

WAKE ALERT – AI POWERED MONITORING SYSTEM

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering degree in Computer Science and Engineering

By

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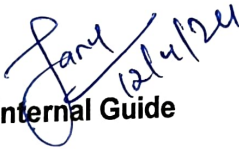
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Ramasani Rashmitha (40111034)** and **Pasuupuleti Jaswanth Kumar (40110913)** who carried out the Project entitled "**WAKE ALERT AI – POWERED MONITORING SYSTEM**" Under my supervision from November 2023 to April 2024.


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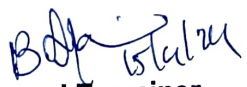

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ABSTRACT

AI monitoring system proposes a smart method for managing modified evaluation of thought of students during addresses in the review lobby. The technique uses 2D and 3D features got by the Kinect One sensor depicting both facial and body properties of a student, including look point and body act. Artificial intelligence estimations are used to plan thought model, giving classifiers which check thought degree of individual student. Human encoding of thought level is used as a readiness set data. The preliminary included 3 individuals whose thought was explained more than brief period in an objective of 1 second. We review available Kinect incorporates and propose features matching the visual thought and lack of regard signs, and present the delayed consequences of request tests. The Wake Alert AI-Powered Monitoring System is a transformative solution poised to redefine safety and security paradigms in our dynamic and interconnected world. This advanced system harnesses the potential of artificial intelligence (AI) to offer real-time monitoring and proactive threat detection, ensuring the safety of individuals, safeguarding valuable assets, and protecting critical infrastructure. At its core, WakeAlert leverages AI technology to analyze data, recognize patterns, and make intelligent decisions in real-time. It offers a comprehensive, integrated sensor network, ranging from surveillance cameras and motion detectors to biometric recognition and environmental sensors, providing an expansive shield against potential dangers. Furthermore, the system can be customized to cater to the unique needs of different environments, from smart cities to healthcare facilities. What sets Wake Alert apart is its proactive approach to threat detection, reducing response times and minimizing risks. Through predictive analytics and data-driven decision-making, the system adds another layer of protection by foreseeing potential safety issues before they fully materialize. The user-friendly interface ensures accessibility to a broad range of users, while scalability caters to diverse requirements, from small businesses to sprawling metropolises. Wake Alert's cost-effective solutions make investments in safety and security not just protective but also financially sound.

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
CNN	CONVOLUTIONAL NEURAL NETWORK
CV	COMPUTER VISION
DNN	DEEP NEURAL NETWORK
RELU	RECTIFIED LINEAR UNITS
ROI	REGION OF INTEREST

CHAPTER 1

INTRODUCTION

AI monitoring aims to create a proctoring system for managing the company's work environment. Nowadays due to the work from home Scenarios a noticeable drop in the productivity of the workforce is observed in the organizations. One of the main reasons for this is due to the lack of proper monitoring of employees. Monitoring every single individual round the clock is something which cannot be done by humans. Now the computer vision comes into picture. The employees are proctored using the computer vision and reports will be sent to the managers on regular basis. This helps the organizations to achieve great productivity and at the same time the workforce will also be accountable. Certainly, here is 500-word paragraph expanding upon introduction.

WAKE ALERT AI – POWERED MONITORING SYSTEM:

In today's fast-paced world, where rapid technological advancements continuously reshape the way we live and work, the imperative of safety and well-being has never been more pronounced. The Wake Alert AI- Powered Monitoring System stands at the forefront of this era, embodying a monumental leap in the realm of safety and security. In a world where real- time threats and challenges abound, this system amalgamates state-of-the- art technology with vigilant monitoring and instant alerting mechanisms to ensure the safety of individuals, safeguard valuable assets, and fortify critical infrastructure. The core tenet of the Wake Alert system is the leveraging of Artificial Intelligence (AI) as the cornerstone of its functionality, and through this, it heralds a groundbreaking paradigm shift in the pursuit of security.

AI, hailed as one of the most transformative technologies of our time, empowers the Wake Alert system in ways that were previously inconceivable. Through the intricate web of algorithms and neural networks that constitute its AI framework, the system is primed to perform a multitude of complex tasks with an unparalleled level of precision and efficiency.

It meticulously analyzes data, deciphers intricate patterns, and renders decisions with uncanny intelligence, all in real time. This real-time capability becomes the lynchpin of the entire monitoring apparatus, as it enables the system to act promptly and decisively in the face of impending threats, ensuring that no potential dangers go unnoticed or unaddressed. The essence of the Wake Alert system lies in its commitment to real-time monitoring, an attribute that elevates its efficacy to uncharted heights. It casts a vigilant eye over a diverse range of environments, spanning residential areas, commercial facilities, industrial sites, and more, with an unwavering dedication to safeguarding lives and properties.

Through its comprehensive network of integrated sensors, which includes advanced surveillance cameras, motion detectors, environmental sensors, and biometric recognition technology, the system bestows an expansive shield against potential dangers. The ability to collect, process, and act on information in real time is not only crucial for the immediate safety of individuals and assets but also for the efficient functioning of numerous industries and organizations that rely on unceasing operational continuity. What distinguishes Wake Alert from traditional monitoring systems is its remarkable proactivity in threat detection system's AI-driven intelligence actively discerns potential threats and triggers immediate alerts.

This proactive approach proves to be a game-changer when it comes to minimizing response times, thus dramatically enhancing the potential for mitigating risks and damage. Moreover, the system incorporates predictive analytics, which, by harnessing historical data and identifying emerging patterns, adds another layer of protection by foreseeing potential safety issues before they fully materialize. Data is the lifeblood of the Wake Alert system. It accumulates vast troves of data through its intricate sensor network, and this data is not only used for enhancing safety but also for optimizing operations, resource allocation, and risk management. The intelligent analysis of data enables informed decision-making and assists organizations and authorities in their quest for efficiency and safety. However, all this sophistication does not come at the cost of complexity. Wake Alert's user interface is designed with simplicity and user-friendliness at its core. It ensures that even non-technical personnel can effortlessly access and interpret data and alerts.

This means that the advantages of this advanced monitoring system are not limited to a select few who possess high levels of technical expertise, but are accessible to a broader range of individuals and organizations. Alert system has recognized the ever-evolving challenges in this dynamic landscape and is designed to be highly adaptable. It can be scaled to fit the needs of small businesses and sprawling metropolises alike, offering a versatile approach to security that is responsive to the specific needs of its users. Moreover, by promoting cost-effective solutions, the Wake Alert system ensures that investments in safety and security not only protect lives and property but also provide a return on investment by enhancing security and operational efficiency. In a world where threats to safety are increasingly complex and dynamic, the Wake Alert AI-Powered Monitoring System emerges as a solution that is destined to make a profound impact. Its applications span across various sectors, including smart cities, transportation systems, energy infrastructure, healthcare facilities, and countless other settings where safety is paramount. With a clear focus on reducing response times, optimizing resource allocation, and proactively identifying and mitigating threats, the system offers a cutting-edge approach to safety and security. Its global implications are immense, and it has the potential to save lives and protect assets on a massive scale. The Wake Alert AI-Powered Monitoring System represents an innovation that encapsulates the essence of progress in the modern era. By amalgamating human intelligence with machine intelligence, it propels the world into a new era of safety and security. As it pioneers the future of security, Wake Alert reaffirms that safety is not just a fundamental human need but an evolving field where innovation and technology will continue to play a pivotal role.

I. The role of AI safety and security:

The foundation of the Wake Alert system lies in the transformative capabilities of AI. This subheading delves into how AI technology is harnessed to provide an unmatched level of intelligence and automation in the realm of safety and security. It explores how AI analyzes data, identifies patterns, and makes real-time decisions to enhance security.

II. Real - Time monitoring and Immediate Alerting:

One of the pivotal features of the Wake Alert system is its real-time monitoring capabilities. This section elucidates how the system vigilantly observes a wide range of environments, from residential areas to industrial sites, ensuring that any unusual or potentially dangerous activities are detected and addressed immediately. The focus here is on the critical need for real-time alerting in the face of evolving threats.

III. Comprehensive and sensor Integration:

The effectiveness of the system is largely attributed to its integrated sensor network. This subheading explains how the Wake Alert system incorporates a variety of sensors, from advanced surveillance cameras to motion detectors, biometric recognition technology, and environmental sensors.

IV. Customization for Varied Environments:

No two safety scenarios are identical, and the Wake Alert system acknowledges this diversity. This section discusses how the system can be customized to suit the unique needs of different environments, be it smart cities, transportation systems, or healthcare facilities. It emphasizes the adaptability of the system to cater to distinct requirements.

V. Proactive Threat

Detection and Immediate Response: Unlike conventional monitoring systems, Wake Alert merely record events; it actively identifies potential threats and triggers immediate alerts.

CHAPTER 2

LITERATURE SURVEY

[1] F. Guede-Fernandez, M.Fernandez-Chimeno, J. Ramos-Castro, and MA. Gracia- Gonzalez, "Driver drowsiness detection based on repiratory signal analysis," IEEE Access, vol. 7, pp. 812826-81838, 2019,doi: 10.1109/ACCESS. 2019.2924481.

Drowsy driving is a prevalent and serious public health issue that deserves of the attention. Recent studies estimate that around 20% of car crashes have been caused by drowsy drivers. Nowadays, one of the main goals in the development of new advanced driver assistance systems is trustworthy drowsiness detection. In this paper, a drowsiness detection method based on changes in the respiratory signal is proposed. The respiratory signal, which has been obtained using an inductive plethysmography belt, has been processed in real time in order to classify the driver's state of alertness as drowsy or awake. It is based on the analysis of the respiratory rate variability (RRV) in order to detect the fight against to fall asleep. Moreover, a method to provide a quality level of the respiratory signal is also proposed. Both methods have been combined to reduce false alarms due to the changes of measured RRV associated not with drowsiness but body movements. A driving simulator cabin has been used to perform the validation tests and external observers have rated the drivers' state of alertness in order to evaluate the algorithm performance. It has been achieved a specificity of 96.6%, a sensitivity of 90.3%, and Cohen's Kappa agreement score of 0.75 on average across all subjects through a leave-one-subject-out crossvalidation. A novel algorithm for driver's state of alertness monitoring through the identification of the fight against to fall asleep has been validated. This algorithm may be a valuable vehicle safety system to alert drowsiness while driving.

[2] Y.Saito, M. Itoh, and T. Inagaki, “Driver assistance system with a dual controlscheme: Effectiveness of identifying driver drowsiness preventing lane departure accidents,” IEEE Trans. Human-Mach. Syst., vol.46, no. 5, pp. 660–671, Oct. 2016, doi: 10.1109/THMS.2016.2549032.

Driver drowsiness is a common cause of fatal traffic accidents. In this study, a driver assistance system with a dual control scheme is developed; it attempts to perform simultaneously the safety control of the vehicle and identification of the driver's state. The assistance system implements partial control in the event of lane departure and gives the driver the chance to voluntarily take the action needed. If the driver fails to implement the steering action needed within a limited time, the assistance system judges that “the driver's understanding of the given situation is incorrect” and executes the remaining control. We used a driving simulator equipped with the assistance system to investigate the effectiveness of identifying driver drowsiness and preventing lane departure accidents. Twenty students participated in three trials on a straight expressway, and they were required to implement only lateral control. We hypothesized that a participant cannot implement the action needed to maintain safety when he/she falls asleep, and that in such a case, the assistance system will implement the safety control repeatedly. The assistance system assisted the participants only when almost really needed, such as when their eyelids were closed. The results validated the hypothesis, showing that the assistance system implemented the safety control repeatedly when a participant fell asleep. In addition, the algorithms used by the assistance system to determine whether the driver can continue driving were evaluated through a leave-one-out cross-validation, and they were proven to be effective for identifying driver drowsiness.

J. Yu, S. Park, S. Lee, and M. Jeon se, “Driver drowsiness detection using condition-adaptive representation learning framework,” IEEE Trans. Intell. Transp. Syst., vol. 20, no. 11, pp. 4206–4218, Nov. 2019, 10.1109/TITS.2011

Author insisted a condition-adaptive representation learning framework for driver drowsiness detection based on a 3D-deep convolutional neural network. The framework consists of four models: spatio-temporal representation learning, scene condition understanding, feature fusion, and drowsiness detection. Spatio-temporal representation learning extracts features that can describe motions and appearances in video simultaneously. Scene condition understanding classifies the scene conditions related to various conditions about the drivers and driving situations, such as statuses of wearing glasses, illumination condition of driving, and motion of facial elements, such as head, eye, and mouth. Feature fusion generates a condition-adaptive representation using two features extracted from the above models. The drowsiness detection model recognizes driver drowsiness status using the condition-adaptive representation. The condition-adaptive representation learning framework can extract more discriminative features focusing on each scene condition than the general representation so that the drowsiness detection method can provide more accurate results for the various driving situations. The framework is evaluated with the NTHU drowsy driver detection video dataset. The experimental results show that our framework outperforms the existing drowsiness detection methods based on visual analysis.

