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Editorial Message

Well-written technical articles contribute to the total body of knowledge for the engineering community and will potentially help many engineers. Articles do not need to be detailed "academic-level" work. In fact, some of the most popular articles are "down to earth" practical applications of existing or new technology.

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VISION-MISSION

VISION

To evolve as a leading computer science and engineering centre producing competent technocrats to meet the demands of ever-changing industry and society.

MISSION

DM1: Impart quality education through innovative teaching learning processes

DM2: Motivate the learners to upgrade technical expertise by promoting learner centric activities.

DM3: Inculcate values and interpersonal skills in the learners towards overall development.

DM4: Upgrade knowledge in cutting edge technologies keeping pace with industrial standards through

collaborations.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of B. Tech in Computer Science and Engineering program shall able to

PEO1: Outperform in professional career or higher learning by upgrading skills in Computer Science and Engineering stream.

PEO2: Provide computing solutions for complex problems to meet industry demands and societal needs.

PEO3: Offer ethical, socially sensitive solutions as professionals and as entrepreneurs in Computer Science and other engineering disciplines.

PEO4: Leverage new computing technologies by engaging in perpetual learning.

A Smart Security Surveillance System

Smart Security:

Our country's prevailing security situation requires that all sectors contributed to some extent to facilitate measures that prevent evildoers from carrying out their deviant activities. Surveillance via IP cameras is one of the most important processes that are essential to safeguard various sensitive places all over the country. Presently, the systems that are used rely too much on a constant human watch, which can lead to negligence and error. The requirement here is to use contemporary AI techniques to guarantee exceptionally watchful surveillance round the clock. We hope to accomplish that with a system that lets users choose an area of interest on the available streams, any movement within that region will be scanned, the objects within it will be categorized based on an available database and any suspicious activity will generate an alarm, alerting the authorities. The algorithm is created in Mat lab and its software implementation is accomplished in open cv. A Voice recognition system can also be incorporated here.

Additional Information:

- **AI Techniques:** The system utilizes contemporary AI techniques, likely including computer vision algorithms for object detection and classification, as well as possibly machine learning for anomaly detection.

- **Area of Interest Selection:** Users can specify specific areas within camera streams for monitoring, allowing for targeted surveillance and reducing false alarms.

- **Object Categorization:** Objects within the designated area are categorized based on a database, likely using object recognition algorithms to identify people, vehicles, or other relevant objects.

- **Alarm Generation:** Any suspicious activity detected within the designated area triggers an alarm, alerting authorities for prompt response.

- **Voice Recognition:** Integration of voice recognition adds another layer of control and usability to the system, allowing for hands-free operation and additional security measures.

- **Implementation:** The algorithm is developed in Matlab, a high-level programming language often used for numerical computing, and implemented using OpenCV, an open-source computer vision library.

Advantages:

- **Enhanced Vigilance:** By leveraging AI, the system offers continuous, vigilant monitoring without the limitations of human fatigue or oversight.

- **Targeted Surveillance:** Users can focus on specific areas of interest, reducing false alarms and improving the efficiency of security monitoring.

- **Quick Response:** Automatic alarm generation ensures that authorities are promptly alerted to any suspicious activity, allowing for rapid response and potential prevention of security breaches.

- **Improved Accuracy:** AI algorithms can provide more accurate object detection and categorization compared to manual surveillance, reducing the likelihood of false positives or missed threats.
- **User-Friendly Interface:** Incorporation of voice recognition technology enhances user experience, making it easier to control and manage the surveillance system.

Disadvantages:

1. **Cost:** Implementing AI-based surveillance systems can be expensive, requiring investment in hardware, software, and ongoing maintenance.
2. **Privacy Concerns:** Increased surveillance may raise privacy concerns among individuals being monitored, necessitating clear policies and safeguards to address privacy issues.
3. **Technical Challenges:** Developing and maintaining AI algorithms for surveillance involves technical challenges such as algorithm optimization, data management, and system integration.
4. **False Alarms:** Despite efforts to minimize false alarms, AI-based surveillance systems may still generate false positives, requiring human intervention for verification and response.
5. **Dependency on Technology:** Reliance on technology for security surveillance means vulnerability to technical failures, cyber threats, and potential system downtime.

E-Learning Platform

Cloud-based:

E-learning in this project, you will create an online e-learning platform, which is shareable. This e-learning platform backed by cloud computing would let the independent LMS (Learning Management Systems) implanted in different e-Learning standards to share their learning content. Cloud computing will facilitate the sharing of a broad spectrum of learning objects, letting learners avail themselves of those easily. The project has three-layer architecture to enable sharing learning modules, and interoperability among various learning content effectively. The middle layer of the infrastructure includes a metadata transformation module and an indexing module to facilitate the transfer of metadata among recognized e-Learning standards.

