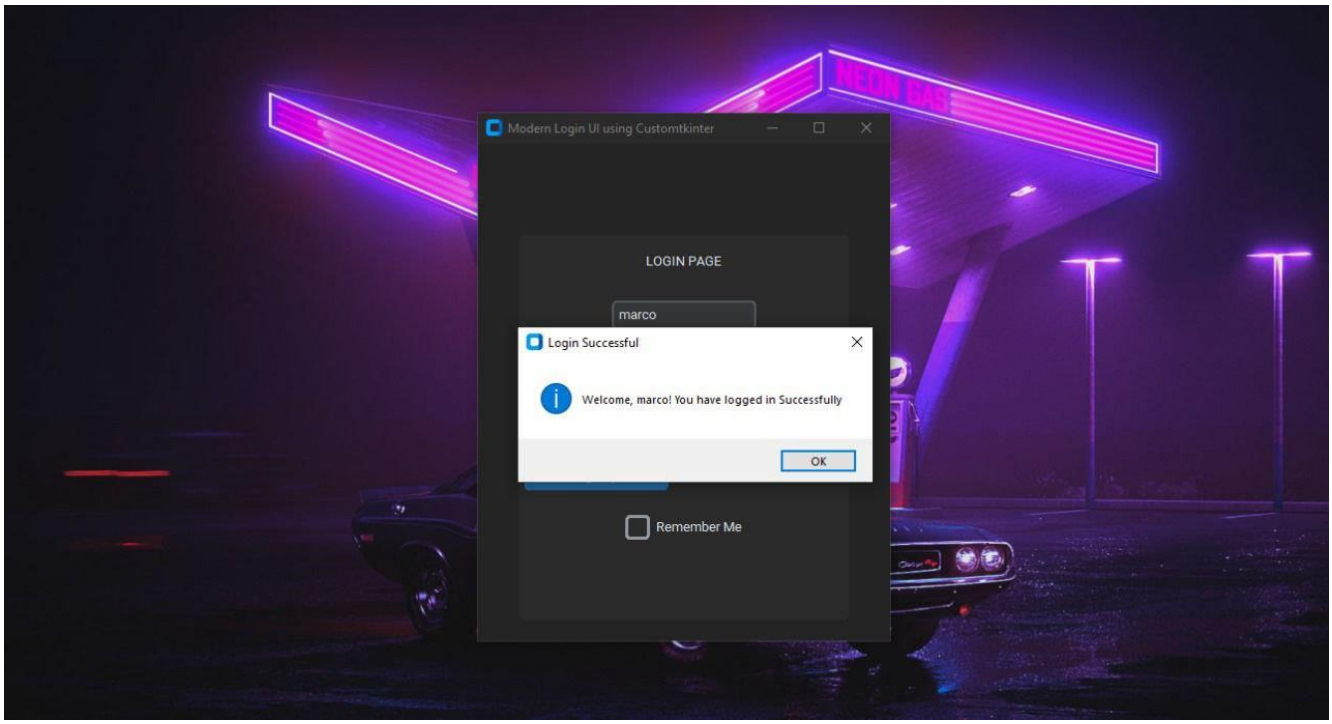
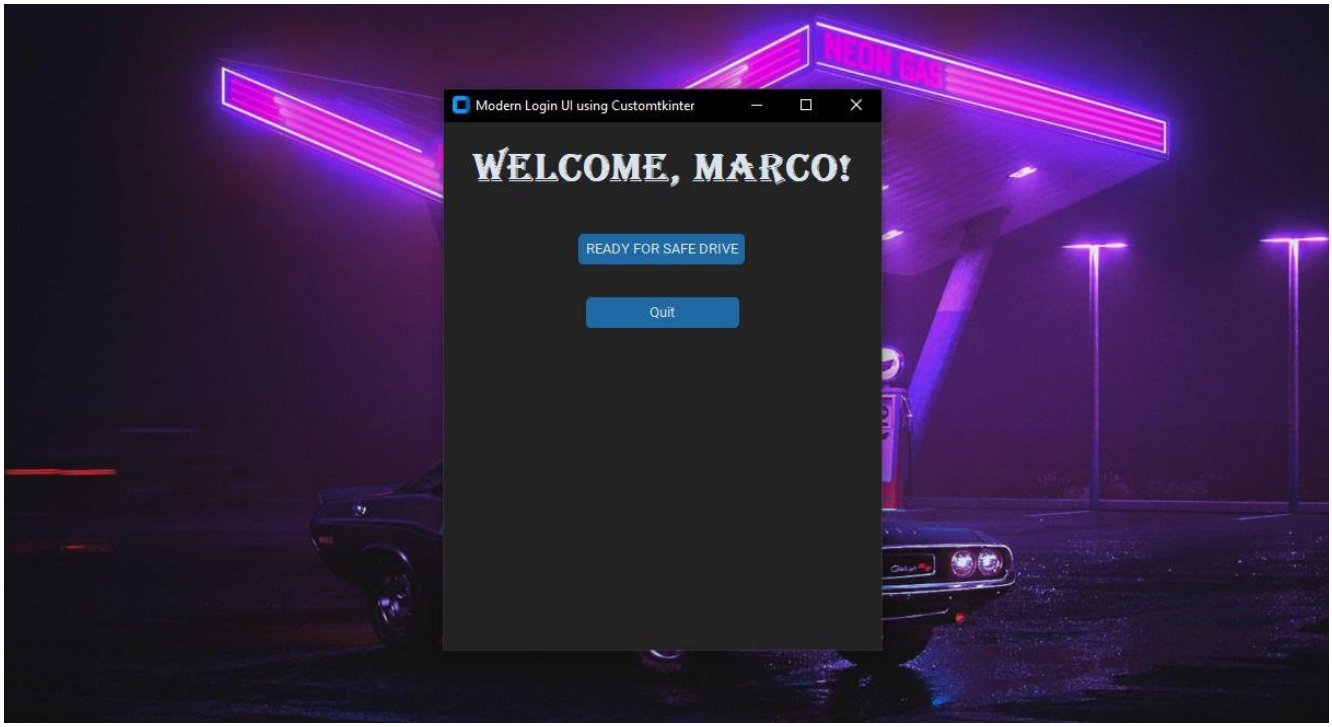
APPENDIX