[3] Y.Hu, M. Lu, C. Xie, and X. Lu, “Driver drowsiness recognition via 3D conditional GAN and two-level attention Bi-LSTM,” *Trans.CircuitsSyst. Video Technol.*, vol. 30, no. 12, pp. 4755–4768, Dec. 2020, doi:10.1109/TCSVT.2019.2958188.

Driver drowsiness has currently been a severe issue threatening road safety, hence it is vital to develop an effective drowsiness recognition algorithm to avoid traffic accidents. However, recognizing drowsiness is still very challenging, due to the large intra-class variations in facial expression, head pose and illumination condition. In this paper, a new deep learning framework based on the hybrid of 3D conditional generative adversarial network and twolevel attention bidirectional long short-term memory network (3DcGAN- TLABiLSTM) has been robust driver drowsiness recognition. Aiming at extracting short-term spatialtemporal features with abundant drowsiness-related information, we design a 3D encoderdecoder generator with the condition of auxiliary information to generate highquality fake image sequences and devise a 3D discriminator to learn drowsiness-related representation from spatial-temporal domain. In addition, for long- term spatial-temporal fusion, we investigate the use of two-level attention mechanism to guide the bidirectional long shortterm memory learn the saliency of short- term memory information and long-term temporal information. For experiment, we evaluate our 3DcGAN-TLABiLSTM framework on a public NTHU-DDD dataset.

[4] Mika Sunagawa,Shin-ichi-Shikii,WataruNakai, Makoto Mochizuki,Koichi Kusakame, and Hiroki Kitajima, Comprehensive Drowsiness Level of the Detection Model Combining Multimodal Information.

Drowsiness detection model that is capable of sensing the entire range of stages of drowsiness, from weak to strong. The key assumption underlying our approach is that the sitting posture- related index can indicate weak drowsiness that drivers themselves do not notice. We first determined the sensitivity of the posture index and conventional indices for the stages of drowsiness. Then, we designed a drowsiness detection model combining several indices sensitive to weak drowsiness and to strong drowsiness, to cover all drowsiness stages. Subsequently, the model was trained and evaluated on a dataset comprised of data collected from approximately 50 drivers in simulated driving experiments. The results indicated that posture information improved the accuracy of weak drowsiness detection, and This model using the driver's blink and posture information covered all stages of drowsiness (F1- score 53.6%, root mean square error 0.620). Future applications of this model include not only warning systems for dangerously drowsy drivers but also systems which can take action before their drivers become drowsy. Since measuring the information requires no restrictive equipmentsuch as on-body electrodes, the model presented here based on blink and posture information can be used in several practical application.

2.1 INFERENCES FROM LITREATURE SURVEY

Existing reviews have been conducted in order to understand advancements in driver drowsiness detection systems. The authors of [13] reviewed the use of head movement- based detection for driver drowsiness. They covered general measures that can be used to detect drowsiness in a driver and provided a comparative analysis of various drowsiness detection systems. More recently, [14] conducted a survey of car safety systems. This included an analysis of signs of drowsiness and various techniques used to measure these signs, with a range of driver drowsiness detection systems reviewed. In addition, [15] presented a survey of driver fatiguedrowsiness detection systems. This work focused on methods that can be used to prevent road accidents and designs for drowsiness detection. Jill and Chisty [16] presented a review of driver drowsiness detection systems. They focused on reviewing existing (2015) drowsiness detection techniques, with an emphasis on preprocessing techniques that can be used on different systems, for example, the circular Hough transform and the Lab color space. While a large number of reviews have been conducted around driver drowsiness detection, the field has advanced and there is a need for a review of machine learning approaches applied to drowsiness detection. This is particularly relevant given recent advances in deep learning. This paper attempts to address this need by assessing behavioural methods that are based on machine learning techniques for the classification stage of drowsiness detection, as shown in fig.2. This paper provides information on a set of machine learning techniques that one can use to make reliable and precise decisions for driver drowsiness detection systems. The remainder of this paper is organized as follows: A general framework for behavioral driver drowsiness detection using machine learning techniques is described in Section II. Section III. provides a review of metrics that are used in driver drowsiness detection and decision- making techniques. Section IV. gives meta- analysis results and lists publicly available datasets which can be used as benchmarks for drowsiness detection task.

2.2 OPEN PROBLEMS IN EXISTING SYSTEM

In the existing system we are used only image processing techniques alone. Image processing techniques we can't find the proper level of detection. The equipment and software required for digital image processing can be expensive, making it difficult for small businesses or individuals to afford. Quality – While digital image processing can enhance image quality, it can also degrade it if not done properly. In the context of the Wake Alert AI-Powered Monitoring System, there are several open problems or challenges in existing systems that this innovative technology seeks to address and improve. Some of these challenges include:

Lack of Real-Time Threat Detection: Traditional monitoring systems rely on post-incident analysis and not provide real-time threat detection. This can result in missed opportunities to prevent or mitigate potential risks.

Fragmented Sensor Networks: Existing systems may have fragmented sensor networks, leading to blind spots or inefficient coverage. Integrating different types of sensors and data sources into a cohesive framework can be a significant challenge.

Reactivity Over Proactivity: Many monitoring systems are reactive in nature, responding to incidents after they occur. Proactive threat detection is crucial, as it can significantly reduce response times and potential damage.

Overwhelming Data Management: With the proliferation of sensors and data sources, existing systems often struggle with managing and sense of the vast amounts of data generated.

CHAPTER 3

REQUIREMENT ANALYSIS

3.1 FEASABILITY 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

ECONOMICAL FEASIBILITY

TECHNICAL FEASIBILITY

SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY: This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

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.

SOCIAL FEASIBILITY: The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it.

REQUIREMENT ANALYSIS: Requirement analysis, also called requirement engineering, is the process of determining user expectations for a new modified product. It encompasses the tasks that determine the need for analysing, documenting, validating and managing software or system requirements. The requirements should be documentable, actionable, measurable, testable and traceable related to identified business needs or opportunities and define to a level of detail, sufficient for system design.

3.2 FUNCTIONAL REQUIREMENTS:

It is a technical specification requirement for the software products. It is the first step in the requirement analysis process which lists the requirements of particular software systems including functional, performance and security requirements. The function of the system depends mainly on the quality hardware used to run the software with given functionality.

USABILITY

It specifies how easy the system must be use. It is easy to ask queries in any format which is short or long, porter stemming algorithm stimulates the desired response for user.

ROBUSTNESS

It refers to a program that performs well not only under ordinary conditions but also under unusual conditions. It is the ability of the user to cope with errors for irrelevant queries during execution.

SECURITY

The state of providing protected access to resource is security. The system provides security and unauthorized access the system there by providing high security.

RELIABILITY

It is the probability of how often the software fails. The measurement is often expressed in MTBF(Mean Time Between Failures). The requirement is needed in order to ensure that the processes work correctly and completely without being aborted. It can handle any load and survive and survive and even capable of working around any failure.

COMPATABILITY

It is supported by version above all web browsers. Using any web servers like local host makes the system real-time experience.

FEASABILITY

The flexibility of the project is provided in such a way that it has the ability to run on different environments being executed by different users.

NON FUNCTIONAL REQUIREMENTS

PORTABILITY

It is the usability of the same software in different environments. The project can run in any operating system.

PERFORMANCE

These requirements determine the resources required, time interval, through every thing that deals with the performance of the system.

SYSTEM TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

3.3 SOFTWARE REQUIRMENT SPECIFICATION DOCUMENT

SYSTEM REQUIRMENTS

HARDWARE REQUIREMENTS

System : Pentiumimi3Processor.

Hard Disk : 500 GB.

Monitor :15” LED

Input Device:Keyboard.

SOFTWARE REQUIRMENTS

Operating system :Windows10

Coding Language : Python

CHAPTER 4

DESCRIPTION OF PROPOSED SYSTEM

The analysis and prompt processing of real-time data have been severely hampered by the enormous volume of digital data created in combination with the growing phasor measurement data in the power grid. In these circumstances, utilizing AI may be quite helpful in facilitating more effective data processing and analysis. This research proposes an AI-assisted power grid event categorization approach with the goal of enhancing the performance of the power grid system as a whole. In addition, a large-scale power grid system introduces an edge cloud sharing method. A multiple edge cloud node-based strategy is designed to balance the load and decrease the maximum processing time. The results of the simulation demonstrate that the suggested AI-assisted event categorization approach and the edge cloud sharing strategy can The system's overall performance will be markedly improved.

4.1 SELECT METHODOLOGY OR PROCESS MODEL

Model is going to employ the suggested system's deep learning algorithm and open-cv, will use a yolo custom weight model and the open-cv and deep learning algorithmsto identify the eye and mobile phone. Utilizing yolo YOLO's quick inference speed, which enables it to analyse pictures in real time, is one of its key features.

4.2 ARCHITECTURE OVERALL DESGIN OF PROPOSED SYSTEM

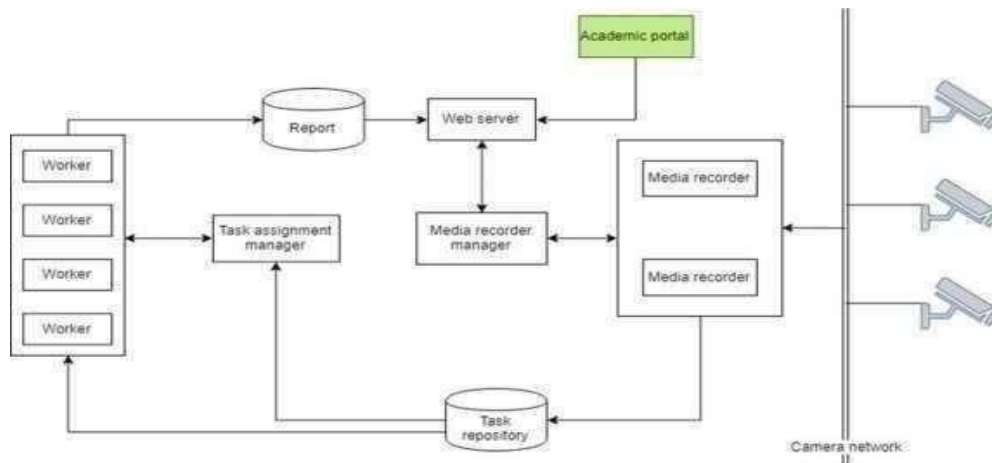


Fig 4.1: System Architecture for Drowsiness Judgment .

The block diagram of the proposed system has been shown in the above figures. The camera captures the image of the person inside the car and sends to the HOG model to train and it detects each feature from face using facial landmark technique in the system. The next step in the process would be as it starts to find position and condition of feature to analyze, it should detect whether the person sleeping or not. If any of the features especially the eye and the head state of the person are detected to be abnormal then automatically the system starts produce the siren sound there will be final judgment of the state of the driver whether the state concentrate or distracted.

4.3 DESCRIPTION OF SOFTWARE FOR IMPLEMENTATION AND TESTING PLAN OF THE PROPOSED MODEL/SYSTEM SYSTEM TESTING.

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

4.4 TYPES OF TESTS

UNIT TESTING

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application. It is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

INTEGRATION TESTING

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing.

FUNCTIONAL TEST

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items:

SYSTEM OR PROCEDURES

Interfacing systems of the procedures must be invoked. Organization and preparation of the functional tests is befocused on requirements, key functions, or special test cases. In addition , systematic coverage of pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is completion of additional tests are identified and the effective value of current tests is todetermined. System testing ensures that the entire integrated software system meet requirements. It tests a configuration to ensure known and predictable results.

CHAPTER 5

IMPLEMENTATION DETAILS

5.1 FACE DETECTION

The symmetry is one of the most important facial features. The model the symmetry in a digital image by a one-dimensional signal (accumulator vector) with a size equal the width of the image, which gives us the value corresponding to the position of the vertical axis of symmetry of objects in the image. The traditional principle to calculate the signal of symmetry is for each two white pixels which are on the sameline we increment the value in the medium between these two pixels in the accumulator vector. (The algorithm is applied on an edge image, we called a white pixel: the pixel with value 1). It can introduce the improvements on the calculationalgorithm of symmetry into an image to adapt it to the detection of face, by applying a set of rules to provide a better calculation of symmetry of the face. Instead of computing the symmetry between two white pixels in the image, it is calculated between two windows .