Additional Information:

- · **Three-Layer Architecture:** The platform is structured with a three-layer architecture to enable efficient sharing of learning modules and interoperability among different learning content. The layers likely include:

  1. **Presentation Layer:** This layer interacts with users, providing the interface through which learners access the platform and its learning content.
  2. **Application Layer:** This layer houses the business logic of the platform, including functionality related to user authentication, content management, and interoperability features.
  3. **Data Layer:** This layer comprises the storage and management of learning content, metadata, and other related data, likely leveraging cloud-based storage solutions.

- · **Metadata Transformation Module:** This module is responsible for converting metadata associated with learning content between different e-learning standards, ensuring compatibility and interoperability.

- **Indexing Module:** The indexing module facilitates efficient search and retrieval of learning content by indexing metadata and organizing it in a searchable format.

Advantages:

- **Interoperability:** By supporting various e-learning standards and facilitating metadata transformation, the platform promotes interoperability among different Learning Management Systems, allowing for seamless sharing of learning content.
- **Scalability:** Leveraging cloud computing enables the platform to scale resources dynamically based on demand, accommodating growing user bases and increasing amounts of learning content.

- **Accessibility:** Learners can easily access a broad spectrum of learning objects from different sources, enhancing their learning experience and providing diverse learning opportunities.
- **Collaboration:** The platform encourages collaboration among educators and institutions by allowing them to share their learning content, resources, and expertise, fostering a collaborative learning environment.
- **Efficiency:** The indexing module enhances the efficiency of content search and retrieval, enabling learners to quickly find relevant learning materials based on their needs and preferences.

Disadvantages:

- **Complexity:** Managing interoperability among various e-learning standards and implementing metadata transformation can introduce complexity to the platform, requiring robust technical expertise and ongoing maintenance.
- **Security Concerns:** Storing learning content in the cloud may raise security concerns regarding data privacy, confidentiality, and potential unauthorized access, necessitating robust security measures and compliance with relevant regulations.
- **Dependency on Internet Connectivity:** Users rely on internet connectivity to access the platform and its learning content, which may pose challenges in areas with limited or unreliable internet access.
- **Cost:** Building and maintaining a cloud-based e-learning platform can entail significant costs, including infrastructure expenses, development costs, and ongoing operational expenses.
- **Quality Control:** Ensuring the quality and accuracy of shared learning content from diverse sources can be challenging, requiring effective quality control measures and content moderation processes.

Customer Experience Management

Customer Experience Management:

Customer Experience Management is to handle the customers' experience by the service provider themselves. It has an important role to play in lessening a load of management for several mobile service providers. This project is solely associated with Mobile Networks. This project will allow the service providers to enhance their service quality. With this, the service provider will have less irritated customers and more satisfied customers. The solution can observe and control elements of significance for CEM on all customer-related KPIs and indexes like their network and channels experience, segment performance, geographical alerts, etc. KPI'S are 'key performance indexes' on which the calculation of CEM is based. All the details will be shown on a dashboard portraying all the outcomes in different forms. The database will have all the customers' CEMs results and are saved and used as per the needs of the dashboard.

Additional Information:

- · **Objective:** The primary objective of this project is to enable mobile service providers to enhance the quality of their services, leading to fewer customer complaints, increased customer satisfaction, and ultimately, improved customer retention.

- · **Key Performance Indicators (KPIs):** KPIs serve as metrics to measure the performance of customer experience. These KPIs include factors such as network performance, channel experience (e.g., call quality, data speed), segment performance (e.g., performance for different customer segments), and geographical alerts (e.g., areas experiencing network issues).

- · **Dashboard:** The project includes a dashboard that provides a visual representation of customer experience metrics, allowing service providers to monitor and analyze the performance of their services in real-time. The dashboard may display data in various forms, such as charts, graphs, and tables, to facilitate easy interpretation.

- · **Database:** A database stores all customer CEM results, enabling historical analysis and trend identification. This data can be utilized to generate insights, make data-driven decisions, and tailor services to meet customer needs more effectively.

Advantages:

- **Improved Service Quality:** By monitoring and analyzing customer experience metrics, mobile service providers can identify areas for improvement and take proactive measures to enhance service quality, leading to higher customer satisfaction.

- **Reduced Customer Churn:** Addressing customer pain points and providing better experiences can help reduce customer churn rates, thereby increasing customer retention and revenue for the service provider.

- **Data-Driven Decision Making:** The availability of comprehensive customer experience data enables data-driven decision-making, allowing service providers to allocate resources more effectively and prioritize initiatives that have the greatest impact on customer satisfaction.