APPENDIX

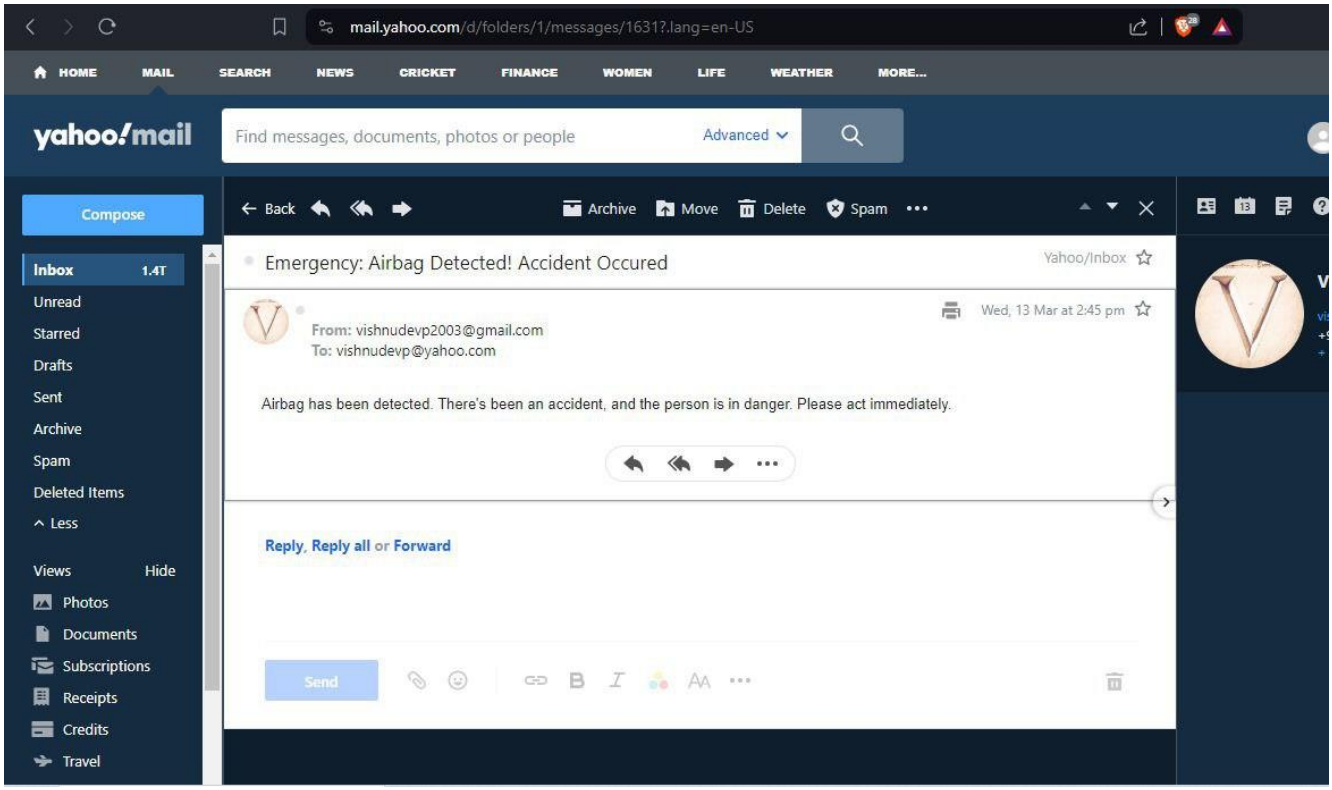
SAMPLE SCREENSHOTS






Modern Login UI using Customtkinter
WELCOME, MARCO!
READY FOR SAFE DRIVE
Quit


Object detector
airbag: 92%
airbag: 95%


mail.yahoo.com/d/folders/1/messages/1631?.lang=en-US
HOME
MAIL
SEARCH
NEWS
CRICKET
FINANCE
WOMEN
LIFE
WEATHER
MORE...
yahoo!mail
Find messages, documents, photos or people
Advanced
Compose
Inbox 1.4T
Unread
Starred
Drafts
Sent
Archive
Spam
Deleted Items
Less
Views Hide
Photos
Documents
Subscriptions
Receipts
Credits
Travel
Back
Archive
Move
Delete
Spam
Emergency: Airbag Detected! Accident Occured
Yahoo/Inbox
Wed, 13 Mar at 2:45 pm
From: vishnudevp2003@gmail.com
To: vishnudevp@yahoo.com
Airbag has been detected. There's been an accident, and the person is in danger. Please act immediately.
Reply, Reply all or Forward
Send