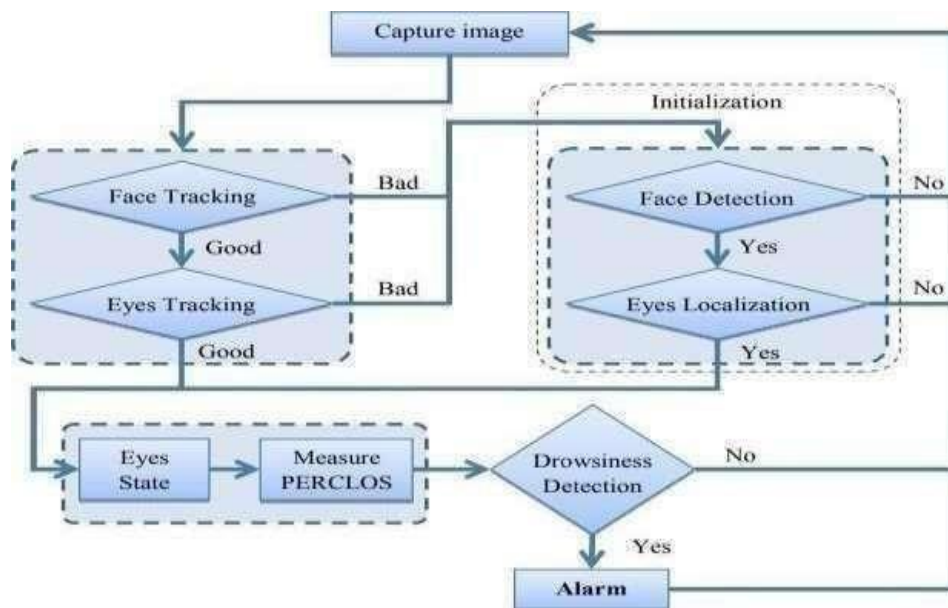


FIG 5.1 : FACE DETECTION

For each window Z1, the window Z2 in the area determined by the parameters S_{min} , S_{max} , and H. We increment the signal of symmetry between these two windows if the sum of white pixels is located between two thresholds S1 (maximum) and S2 (minimum). Then extract the vertical region of the image contours (Region of Interest ROI) corresponding to the maximum index of the obtained signal of symmetry. Next, take a rectangle with an estimated size of face (Because the camera is fixed and the driver moves in a limited zone so we can estimate the size of the face using the camera focal length after the step of camera calibration) and scan the ROI by searching the region that contains the maximum energy corresponding to the face. It includes checking on two axes: the position variance of the face detected according to time; i.e., in several successive images, it is necessary that the variance of the positions of the detected face is limited; because the speed of movement of the face is limited of some pixels from a frame to another frame which follows.

5.2 EYE LOCALIZATION

Since the eyes are always in a defined area in the face (facial anthropometric properties), limit our research in the area between the forehead and the mouth (Eye Region of Interest 'eROI')

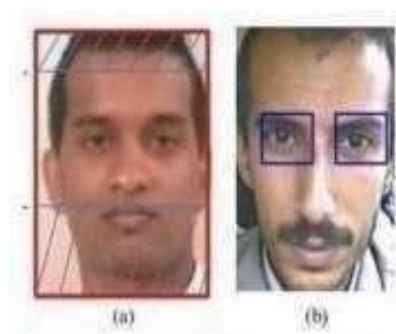


FIG 5.2 Eye localisation using Symmetry a.Eroi b. Result.

benefit from the symmetrical characteristic of the eyes to detect them in the face. First, sweep vertically the eROI by a rectangular mask with an estimated height of height of the eye and a width equal to the width of the face, and calculate the symmetry. The eye area corresponds to the position which has a high measurement of symmetry. Then, in this obtained region, calculate the symmetry again in both left and right sides. The highest value corresponds to the center of the eye. The results are shown in Figure:

Tracking

The tracking is done by Template Matching using the SAD Algorithm (Sum of Absolute Differences).

5.3 Eye States

The determination of the eye state is to classify the eye into two states: open or closed. Use the Hough transform for circles [10] (HTC) on the image of the eye to detect the iris. For that, apply the HTC to the edge image of the eye to detect the circles with defined rays, and take at the end the circle which has the highest value in the accumulator of Hough for all the rays. Then, apply the logical 'AND' logic between edges image and complete circle obtained by the HTC by measuring the intersection level between them "S". Finally, the eye state.

5.4 Driver State

Driver state determine by measuring PERCLOS. If the driver closed his eyes in at least 5 successive frames several times over a period of up to 5 seconds, it is considered drowsy.– Eyes states using HTC. (a) and (b) Edge detection , (c) and (d) Eyes states results. How the Algorithm Works Our system starts with the initialization phase, which is face and eyes detection to extract both face and eyes regions and take them as templates to track them in the following frames. For each tracking we test if that tracking is good or bad? If the tracking is bad we return to the initialization step, else we pass to the following steps which are: eyes states identification and driver state. The results are shown in Figure

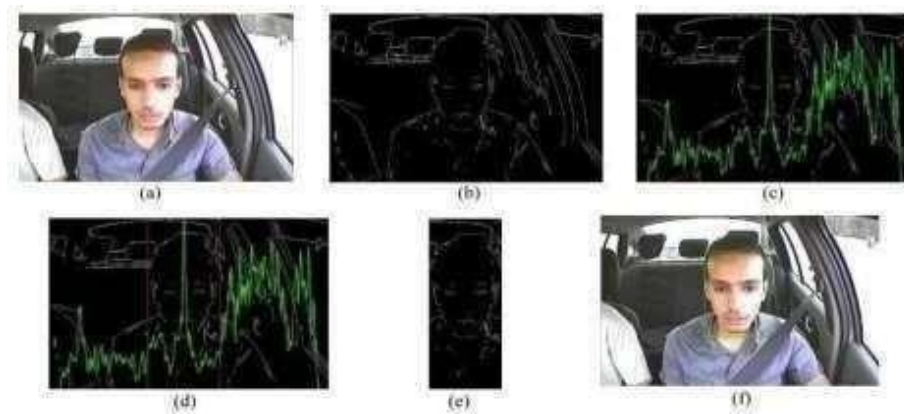


Fig 5.3 : Driver's eye state identification

5.5 How the Algorithm Works

System starts with the initialization phase, which is face and eyes detection to extract both face and eyes regions and take them as templates to track them in the following frames. For each tracking we test if that tracking is good or bad? If the tracking is bad return to the initialization step, else pass to the following steps which are: eyes states identification and driver state.

CHAPTER 6

OUTCOMES AND DISCUSSIONS

6.1 GENERAL FEATURE

Convolutional neural networks are hierarchical machine-learning models capable of learning a complex representation of images using vast amounts of data. They are inspired by the human visual system and learn multiple layers of transformations, which extract a progressively more sophisticated representation of the input.

Our system uses heuristic/knowledge-based machine-learning technology, in which the process to generate descriptors starts with an early step to discover all the labels included in our problem domain (knowledge pool). This is done by processing all the available video images with the analyzer API, and then removing the duplicated label values. The proposed analyzer uses basic Deep Neural Network (DNN) architectures for object detection and parsing to generate compositional models. This step resembles a codebook or dictionary generation process. Each input image is then encoded as a list of probability values whose length is determined by the size of the dictionary. The i th value in this descriptor corresponds to the probability returned by the analyzer for the i th label, or zero otherwise.

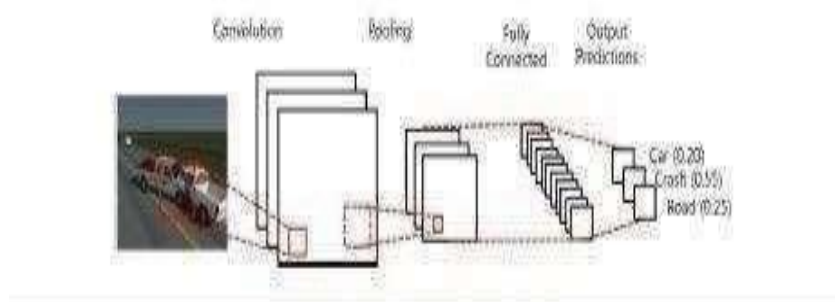


Fig 6.1 Various Steps for Real time Video Analyzing Process

Our system has the following benefits:

Scalable: DNNs [13], [12] scale to billions of parameters giving them the capacity to learn highly complex concepts and thousands of categories. Modern hardware and an abundance of data enable our system to train larger and more powerful networks.

Fast: the trained model stores its knowledge compactly in learned parameters, making it easy to deploy in any environment. There is no need to store any additional data to make predictions for new inputs. This means that we could easily use them in embedded devices such as CCTV to provide responses in milliseconds.

Flexible: unlike traditional computer vision approaches [14] our system learns to extract discriminative features from the input using the provided training data, instead of using hand-engineered feature extractors such as SIFT [15] and LBP [16]. This makes these features easy to adapt to problems in any domain.

6.2 EMERGENCY ALERTING

Our EAS has the ability to aggregate emergency information from CCTV devices. Below are the basic steps involved in alerting emergency services such as the fire/police station to an emergency situation.

1. CCTV stores the captured video data in their own storage device.
2. The analyzer module periodically monitors the stored video data based on the deep-learning technology.
3. When the system detects disaster, it sends an emergency alert message directly to the fire/police station.
4. Fire department/police station receives the emergency alert message accompanied by other related information such as location, type of disaster, analyzed results, and image data (optional). In step 4, to avoid network congestion, the system optionally sends the image files.

6.3 EXPERIMENTAL ANALYSIS

Experimental analysis of our system by developing a simulator and use two different types of disasters for experimentation purposes. The first is a fire and the other is a car accident. We performed the simulation by using the following system: Intel Core i74810MQ (4 Cores -8 Threads), Nvidia Quadro K4100M (4 GB) GPU, and 16 GB RAM. The use of a GPU to train deep neural networks enabled us to increase the runtime, ranging from 3x faster to 15x faster . Our simulator is programmed with Python. The simulator randomly generates an emergency situation based on the Poisson process We simulated the two emergency situations more than 100 times at each measuring point while progressively increasing the level of strength (weak, normal, strong) and the lambda value ($\lambda=0.1, 0.3, 0.6$). Values of $\lambda=0.1$ and 0.6 mean an event (disaster) occurred on average every 10 and 5 s, respectively. In Fig. 2, Fig. 3, lines indicated with various colors have different meanings. Each line was plotted using data from our database.

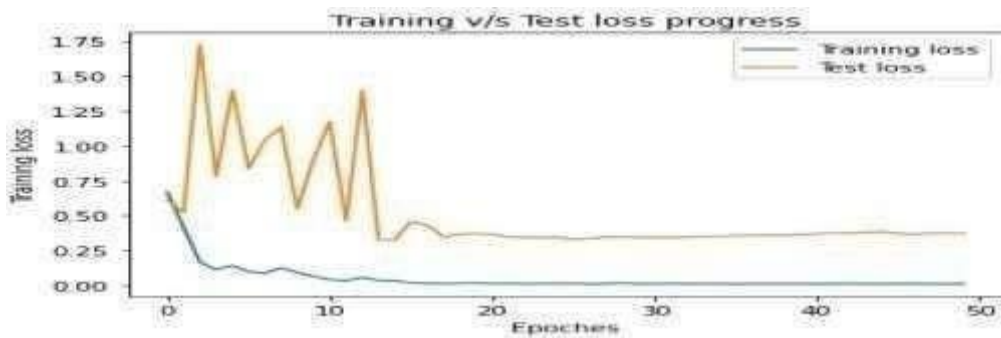


Fig 6.2 : Emergency Prediction

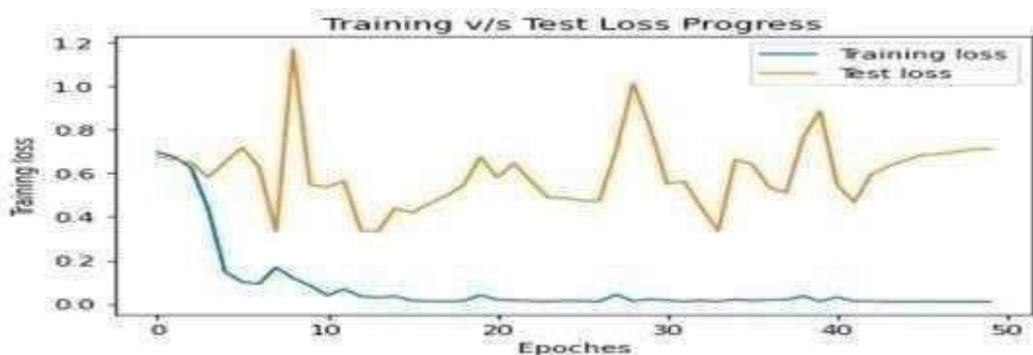


Fig 6.3 : Emergency Conviction

The rate of road accidents in metropolitan areas is increasing day by day. A significant portion of the workforce is dedicated to maintaining civil law and order, requiring more automation in this area rather than human resources. A possible human error could result in a series of catastrophic events, further supporting my proposal/motivation to develop an end-to-end solution. By designing a scalable, efficient model that uses minimal resources, I have successfully eliminated the need for multiple monitors a PC.