- **Enhanced Customer Loyalty:** Consistently delivering positive experiences can foster customer loyalty and advocacy, as satisfied customers are more likely to continue using the service and recommend it to others.

- **Competitive Advantage:** Investing in customer experience management can differentiate a mobile service provider from competitors and serve as a competitive advantage in the market, attracting new customers and retaining existing ones.

Disadvantages:

- **Implementation Complexity:** Implementing a comprehensive customer experience management system can be complex and resource-intensive, requiring integration with existing systems, data collection mechanisms, and analytics capabilities.

- **Data Privacy Concerns:** Collecting and storing customer data for CEM purposes may raise privacy concerns among customers, necessitating strict adherence to data protection regulations and robust security measures to safeguard sensitive information.

- **Cost:** Developing and maintaining a CEM system involves significant costs, including investment in technology infrastructure, analytics tools, and skilled personnel for data analysis and interpretation.

- **Resistance to Change:** Employees within the organization may resist changes associated with implementing CEM initiatives, such as adopting new processes or technologies, which can hinder successful implementation and adoption.

Risk of Overreliance on Metrics: Overreliance on quantitative metrics without considering qualitative aspects of customer experience may result in overlooking important customer insights and nuances, leading to suboptimal decision-making.

Android Local Train Ticketing System

Train Ticketing System:

In this project, you will create a ticketing application for local trains. Customers can look into the app to make reservations for local trains and acquire online booking receipts. Customers can print these receipts as proof for travelling. The app comprises two accounts, one Admin account, and the other being a user account. With the help of the Admin account, the Admin can view all the booked tickets of a user. While using the application, users have to fill a ticket booking form to make the reservation.

Additional Information:

➢ · **Reservation System:** The application provides a platform for customers to make reservations for local train tickets. Users can search for available trains, select their preferred journey, and book tickets through the app.

➢ · **Online Booking Receipts:** Upon successful booking, customers receive online booking receipts which they can use as proof for traveling. These receipts contain essential details such as the journey date, time, train details, and seat information.

➢ · **Admin Account:** The system includes an Admin account with special privileges. The Admin can access information regarding all booked tickets, allowing them to monitor reservations and manage any issues that arise.

➢ · **User Account:** Users can create individual accounts within the app, enabling them to manage their bookings, view past reservations, and make new bookings conveniently.

➢ · **Ticket Booking Form:** To make a reservation, users need to fill out a ticket booking form, providing necessary information such as the departure and destination stations, preferred travel date, and the number of tickets required.

Advantages:

1. **Convenience:** The app offers convenience to users by allowing them to book train tickets from anywhere at any time using their smartphones, eliminating the need to visit ticket counters physically. 2. **Time-Saving:** With online booking facilities, users can save time that would otherwise be spent waiting in queues at ticket counters, leading to a more efficient booking process.

2. **Accessibility:** The application improves accessibility to train ticket booking services, particularly for users who may face mobility issues or reside in remote areas with limited access to ticketing facilities.

3. **Transparency:** Users have access to detailed booking receipts, providing transparency regarding their reservations and ensuring they have all necessary information for their journey.

4. **Admin Management:** The inclusion of an Admin account enables efficient management of ticket bookings, allowing administrators to monitor bookings, address customer queries, and resolve issues promptly.

Disadvantages:

1. **Technological Barriers:** Users who are not familiar with smart phone technology or do not have access to smart phones may face challenges in using the application, potentially excluding a portion of the population from accessing train ticketing services.

2. **Reliance on Internet Connectivity:** The application requires a stable internet connection for users to access and use its features, which may pose challenges in areas with poor network coverage or for users with limited data connectivity.

3. **Security Concerns:** Online transactions and the storage of personal information within the app raise security concerns regarding data privacy and potential cyber threats, necessitating robust security measures to safeguard user data.

5. **System Reliability:** Any technical glitches or system failures within the application could disrupt the booking process and inconvenience users, highlighting the importance of ensuring the reliability and stability of the system.

6. **Customer Support:** In the event of issues or discrepancies with bookings, users may require prompt and efficient customer support services to address their concerns and provide assistance, highlighting the importance of responsive customer support mechanisms.

E-Parking Challan

<u>**E-Parking Challan:**</u>

The primary idea for creating this project is to make an application that can be utilized by the traffic police in the event of wrong parking. Oftentimes, the car owners park their cars at places they are not supposed to. If a car is parked wrongly, the police can take a picture of the car and its license plate. They can send the pictures into the central database from where the owner of the car will be fined and will receive an auto-generated SMS regarding it. This application would also provide the violation history of the violator with one click. One can pay the challan via e-payment or can be added to the annual tax of the car.