Considering the above situation, a deep convolutional Neural Network model is used that requires little human intervention. I validated different pre-trained deep learning models such as VGG-16, InceptionV3, and ResNet to find a balance between accuracy and precision and the time taken to give the results. I have chosen the VGG16 as my base model from the results obtained. I have input a Livestream feed which will get split down into smaller clips; then, the model generates frames from the clip based on a particular FPS (frames per second) and generates the valuable results.

The frames are then sent to the model for prediction, and the results will be obtained in real- time. My model's prediction time buffer has been minimal, and detection is close to real-time. Consolidated alerts to supervisors and relevant local authorities to further enhance the safety ofmembers of society. Since most new construction areas are more likely to have a CCTV system installed nearby, the initial cost/barrier to entry is met, making the model easier to deploy. Model performance is measured using hisfour parameters: precision, recall, accuracy, and F1 score

My model's prediction time buffer has been minimal, and detection is close to realtime. Consolidated alerts to supervisors and relevant local authorities to further enhance the safety ofmembers of society. Since most new construction areas are more likely to have a CCTV systeminstalled nearby, the initial cost/barrier to entry is met, making the model easier to deploy. Model performance is measured using his four parameters: precision, recall, accuracy, and F1 score.We evaluated our system developing and use different types of diasters for implementation purposes in system.

CHAPTER 7

RESULTS AND DISCUSSIONS

7.1 MODULES

INPUT ACQUISITION DATA

The data acquisition system going to capture the video from web cam.open-CV method is used to capture the video from the web cam .

PRE PROCESSING

The pre-processing is used get some video from the previous step that video will under a process called grey-scale, that video will converter into fps image then goes under a technique grey scale.



Fig 7.1 : Pre Processing image technique for classification

FEATURE EXTRACTION

The feature extraction is going to capture the ROI i.e face will recognise and show the face in a box format. ROI means region of interest that techniques we used.



Fig 7.2 : ROI Feature Extraction

SEGMENTATION

The segmentation is a technique called full mount technique that is used to segment the Image.



Fig 7.3 : Image Segmentation

CLASSIFICATION

Step 1: Import the libraries.

Step 2: Fetch data.

Step 3: Determine the target variable.

Step 4: Creation of predictors variables.

Step 5: Test and train dataset split.

Step 6: Create the machine learning classification model using the train.

7.2 METHODOLOGIES

FACE RECOGNITION MODULE

The face recognition module serves as the cornerstone of the system, employing facial recognition technology for secure employee login. During the registration process, facial features will be captured, securely stored, and subsequently utilized for matching during login attempts. The implementation will go beyond traditional facial recognition by incorporating multi-modal biometric features, enhancing the accuracy and robustness of the authentication process.



Fig 7.4: Face Recognition Module

BEHAVIOURAL MONITORING MODULE

The behavioral monitoring module leverages computer vision techniques to track various aspects of employee behavior. This includes eye tracking for assessing focus, mouth opening detection for identifying verbal communication, and mobile phone use detection.



Fig 7.5 : Behavioural Monitoring

IMPLEMENTATION

In the implementation phase, we will develop the system using Python as the primary programming language. The goal is to create a modular and scalable application that seamlessly integrates the facial recognition and behavioral monitoring modules. Throughout this phase, extensive testing will be conducted to verify correct functionality and reliability of each component.

PRIVACY MEASURE IMPLEMENTATION

Privacy measures are a critical aspect of the "Wake Alert" system. To address privacy concerns, the system will implement data anonymization to dissociate personal info from monitored activities. Encryption techniques will be applied to safeguard sensitive information during storage and transmission. These privacy-enhancing measures are essential to ensure compliance with privacy regulations and to build trust among the employees using the system.

ETHICAL AND LEGAL CONSIDERATIONS

Ethical and legal considerations will guide development and deployment of the system. Informed consent will be obtained from employees before implementing the monitoring system, and the design will adhere to ethical standards. Legal compliance with privacy laws and regulations will be ensured emphasizing transparency, respect for individual will be ensured, emphasizing transparency, respect for individual privacy rights, and provision of opt-out options for employees.

7.3 FACE RECOGNIZABLE PROOF

Created an employee proctoring system using Python to monitor workplace for the Engagement potentially address unethical activities. The system leverages power **YOLO v3**: This deep learning model detects cell phone usage in real-time, helping Is to identify instances where employees might be distracted. Support vector to the Machines (SVM) and other Classifiers: These algorithms go beyond simply faces. They detect subtle nuances in eye and mouth movements, offering insights into attentiveness and potential diseng



Fig 7.6 : Cell Phone Detection

7.4 IDENTIFYING AREAS FOR IMPROVEMENT

Our goal isn't simply to catch misconduct but proactively improve overall productivity by analyzing the collected data, we aim To:

Pinpoint Sections: Identify specific sections or teams where attentiveness may be lower than desired. This datadriven approach help us focus improvement efforts investigate

Investigate Underlying Issues: We plan to delveop deeper than just identifying specific in dividuuals using their phone.We want to understand the reasons behind any of this Unaunthetical behaviour



Fig 7.7 : Mouth Detection

Addressing Root Causes: While the system can identify areas for improvement, address the underlying reasons for disengagement requires tailored solutions and ongoing . By implementing this Python-based proctoring system responsibly and ethically, we hope to gain valuable insights that ultimately lead to more engaged and productive work environment for everyone.



Fig 7.8 Drowsiness Detection

CHAPTER 8

CONCLUSION

8.1 CONCLUSION

Understudy accomplishment expectation is an exploration area of interest in the field of instructive information mining as of late. It is too a significant objective for learning examination. Since current related research has not thought about that various elements have various impacts on understudy accomplishment, and that understudy accomplishment can be viewed as transient information, this paper proposes an understudy accomplishment forecast model in view of MIC, CNN, consideration system, and GRU. The accompanying ends can be drawn. (1) The request for relationship of the boundaries with understudy accomplishment from biggest to littlest is understudy learning conduct qualities, course trait attributes, and understudy trait qualities. It shows that we ought to center around directing understudies to foster great learning conduct. (2) Contrasted and the current pattern models, the proposed MCAG model not just investigates transient and aspect attributes of information yet additionally further depicts the impact of various boundaries on the forecast results. (3) The exploratory outcomes show that the upsides of the assessment metric of the proposed MCCB model are bigger than the four benchmark models and three sub-models, demonstrating that the proposed model beats the four gauge models and two sub-models, the proposed model can foresee understudy accomplishment all the more precisely. In future work, we intend to think about additional connected elements to additionally exhibit the forecast presentation of the proposed MCAG model. Furthermore, we expect to investigate more compelling profound learning structures to work on the precision of understudy accomplishment expectation.

8.2 RECOMMENDATIONS FOR FUTURE RESEARCH

1. Real-Time Monitoring: Develop systems capable of real-time monitoring of power consumption at various levels, including individual appliances, circuits, buildings, and even larger infrastructure grids. Research should focus on improving the accuracy, granularity, and reliability of monitoring data.

2. Predictive Analytics: Explore the use of predictive analytics and machine learning algorithms to forecast future power consumption trends based on historical data, weather patterns, and other relevant factors. This could enable proactive management of energy usage and optimization of power distribution.

3. Anomaly Detection: Investigate techniques for detecting anomalies in power consumption patterns, such as sudden spikes or drops in usage, which may indicate equipment malfunction, electrical faults, or unauthorized activities. Develop algorithms to automatically generate alerts when anomalies are detected.

4. Energy Efficiency Optimization: Research methods for optimizing energy efficiency based on real-time monitoring data. This could involve dynamically adjusting power settings, scheduling operations during off-peak hours, or implementing demand-response strategies to reduce overall energy consumption.

5. Integration with Smart Grids: Explore ways to integrate power monitoring systems with smart grid technologies for enhanced control and coordination of energy resources. Investigate the interoperability of different monitoring devices, protocols, and communication standards to facilitate seamless integration.

6. User Interface Design: Conduct research on user interface design principles for power monitoring systems, with a focus on usability, accessibility, and engagement. Develop intuitive dashboards, visualizations, and notification systems to empower users to make informed decisions about their energy usage.

7. Privacy and Security: Address privacy and security concerns associated with power monitoring systems, particularly regarding the collection, storage, and transmission of sensitive energy consumption data. Research methods for anonymizing data, implementing encryption protocols, and securing communication channels against potential threats.

8. Scalability and Robustness: Evaluate the scalability and robustness of power monitoring systems to accommodate large-scale deployments in diverse settings, such as residential, commercial, and industrial environments. Investigate techniques for managing network congestion, handling data aggregation, and ensuring system resilience.

9. Regulatory Compliance: Examine regulatory requirements and standards governing the deployment and operation of power monitoring systems, particularly concerning data privacy, consumer rights, and environmental sustainability. Research methods for ensuring compliance with relevant regulations and industry best practices.

10. User Behavior Analysis: Study user behavior and decision-making processes related to energy consumption, with the goal of identifying patterns, biases, and opportunities for intervention. Use insights from behavioral economics and psychology to design interventions that promote energy conservation.

8.3 RESEARCH ISSUES

1. Data Accuracy and Reliability: Ensuring that the data collected by the monitoring system is accurate and reliable is crucial. Research may focus on improving sensor technologies, data collection methodologies, and calibration techniques to minimize errors and discrepancies in power consumption measurements.

2. Energy Consumption Modeling: Developing accurate models to represent energy consumption patterns of different devices, appliances, and systems is essential for effective power monitoring. Research may involve collecting and analyzing large datasets to identify common usage patterns and develop predictive models that can accurately estimate energy consumption.

3. Optimization Algorithms: Designing optimization algorithms that can analyze real-time power consumption data and provide recommendations for optimizing energy usage is another important research issue. This may involve developing machine learning algorithms, optimization techniques, and decision support systems that can adapt to changing energy demand and supply conditions.

4. User Interface Design: Designing user-friendly interfaces that allow users to easily monitor their energy consumption and receive alerts or notifications when abnormal behavior is detected is crucial. Research may focus on understanding user needs and preferences, designing intuitive interfaces, and evaluating the usability of the system through user studies and feedback.

5. Privacy and Security: Protecting the privacy and security of sensitive energy consumption data is a significant research issue. This may involve developing encryption and authentication mechanisms to secure data transmission, implementing access control policies to restrict data access, and ensuring compliance with privacy regulations and standards.

6. Scalability and Interoperability: Ensuring that the monitoring system can scale to accommodate large numbers of devices and users, and can interoperate with existing infrastructure and standards, is essential. Research may focus on developing scalable architectures, communication protocols, and interoperability standards that can support the integration of heterogeneous devices and systems.

7. Energy Efficiency and Sustainability: Designing the monitoring system to promote energy efficiency and sustainability is an important research issue. This may involve developing algorithms and incentives to encourage users to adopt energy-saving behaviors, integrating renewable energy sources and energy storage systems into the monitoring infrastructure, and analyzing the environmental impact of energy consumption patterns.

8. Real-Time Analysis and Decision-Making: Enabling real-time analysis of power consumption data and providing timely alerts and recommendations to users is crucial for effective energy management. Research may focus on developing algorithms and techniques for real-time data processing, anomaly detection, and decision-making that can operate with low latency and high reliability.

9. Cost-Effectiveness: Ensuring that the monitoring system is cost-effective and provides a good return on investment for users is important for widespread adoption. Research may involve developing cost models, evaluating the economic benefits of energy savings and operational efficiencies enabled by the system, and identifying barriers to adoption and strategies for overcoming them.

10. Long-Term Monitoring and Maintenance: Designing the monitoring system to be robust and resilient over the long term, and ensuring that it can be easily maintained and upgraded, is essential.

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APPENDIX

A) SOURCE CODE

```
import tensorflow
as tf import
numpy as np
import cv2

from tensorflow.keras import
Model from
tensorflow.keras.layers import
(
    Add,
    Concat
    enate,
    Conv2
    D,
    Input,
    Lambda
    a,
    Leaky
    ReLU,
    UpSampling2D,
    ZeroPadding2D,
    BatchNormalization
)
from tensorflow.keras.regularizers
import l2 import wget
```

```

def load_darknet_weights(model,
    weights_file): ""
    Helper function used to load darknet weights.

    :param model: Object of the Yolo v3 model
    :param weights_file: Path to the file with Yolo V3 weights
    #Open the weights file

    wf = open(weights_file, 'rb')

    major, minor, revision, seen, _ = np.fromfile(wf, dtype=np.int32, count=5)

    #Define names of the Yolo layers (just for a
    reference) layers = ['yolo_darknet',
        'yolo_conv_0',
        'yolo_output_0',
        'yolo_conv_1',
        'yolo_output_1',
        'yolo_conv_2',
        'yolo_output_2']

    for layer_name in layers:

        sub_model =
        model.get_layer(layer_name) for i,
        layer in
        enumerate(sub_model.layers):

            if not
                layer.name.startswith('conv2d'
                ): continue

```

```

#Handles the special, custom Batch normalization layer
batch_norm = None
if i + 1 < len(sub_model.layers) and \

    sub_model.layers[i + 1].name.startswith('batch_norm'):
batch_norm = sub_model.layers[i + 1]

filters = layer.filters
size = layer.kernel_size[0] in_dim = layer.input_shape[-1]
if batch_norm is None:
    conv_bias = np.fromfile(wf, dtype=np.float32,
count=filters)else:
# darknet [beta, gamma, mean, variance]
bn_weights = np.fromfile(
    wf, dtype=np.float32, count=4 *
filters)# tf [gamma, beta, mean,
variance]
bn_weights = bn_weights.reshape((4, filters))[[1, 0, 2, 3]]

# darknet shape (out_dim, in_dim, height, width)
conv_shape = (filters, in_dim, size, size)
conv_weights = np.fromfile(
    wf, dtype=np.float32,
count=np.product(conv_shape)) # tf shape (height,
width, in_dim, out_dim) conv_weights =
conv_weights.reshape(
conv_shape).transpose([2, 3, 1, 0])

if batch_norm is None:

```

```

layer.set_weights([conv_weights, conv_bias
else:
layer.set_weights([conv_weights])
batch_norm.set_weights(bn_weights)

assert len(wf.read()) == 0, 'failed to read all
data' wf.close()

def draw_outputs(img, outputs,
class_names): '''
Helper, util, function that draws predictions on the image.

:param img: Loaded image
:param outputs: YoloV3 predictions

:param class_names: list of all class names found in
the dataset '''
boxes, objectness, classes, nums = outputs

boxes, objectness, classes, nums = boxes[0], objectness[0],
classes[0], nums[0] wh = np.flip(img.shape[0:2])
for i in range(nums):

    x1y1      =      tuple((np.array(boxes[i][0:2])      *
wh).astype(np.int32))      x2y2      =
tuple((np.array(boxes[i][2:4])      *
wh).astype(np.int32)) img = cv2.rectangle(img,
x1y1, x2y2, (255, 0, 0), 2)
img      =      cv2.putText(img,      '{}
{:.4f}'.format(
class_names[int(classes[i])],
anchors = np.array([(10, 13), (16, 30), (33, 23), (30, 61), (62, 45)

```

```

(59, 119), (116, 90), (156, 198), (373, 326)],
np.float32) / 416

```

```

yolo_anchor_masks = np.array([[6, 7, 8], [3, 4, 5], [0, 1, 2]])

```

```

def DarknetConv(x, filters, kernel_size, strides=1,
    batch_norm=True): '''
    Call this function to define a single Darknet convolutional layer

    :param x: inputs
    :param filters: number of filters in the convolutional layer
    :param kernel_size: Size of kernel in the Conv layer
    :param strides: Conv layer strides
    :param batch_norm: Whether or not to use the custom batch norm layer.

    #Image
    padding if
    strides ==
    1:
    padding = 'same'
    else:
    x = ZeroPadding2D(((1, 0), (1, 0)))(x) # top left half-
    padding padding = 'valid'

```

```

#Defining the Conv layer
x = Conv2D(filters=filters,
kernel_size=kernel_size, strides=strides,
padding=padding,
use_bias=not batch_norm, kernel_regularizer=l2(0.0005))(x)

if batch_norm:
x = BatchNormalization()(x)
x =

LeakyReLU(alpha=0.1)(x)
return x

def
DarknetResidual(x,
filters): '''
Call this function to define a single DarkNet Residual layer

:param x: inputs
:param filters: number of filters in each
Conv layer. '''
prev = x
x = DarknetConv(x, filters
// 2, 1) x = DarknetConv(x,
filters, 3)
x = Add()([prev,
x]) return x

def DarknetBlock(x, filters,

```

```
blocks): ""
```

Call this function to define a single DarkNet Block (made of multiple Residual layers)

```
:param x: inputs
```

```
:param filters: number of filters in each Residual layer
```

```
:param blocks: number of Residual layers in  
the block ""
```

```
x = DarknetConv(x, filters, 3,  
strides=2) for _ in range(blocks):
```

```
x = DarknetResidual(x, filters)
```

```
return x
```

```
def
```

```
Darknet(name=No
```

```
ne): ""
```

The main function that creates the whole

```
DarkNet. ""
```

```
x = inputs = Input([None,
```

```
None, 3]) x =
```

```
DarknetConv(x, 32, 3)
```

```
x = DarknetBlock(x, 64, 1)
```

```
x = DarknetBlock(x, 128, 2) # skip connection
```

```
x = x_36 = DarknetBlock(x, 256, 8) # skip
```

```
connection x = x_61 = DarknetBlock(x,
```

```
512, 8)
```

```
x = DarknetBlock(x, 1024, 4)
```

```
return tf.keras.Model(inputs, (x_36, x_61, x), name=name)
```

```

def YoloConv(filters,
             name=None): '''
    Call this function to define the Yolo Conv layer.

    :param filters: number of filters for the conv layer
    :param name: name of
    the layer '''
    def yolo_conv(x_in):
        if isinstance(x_in, tuple):
            inputs = Input(x_in[0].shape[1:]),
            Input(x_in[1].shape[1:]) x, x_skip = inputs

            # concat with skip
            connection x =
            DarknetConv(x, filters, 1) x
            = UpSampling2D(2)(x)
            x = Concatenate()([x,
            x_skip]) else:
            x= inputs = Input(x_in.shape[1:])

            x= DarknetConv(x, filters, 1)
            x = DarknetConv(x, filters *
            2, 3) x = DarknetConv(x,
            filters, 1)
            x = DarknetConv(x, filters *
            2, 3) x = DarknetConv(x,
            filters, 1)

            return Model(inputs, x,

```

```

def YoloOutput(filters, anchors, classes,
               name=None): '''
    This function defines outputs for the Yolo V3. (Creates output projections)

    :param filters: number of filters for the conv layer
    :param anchors: anchors
    :param classes: list of classes in a dataset
    :param name: name of
    the layer '''
    def yolo_output(x_in):

        x = inputs =
        Input(x_in.shape[1:]) x =
        DarknetConv(x, filters * 2, 3)
        x = DarknetConv(x, anchors * (classes + 5), 1, batch_norm=False)

        x = Lambda(lambda x: tf.reshape(x, (-1, tf.shape(x)[1], tf.shape(x)[2],
        anchors, classes + 5)))(x) return
    tf.keras.Model(inputs, x, name=name)(x_in)
    return yolo_output

def yolo_boxes(pred,
               anchors, classes): '''
    Call this function to get bounding boxes from network predictions

    :param pred: Yolo predictions
    :param anchors: anchors
    :param classes: List of classes from
    the dataset '''

```

```

# pred: (batch_size, grid, grid, anchors, (x, y, w, h, obj, classes))

grid_size = tf.shape(pred)[1]

#Extract box coordinates from prediction
vectors box_xy, box_wh, objectness,
class_probs = tf.split(
    pred, (2, 2, 1, classes), axis=-1)

#Normalize
coordinates box_xy =
tf.sigmoid(box_xy)
    objectness = tf.sigmoid(objectness)
class_probs = tf.sigmoid(class_probs)
    pred_box = tf.concat((box_xy, box_wh), axis=-1) # original xywh for loss

# !!! grid[x][y] == (y, x)
grid = tf.meshgrid(tf.range(grid_size), tf.range(grid_size))
grid = tf.expand_dims(tf.stack(grid, axis=-1), axis=2) # [gx, gy, 1, 2]

box_xy = (box_xy + tf.cast(grid, tf.float32)) / \
    tf.cast(grid_size, tf.float32)
box_wh = tf.exp(box_wh) * anchors

box_x1y1 = box_xy -

```

```

box_xy + box_wh / 2
bbox = tf.concat([box_x1y1, box_x2y2], axis=-1)

```

```

return bbox, objectness, class_probs, pred_box

```

```

def yolo_nms(outputs, anchors, masks,
            classes): # boxes, conf, type
    b, c, t = [], [], []

```

```

    for o in outputs:

```

```

        b.append(tf.reshape(o[0], (tf.shape(o[0])[0], -1, tf.shape(o[0])[-1])))

```

```

        c.append(tf.reshape(o[1], (tf.shape(o[1])[0], -1, tf.shape(o[1])[-1])))

```

```

        t.append(tf.reshape(o[2], (tf.shape(o[2])[0], -1, tf.shape(o[2])[-1])))

```

```

    bbox = tf.concat(b, axis=1)

```

```

    confidence = tf.concat(c,

```

```

    axis=1) class_probs =

```

```

    tf.concat(t, axis=1)

```

```

    scores = confidence * class_probs

```

```

    boxes, scores, classes, valid_detections =

```

```

        tf.image.combined_non_max_suppression( boxes=tf.reshape(bbox,
            (tf.shape(bbox)[0], -1, 1, 4)),

```

```

scores, (tf.shape(scores)[0], -1, tf.shape(scores)[-1])),
    max_output_size_per_class
=100,max_total_size=100,
iou_threshold=0.5,
score_threshold=0.6
)
return boxes, scores, classes, valid_detections

def YoloV3(size=None, channels=3, anchors=yolo_anchors,
masks=yolo_anchor_masks, classes=80):

    x = inputs = Input([size, size, channels], name='input')
    x_36, x_61, x = Darknet(name='yolo_darknet')(x)
    x = YoloConv(512, name='yolo_conv_0')(x)

    output_0 = YoloOutput(512, len(masks[0]), classes, name='yolo_output_0')(x)
    x = YoloConv(256, name='yolo_conv_1')((x, x_61))

    output_1 = YoloOutput(256, len(masks[1]), classes, name='yolo_output_1')(x)

    x = YoloConv(128, name='yolo_conv_2')((x, x_36))

    output_2 = YoloOutput(128, len(masks[2]), classes, name='yolo_output_2')(x)

    boxes_0 = Lambda(lambda x: yolo_boxes(x,
anchors[masks[0]], classes), name='yolo_boxes_0')(output_0)
    boxes_1 = Lambda(lambda x: yolo_boxes(x,
anchors[masks[1]], classes), name='yolo_boxes_1')(output_1)
    boxes_2 = Lambda(lambda x: yolo_boxes(x, anchors[masks[2]], classes)

```

```

    outputs = Lambda(lambda x: yolo_nms(x, anchors, masks,
classes), name='yolo_nms')((boxes_0[:3], boxes_1[:3], boxes_2[:3]))

```

```

    return Model(inputs, outputs, name='yolov3')

```

```

def weights_download(out='models/yolov3.weights'):

```

```

    _ =

```

```

    wget.download('https://pjreddie.com/media/files/yolov3.weights',
out='models/yolov3.weights')

```

```

    # weights_download() # to download

```

```

weights_yolo = YoloV3()

```

```

    load_darknet_weights(yolo, 'models/yolov3.weights')

```

```

cap = cv2.VideoCapture(0)

```

```

while(True):

```

```

    ret, image =

```

```

    cap.read() if ret

```

```

    == False:

```

```

        break

```

```

        img = cv2.cvtColor(image,

```

```

cv2.COLOR_BGR2RGB) img =

```

```

cv2.resize(img, (320, 320))

```

```

        img =

```

```

img.astype(np.float32)

```

```

img =

```

```

np.expand_dims(img, 0)