Additional Information:

- ➤ **Mobile Application:** The project involves the development of a mobile application that enables traffic police officers to capture photos of wrongly parked vehicles along with their license plates.
- ➤ **Central Database:** The captured photos and license plate information are sent to a central database where the vehicle owner's details are stored. This database serves as a repository for parking violation records.
- ➤ **Auto-Generated SMS:** Upon receiving the violation report, the system automatically generates an SMS notification to the vehicle owner, informing them about the parking violation and the associated fine.
- ➤ **Violation History:** The application provides access to the violation history of the vehicle owner with a single click. This feature allows authorities to track repeat offenders and take appropriate action.
- ➤ **Payment Options:** Vehicle owners have the option to pay the parking fine electronically via e-payment methods integrated into the application. Alternatively, the fine can be added to the vehicle owner's annual tax payment.

Advantages:

1. **Efficiency:** The use of digital technology streamlines the process of issuing parking fines, reducing paperwork and administrative overhead for traffic police officers.
2. **Transparency:** By automating the process, the system ensures transparency in issuing parking fines, as all records are stored digitally and can be accessed easily by both authorities and vehicle owners.
3. **Convenience:** Vehicle owners receive instant notifications of parking violations via SMS, allowing them to promptly address the issue and make payment through convenient e-payment methods.
4. **Improved Compliance:** The swift and automated issuance of parking fines encourages compliance with parking regulations, as vehicle owners are promptly notified and held accountable for violations.

5. **Data Analysis:** The central database enables authorities to analyze parking violation trends, identify
   a. hotspot areas, and implement targeted enforcement strategies to improve traffic management.

Disadvantages:

1. **Privacy Concerns:** Capturing and storing vehicle and owner information in a central database raises privacy concerns, particularly regarding the use and protection of personal data.

2. **Technical Challenges:** Developing and maintaining a robust mobile application and central database infrastructure entails technical challenges such as system reliability, data security, and scalability.

3. **Dependency on Technology:** The effectiveness of the E-Parking Challan system relies on the availability and reliability of digital technology, including mobile networks, smart phones, and electronic payment systems.

4. **Resistance to Change:** Some vehicle owners may resist the transition to digital parking fine issuance and payment methods, particularly if they are accustomed to traditional paper-based processes.

Potential Errors: Automated systems are susceptible to errors, such as misidentification of vehicles or incorrect issuance of fines, which may result in disputes and require manual intervention to resolve. Regular monitoring and quality assurance measures are necessary to mitigate such risks.
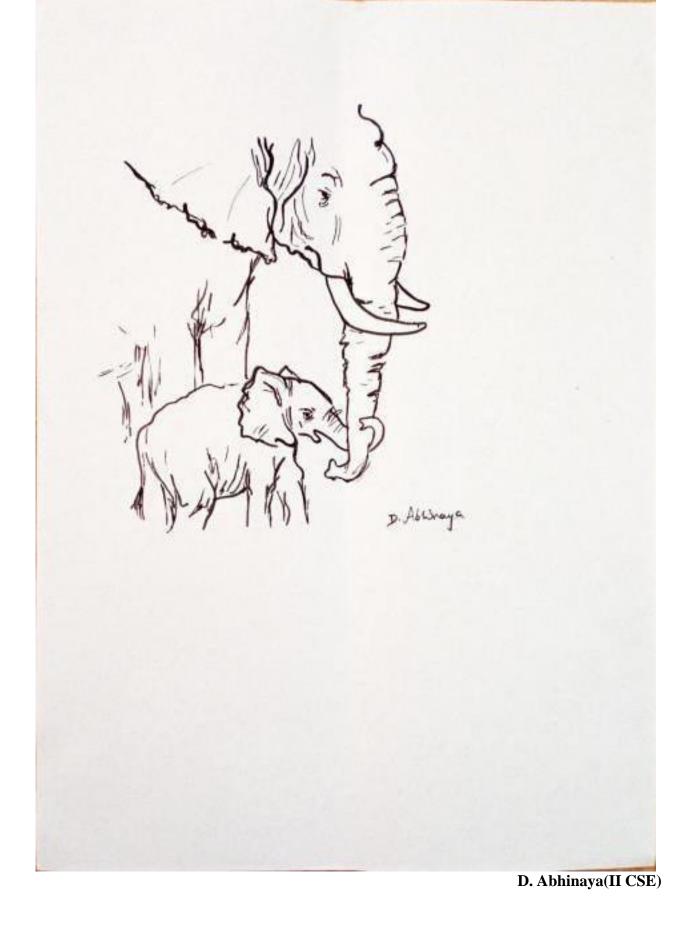
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PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO 1: Apply the expertise in adaptive algorithms to develop quality software applications.

PSO 2: Demonstrate the capabilities in basic and advanced technologies towards getting employed or to become an entrepreneur.