```

```

class_names = [c.strip() for c in
open("models/classes.TXT").readlines()]boxes, scores, classes,
nums = yolo(img)
count=0

for i in range(nums[0]):

if int(classes[0][i] == 0):
    count +=1
    if int(classes[0][i] ==
67): print('Mobile Phone
detected')
    if count == 0:
        print('No person
detected') elif count >
1:
    print('More than one person detected')

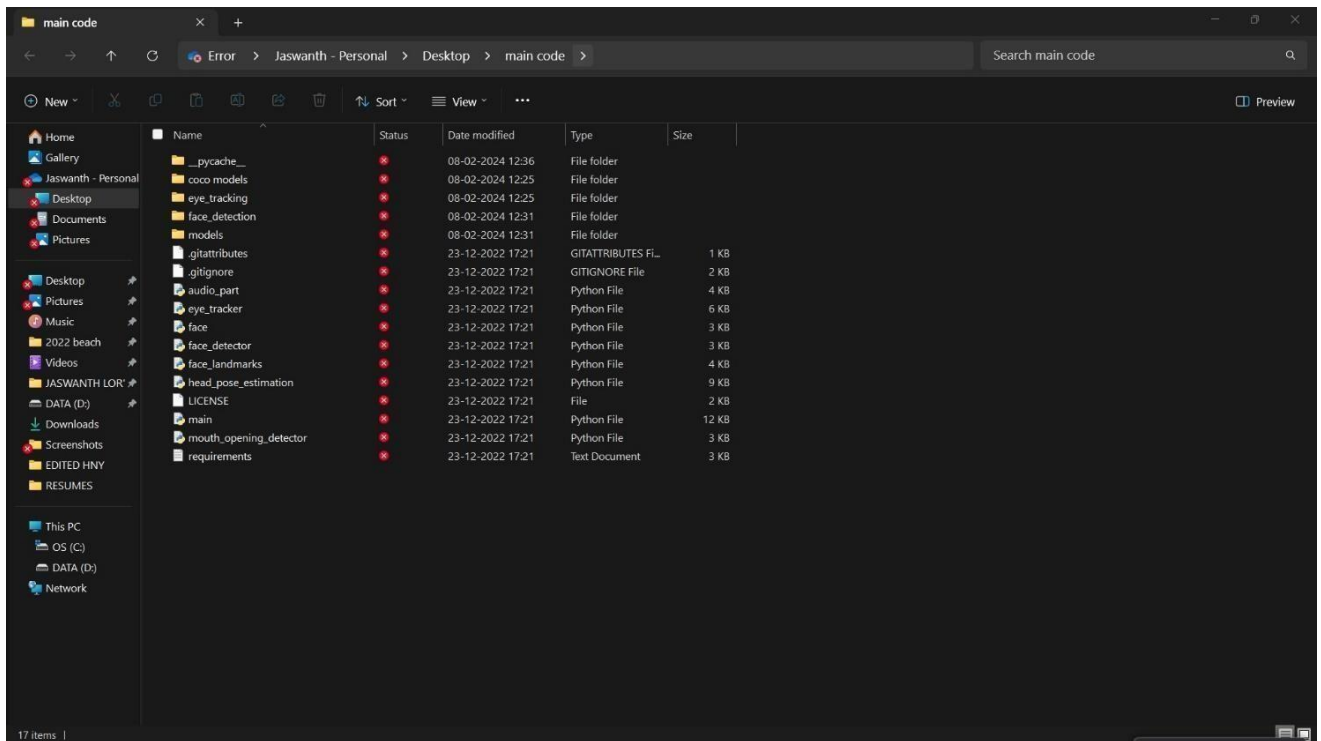
image = draw_outputs(image, (boxes, scores, classes, nums), class_names)

cv2.imshow('Prediction', image)
if cv2.waitKey(1) &
0xFF == ord('q'): break

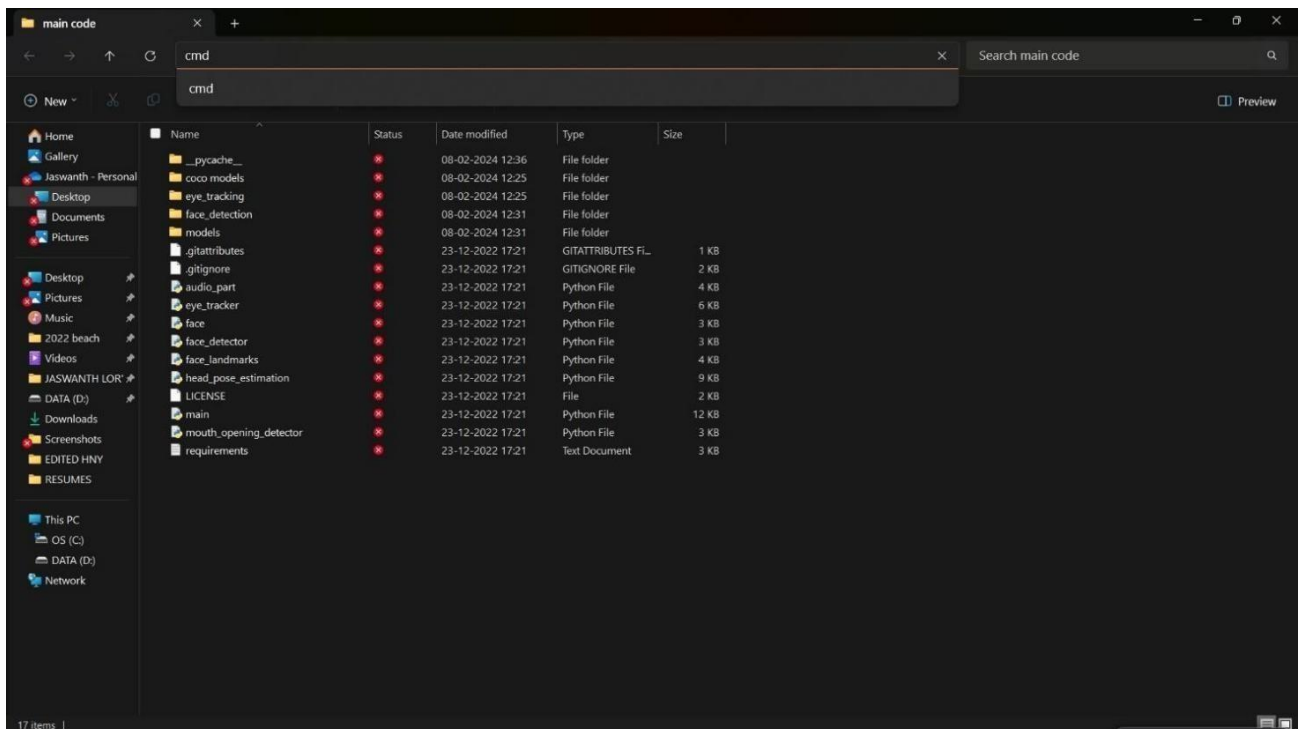
cap.release()
cv2.destroyAllWindows()
ws(

```

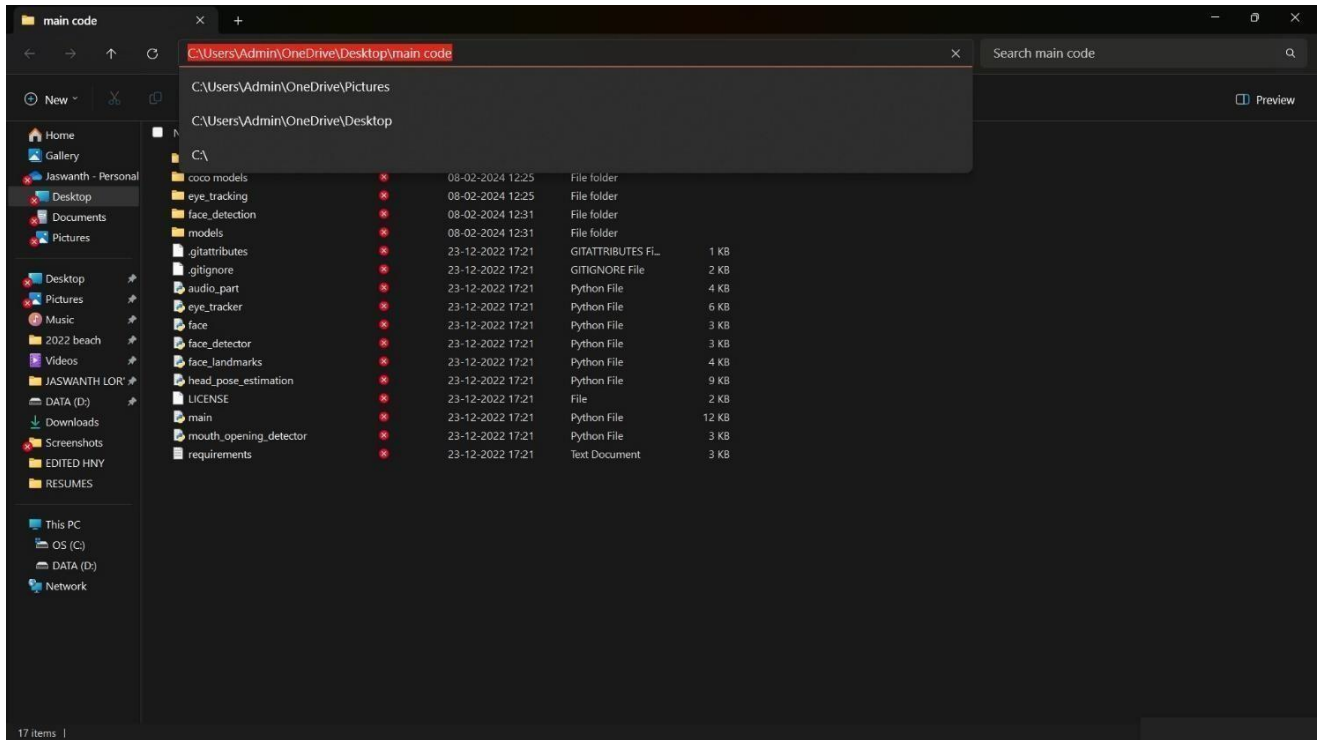
B) SCREEN SHOTS



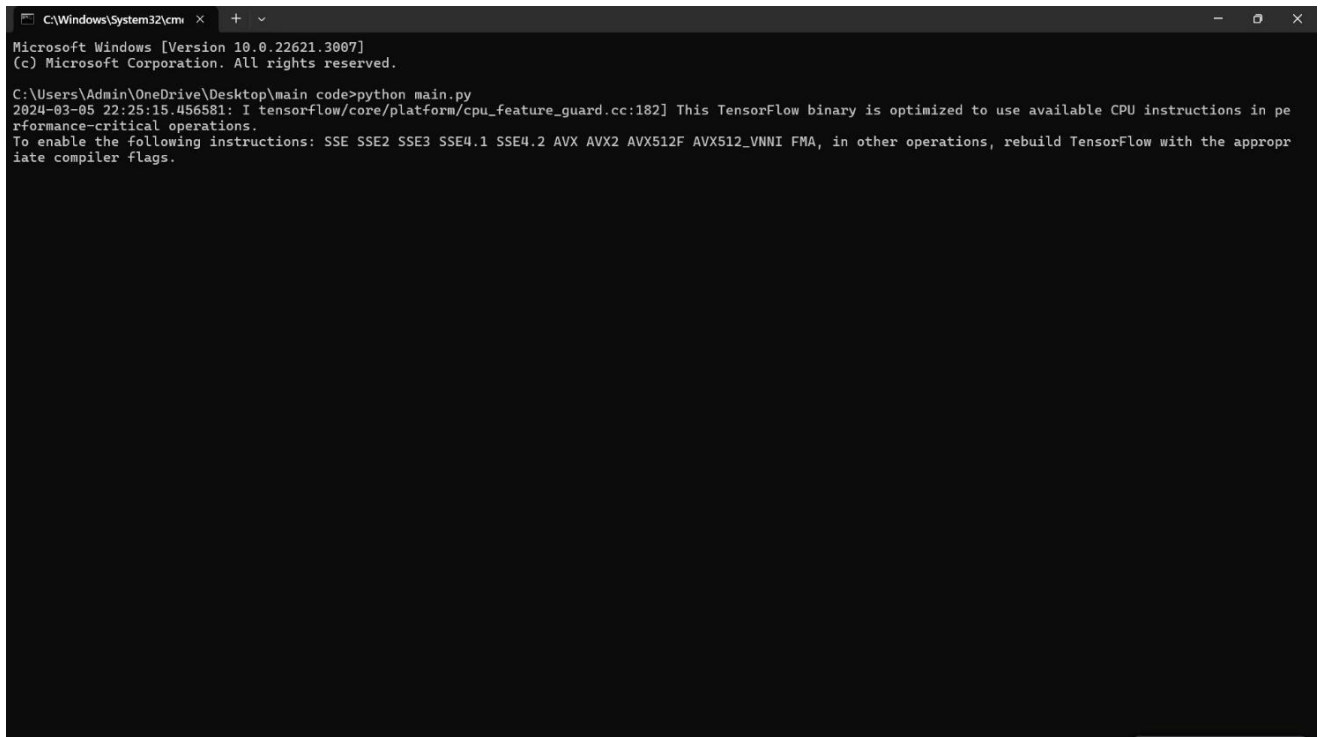
A) MAIN CODE



B) COMMAND PROMT



C) USER ADMIN



D) MAIN CODE> Python main.py


```
C:\Windows\System32\cmd x + v
Microsoft Windows [Version 10.0.22621.3007]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin\OneDrive\Desktop\main code>python mouth_opening_detector.py
2024-03-05 22:27:02.886926: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.
To enable the following instructions: SSE SSE2 SSE3 SSE4.1 SSE4.2 AVX AVX2 AVX512F AVX512_VNNI FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'global_step:0' shape=() dtype=int64_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer1/conv2d/kernel:0' shape=(3, 3, 3, 32) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer1/conv2d/bias:0' shape=(32,) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer2/conv2d/kernel:0' shape=(3, 3, 32, 64) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer2/conv2d/bias:0' shape=(64,) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'global_step:0' shape=() dtype=int64_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer1/conv2d/kernel:0' shape=(3, 3, 3, 32) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer1/conv2d/bias:0' shape=(32,) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer2/conv2d/kernel:0' shape=(3, 3, 32, 64) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer2/conv2d/bias:0' shape=(64,) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'global_step:0' shape=() dtype=int64_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer1/conv2d/kernel:0' shape=(3, 3, 3, 32) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
WARNING:tensorflow:Unable to create a python object for variable <tf.Variable 'layer1/conv2d/bias:0' shape=(32,) dtype=float32_ref> because it is a reference variable. It may not be visible to training APIs. If this is a problem, consider rebuilding the SavedModel after running tf.compat.v1.enable_resource_variables().
```

G) MAINCODE>Pythonmouth_opening_detector.py

C. RESEARCH PAPER

WAKEALERT: AI POWERED MONITORING SYSTEM

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Abstract—Balancing organizational needs with employee privacy poses a challenge when implementing monitoring systems. This paper explores an ethical approach to employee monitoring that prioritizes transparency, informed consent, and data privacy protection. The proposed system focuses on mobile phone usage detection, drowsiness detection, employee attention detection to support employee well-being and productivity, aiming to reduce fatigue-related issues and promote work-life balance. We discuss the ethical considerations involved and the importance of clear communication with employees throughout the implementation process. This approach seeks to achieve organizational goals while upholding employee privacy and promoting a positive work environment.

Index Terms—Wake Alert System, AI, Monitoring, Face Recognition, SVM, Machine Learning

I. INTRODUCTION

In today's competitive world, organizations strive for increased productivity to achieve their goals. However, traditional methods often focus solely on output, neglecting the importance of employee well-being and work-life balance. This can lead to presenteeism, burnout, and ultimately, decreased productivity. This paper explores a novel approach that prioritizes both sustainable productivity and employee well-being. We investigate attention of the employee and other unethical activities done by the employee to address existing productivity challenges in the workplace. Our goal is to identify solutions that not only enhance efficiency but also foster a supportive work environment, leading to engaged employees and improved long-term performance. While focusing on productivity is crucial, we acknowledge the ethical considerations involved and prioritize transparent methods and respect for employee privacy. Through this research, we aim to contribute to a workplace culture that values both productivity and employee well-being, leading to optimal performance for both individuals and organizations.

The system takes a multi-faceted approach:

(SVM) for classification, and face recognition, we can monitor employee activities during work hours.

Focus on attentiveness: Moving beyond basic proctoring, our system focuses on identifying patterns of inattentiveness and potential unethical behavior like using mobile phones.

Data-driven insights: The gathered data is used to identify trends and create a holistic picture, helping us understand the root causes affecting employee productivity.

Our goal is not to punish or reprimand individuals but rather to utilize this data responsibly. By analyzing trends and gathering additional qualitative data, we aim to:

Identify underlying issues: Understand the factors contributing to inattentiveness and unethical behavior.

Implement targeted interventions: Design solutions, such as training programs, workload adjustments, or stress management resources, to address the identified issues and ultimately improve employee well-being and overall productivity. This employee proctoring system, combined with a data-driven and ethical approach, can be a valuable tool in fostering a more engaged and productive work environment.

II. EASE OF USE

- **Seamless Integration:** Integrate the system seamlessly into existing workflows, minimizing disruption and additional steps.
- **Intuitive Interface:** Design a user-friendly interface with auto login with face functionality, clear icons, minimal text, intuitive interaction flows and clear alerts and warnings.
- **Data Transparency:** Provide clear and accessible information about how data is collected, used, and stored, fostering trust and understanding.
- **Simple and intuitive interface:** Design a clean and user-friendly interface for both administrators and employees. Minimize technical jargon and complex configurations.

- Customization options: Allow administrators to customize the sensitivity levels of object detection and classification algorithms to adjust to different work environments and employee roles. Offer options for employees to personalize their workspaces to enhance comfort and focus.
- Data visualization and actionable insights: Present data on employee engagement in clear and concise dashboards. Use visualizations like charts and graphs to make data easily understandable.
- Integrations and automation: Integrate your system with existing productivity tools employees already use to streamline workflow and minimize disruption. Automate tasks like data collection and report generation where appropriate.
- Feedback and communication: Encourage open communication, allowing employees to provide feedback on the system and their work environment. Address their concerns promptly and transparently.
- Continuous improvement: Regularly review and refine your system based on user feedback and evolving needs. Conduct periodic assessments to measure the effectiveness of the system in improving productivity and employee engagement.

III. LITERATURE SURVEY

- **Automatic System for Driver Drowsiness Detection System using Deep Learning of International Conference for Advancement in Technology (ICONAT) by Sasi Preetham Ch(2023)** The proposed model is carried out the usage of switch studying and OpenCV, and the consequences show that the constructed version is more a hit in spotting driver yawning than the cutting-edge findings. Life is destroyed by using the approaches wherein things are unfold by using human deceit. Various reminiscence schemes had been diagnosed to disrupt knowledge robbery, but the scheme stays dramatic. Using switch mastering strategies to display the digital driving force and goal the attention. This version splits the unique ice dataset into subjects.
- **An Enhanced Haar Cascade Face Detection Schema for Gender Recognition of International Conference on Smart Computing and Application (ICSCA) by PSVS Sridhar (2023)** On the other hand, the accuracy of automatic gender identification has constantly been a source of difficulty or complaint. Initial face popularity is accomplished the usage of Haar Cascade Face Detection, that's based totally on the Viola-J face reputation algorithm. Facial functions which include eyes, mouth and nose are then determined. Second, the Viola-Jones face recognition algorithm acknowledges faces and facial features including eyes, mouth and nostril and displays the consequences.
- **An Intelligent Camera Based Eye Controlled Wheelchair System: Haar Cascade and Gaze Estimation Algorithms of International Conference on Applied Intelligence and Sustainable Computing (ICAISC) by V Viswanatha (2023)** It uses an picture comparison method wherein the photograph of the attention is processed to determine the course of gaze the use of Haar cascade and case estimation algorithms, and then moves the wheelchair according to the course of eye movement. The tracking estimation set of rules is so accurate that one set of rules does the equal task as if two algorithms (canny facet detection, Hough rework) do the equal task. With this approach, a disabled man or woman can manipulate their wheelchair via transferring their eyes.
- **Driver Drowsiness Detection Using Deep Learning/ 2023 4th International Conference for Emerging Technology (INCET) by Dhiren Ojha (2023)** In this newsletter, we provide a complete assessment of driving force yawn detection systems, such as key functions, advantages, and limitations. We will review commonplace techniques for detecting motive force yawning, together with physiological measurements, eye tracking, and machine getting to know procedures. Challenges are highlighted with the development and implementation of such structures, consisting of variability in man or woman sleep patterns, converting environmental conditions, and trade-offs among accuracy and consumer enjoy. This examine gives a motive force drowsiness detection approach based on machine learning. Mechanisms and physiological indicators which include electroencephalogram (EEG) and electrocardiogram (ECG).
- **Driver Drowsiness Detection and Alert System of IEEE International Conference on Integrated Circuits and Communication Systems (ICICACS) by R. Kannan (2023)** The machine works by way of tracking the driving force's eyes and sounds if he is asleep. The machine as a result advanced is a actual-time system without major intrusion. Improving impact forces without compromising safety is a concern. This design driving force detects blinks and yawns. If the driving force's eyes are closed for a long term, he's taken into consideration sleepy and the sound echoes. Because of its importance, the yaw detection driving force turns into an essential component of laptop vision and image processing software.
- **Eye Detection in Image of Face with Mask from Various Viewpoints by Haar-based Cascade Technique by Chadchayada Samarak (2023)** Current studies on masked face detection has barriers while carried out to non-frontal face photos. For best performance, aspect edges should be created. The eye detection manner involves analysing the seen side photographs of the face. Therefore, we advise a method

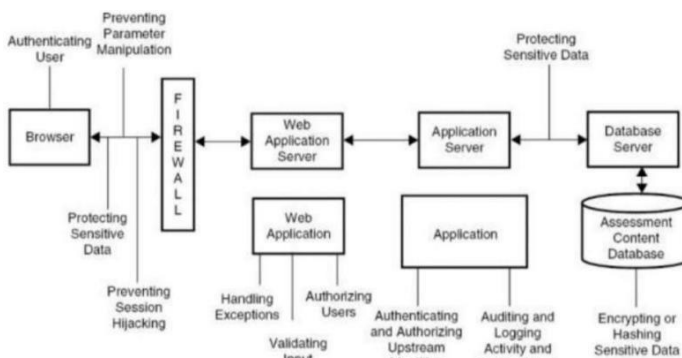
to detect eyes from face images using Haar based totally approach. Haar Cascade Classifier-based Real-Time Face Recognition and Face Detection of 4th

- **International Conference on Electronics and Sustainable Communication Systems (ICESC) by M Monica Dhana Ranjini(2023)** The principal reason of face detection algorithms is to determine whether a face is seen in an photograph. The complexity and accuracy of face detection and reputation has these days been the concern of tons studies, however real-time face detection based totally at the Viola-Jones algorithm, which can as it should be recognize faces in real-time, has revolutionized the sphere. . Many detection problems consisting of item, face, motion and face recognition can be effectively solved the usage of neural networks.
- **Identification of Driver Drowsiness Detection using a Regularized Extreme Learning Machine of Second International Conference on Electronics and Renewable Systems (ICEARS) by Ravi Mohan(2023)** This paper affords a detection approach that makes use of picture software to investigate pix of a motive force's face from a video digital. A driver's alertness is measured by how open or closed their eyes are. This paper offers a based intense learning machine, a singular risk discount method based totally at the precept of structural and weighted least squares. In most cases the generalization overall performance is substantially progressed the usage of the proposed algorithm without requiring extra education time. This technique outperforms CNN and ELM fashions, attaining an accuracy of round ninety nine percent.
- **Real-time Driver Drowsiness Detection and Assistance System using Machine Learning and Iot of 8th International Conference on Communication and Electronics Systems (ICCES) by Pragati Sudarshan (2023)** The goal of this paper is to put in force a wise notification device process that could extensively lessen the range of site visitor's injuries. The studies will broaden a system capable of real-time monitoring of the motive force to provide active popularity to detect sleepiness or fatigue in actual-time. Sleep detection structures are correct sufficient to hit upon, however now not match on the subject of prevention. Let's create a bodily motive force caution machine. Here, this studies will use Machine Learning Algorithm, Cascade Haar Algorithm and Internet of Things to configure the hardware. This era will wake the motive force if his eyes are closed for a long time, activate the alarm, sprinkle water in a positive position and go back to the lively position.
- **Research on the development of a proctoring system for conducting online exams in Kazakhstan by Ardak Nurpeisova and Anargaul shaushenova(2023)** The landscape of online education in Kazakhstan necessitates robust online exam proctoring systems to ensure academic integrity. This survey explores the existing literature on the development and implementation of such systems. While dedicated research on proctoring systems for online exams in Kazakhstan appears scarce, exploring broader research and alternative sources can provide valuable insights.
- **AI proctoring for offline examinations with 2-Longitudinal-Stream Convolutional Neural Networks by Tong Liu (2022)** The study presents a novel approach to AI proctoring for offline exams. While the proposed system shows potential for improving efficiency and detection accuracy, further research is necessary to address limitations and ethical concerns before wider adoption.
- **Driver Drowsiness Recognition via 3D Conditional GAN and Two-level Attention Bi-LSTM by Yacong Hu, Mingqi Lu, Chao Xiet(2022)** The 3D Conditional GAN effectively addressed the data scarcity issue by generating realistic synthetic data for training the model. The two-level attention mechanism helped the model focus on crucial aspects of the data relevant to drowsiness detection.
- **A Systematic Review on AI-based Proctoring Systems: Past, Present and Future by Aditya Nigam1, Rhitvik Pasricha1 (2021)** The review provides a comprehensive overview of the current state of AI-based proctoring systems, highlighting their potential benefits and significant challenges. As online education continues to evolve, addressing the identified issues and fostering responsible development of AIPS are crucial for ensuring their ethical and effective implementation in educational settings.
- **Non-Nosy Homeroom Consideration Global positioning framework by Andrew Sanders; Bradley Boswell; Gursimran Singh Walia; Andrew Allen(2021)** The purpose of this corporation is to evaluate institutions that need to improve the schooling of students, searching for the potential to improve the flow of the direction, and college students searching out a comfortable gaining knowledge of environment.
- **Online Recognition of Mindfulness of Understudies with Exceptional Necessities by Khandker Aftarul Islam; Tanzima Hashem; Mohammed Eunus Ali; Tasin Ishmam (2021)** In this paper, we endorse the primary deep gaining knowledge of-based totally interest country prediction method for students with ASD. Our version detects behaviors (e.G., uncommon movements, gazes, and so forth.) and activities from real-time

appearances and makes use of them as capabilities representing low, medium, and high degrees of attention. Current brand new attentional techniques for measuring the dimensions of normally growing college students the use of gaze or facial features cannot without problems be extended to college students with ASD because they do now not show off typical and regular behaviors.

- **Understudy fixation level checking framework in light of profound convolutional brain organization by U. B. P. Shamika; W. A. C. Weerakoon; P. K. P. G. Panduwawala; K. A. P. Dilanka(2021)** This paper describes a look at of development models used to screen pupil interest for the duration of various degrees of engagement. Experiments have been to begin with performed the usage of a deep neural network for student attention and emotion the usage of the Keras library. This observe discovered that emotions like calmness, happiness, marvel and fear are important in figuring out the eye degree of college students. These results helped pick out students with previous terrible attention tiers, allowing teachers to consciousness their aid and recommendation on college students who wanted it, ensuing in a higher online getting to know environment.
- **Controlling Mouse Motions Using Eye Tracking Using Computer Vision by Kshitij Meena, Manish kumar, Mohith Jangra(2020)** The algorithm starts to detect a face of a person using a face detection algorithm. After detecting the face, the position of eyes and mouth is captured for controlling the mouse functions such as left-click, right-click, and cursor movement. This method doesn't require any special hardware and sensors. It is a hands-free system that is useful for handicapped. First, we have to activate the mouse control mode by opening the mouth. For moving the mouse cursor left or right we simply have to move our head in the intended direction of movement of a cursor. For enabling the scroll mode, we have to squint our eyes into the camera and on initiation, it will show scroll mode is on.

IV. SYSTEM ARCHITECTURE



- 1.Data Acquisition Layer:

Employee Client: Lightweight application installed on the employee's computer. Captures webcam and microphone data with user consent. Monitors screen activity in the background if required (with clear communication and consent). Uploads data to the server securely.

Optional Wearable Device: (Consider privacy implications and employee feedback) Captures additional data like gaze direction or head movement (with informed consent). Transmits data securely to the server.

- 2.Data Processing and Analysing Layer: Receives data from the client and wearables (if applicable). Preprocesses data: Removes noise, formats data for analysis. Object Detection and Classification: Uses YOLO v3 for identifying mobile phone usage and other predefined activities. Face Recognition: Identifies employees using a secure face recognition model, complying with data privacy regulations. Eye and Mouth Detection: Utilizes SVM or other classifiers to analyze facial features. Engagement Analysis: Combines data from various sources (activity detection, gaze tracking, self-reported information) using a weighted scoring system or machine learning models (considering potential biases) to estimate employee engagement levels. Data Anonymization: Anonymizes individual data before further analysis, ensuring privacy.
- 3.Presentation and User Interaction Layer: Management Dashboard: Provides administrators with insights into overall employee engagement levels through intuitive visualizations (charts, graphs). Allows customization of sensitivity levels for detection algorithms based on role and environment. Enables viewing anonymized individual data and generating reports for further analysis. Employee Feedback System: Offers employees a way to provide anonymous feedback on the system and their work environment. Allows employees to report distractions or request adjustments to improve their focus and well-being.

- 4. Communication and Intervention Layer: Alert System (Optional): May trigger real-time alerts for administrators in case of detected unethical activities (consider potential misuse and false positives). Intervention Strategies: Focus on understanding root causes through open communication and employee feedback before taking corrective actions. Implement targeted interventions based on identified issues, such as workload adjustments, training opportunities, or addressing environmental distractions

V. EXISTING SYSTEM

In the current scenario, employee monitoring systems primarily rely on mouse movements, attendance tracking and key-

board activity. These systems often encounter several challenges and limitations such as :

- Authentication and Access
- Limited Behavioral Monitoring
- Scalability and Flexibility
- False Positives/Negatives

VI. PROPOSED SYSTEM

The proposed system, aims to overcome the shortcomings of the existing systems by introducing innovative features and methodologies such as :

- **Facial Authentication:** Implement a robust facial authentication system for seamless and secure employee login.
- **Comprehensive Behavioral Monitoring:** Integrate advanced computer vision techniques to monitor a wide range of employee behaviors, including eye tracking, mouth opening, facial expressions, and mobile phone usage.
- **Privacy-Preserving Design:** The system is designed with a privacy-centric approach, ensuring that sensitive data is encrypted, and accessible only to authorized personnel.
- **Adaptive AI-based Monitoring:** Utilize machine learning algorithms to create an adaptive monitoring system that can learn and adapt to different workplace scenarios, reducing false positives and negatives.
- **Real-time Alerts and Reporting:** Implement a real-time alert system that notifies administrators when unusual activities are detected.
- **Benefits:**
 - Addresses ethical concerns regarding employee privacy and minimizes potential for misuse.
 - Enhances user-friendliness by focusing on transparency and employee well-being.
 - Shifts focus from individual monitoring to identifying and addressing root causes of disengagement.

VII. METHODOLOGY

A. Face Recognition Module

The face recognition module serves as the cornerstone of the system, employing facial recognition technology for secure employee login. During the registration process, facial features will be captured, securely stored, and subsequently utilized for matching during login attempts. The implementation will go beyond traditional facial recognition by incorporating multi-modal biometric features, enhancing the accuracy and robustness of the authentication process.

B. Behavioral Monitoring Module

The behavioral monitoring module will leverage computer vision techniques to track various aspects of employee behavior. This includes eye tracking for assessing focus, mouth opening detection for identifying verbal communication, and mobile phone usage detection. Image processing and machine learning algorithms will be employed to interpret visual cues, providing a comprehensive understanding of employee activities.



Fig. 1. Face Recognition



Fig. 2. Attention and Behavioral Detection

C. Implementation

In the implementation phase, we will develop the system using Python as the primary programming language. The goal is to create a modular and scalable application that seamlessly integrates the facial recognition and behavioral monitoring modules. Throughout this phase, extensive testing will be conducted to verify the correct functionality and reliability of each component.

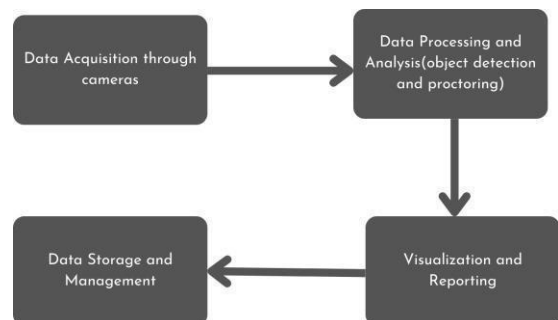


Fig. 3. System Flow chart

D. Privacy Measures Implementation

Privacy measures are a critical aspect of the "Wake Alert" system. To address privacy concerns, the system will implement data anonymization to dissociate personal information from monitored activities. Encryption techniques will be applied to safeguard sensitive information during storage and transmission. These privacy-enhancing measures are essential to ensure compliance with privacy regulations and to build trust among employees using the system.

E. Ethical and Legal Considerations:

Ethical and legal considerations will guide the development and deployment of the system. Informed consent will be obtained from employees before implementing the monitoring system, and the design will adhere to ethical standards. Legal compliance with privacy laws and regulations will be ensured, emphasizing transparency, respect for individual privacy rights, and the provision of opt-out options for employees.

VIII. RESULTS AND DISCUSSIONS

We've created an employee proctoring system using Python to monitor workplace engagement and potentially address unethical activities.

The system leverages powerful technologies:

- YOLO v3: This deep learning model detects cellphone usage in real-time, helping identify instances where employees might be distracted.
- Support Vector Machines (SVM) and other Classifiers: These algorithms go beyond simply recognizing faces. They detect subtle nuances in eye and mouth movements, offering insights into attentiveness and potential disengagement.
- Face Recognition: This technology ensures secure employee identification and login, streamlining the monitoring process.



Fig. 4. Cell Phone Detection

A. Identifying Areas for Improvement

Our goal isn't simply to catch misconduct but to proactively improve overall productivity. By analyzing the collected data, we aim to:

- Pinpoint Sections: Identify specific sections or teams where attentiveness may be lower than desired. This data-driven approach helps us focus improvement efforts where they're most needed.
- Investigate Underlying Issues: We plan to delve deeper than just identifying specific individuals using their phone. We want to understand the reasons behind any disengagement or unethical behavior. This could involve factors like workplace stress, unclear expectations, or lack of motivation. Ultimately, Boosting Productivity.

Through data-driven insights and targeted interventions, we hope to achieve:

- Increased Attentiveness: By addressing underlying issues and providing relevant support, we aim to enhance employee focus and engagement.
- Reduced Unethical Activities: By promoting clear expectations and offering alternative coping mechanisms, we aim to create a work environment that discourages misconduct.
- Overall Productivity Growth: By addressing disengagement and promoting a positive work experience, we expect to see measurable improvements in employee productivity.

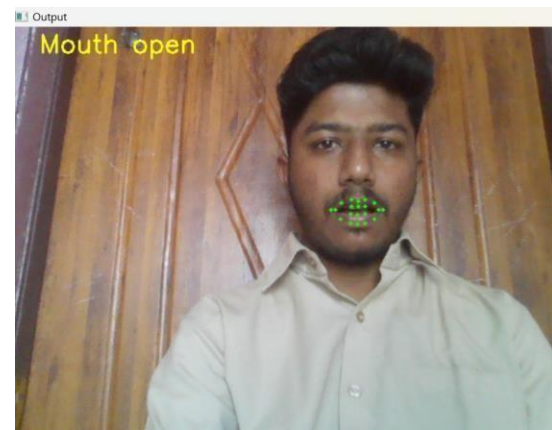


Fig. 5. Detects if employee is talking

B. Additional Considerations

- Privacy and Transparency: Implementing such a system needs careful consideration of employee privacy concerns. Transparency about data collection and usage is crucial.
- Ethical Implications: The system should be used ethically and responsibly, focusing on improvement rather than punishment.

- Addressing Root Causes: While the system can identify areas for improvement, addressing the underlying reasons for disengagement requires tailored solutions and ongoing support.

By implementing this Python-based proctoring system responsibly and ethically, we hope to gain valuable insights that ultimately lead to a more engaged and productive work environment for everyone.

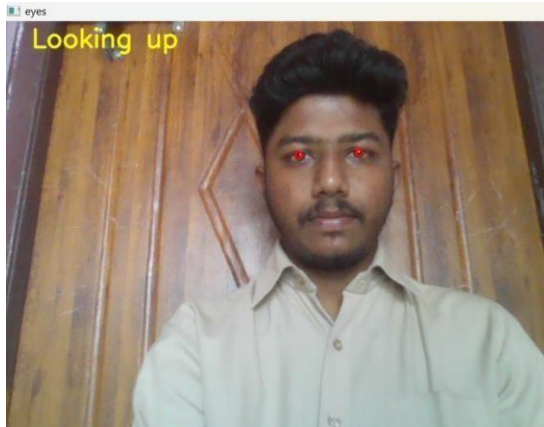


Fig. 6. Drowsiness Detection

CONCLUSION

This research explored the complexities of enhancing workplace vigilance and productivity while upholding ethical principles and respecting employee autonomy. Instead of solely focusing on monitoring technologies, the investigation delved into alternative approaches that promote employee wellness, engagement, and mindful work practices. This employee proctoring system, built using Python and machine learning, has the potential to be a valuable tool for promoting a more engaged and productive work environment. By focusing on identifying patterns and underlying issues rather than individual blame, we can implement targeted interventions that address the root causes of inattentiveness and unethical behavior.

However, it's crucial to remember that ethical considerations and responsible data usage are paramount. Transparency, clear communication, and a focus on employee well-being are essential for this initiative to succeed.

Ultimately, the success of this system will be measured by its ability to improve overall employee well-being and foster a culture of engagement that leads to increased productivity and organizational success. We are committed to utilizing this technology responsibly and ethically to achieve these goals.

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