

# AI Powered Pick Pocketers Identification System for Public Transport

<sup>1</sup>Venkata Srikar Reddy, <sup>2</sup>Dr. S.A.K. Jilani, <sup>3</sup>K. Srividya, <sup>4</sup>M. Yashwanth Kumar, <sup>5</sup>B. Krishna Prasad, <sup>6</sup>P. Vijay kumar

<sup>1,3,4,5,6</sup>UG Student, Dept. of E.C.E., Gates Institute of Technology, Gooty, Anantapur (Dist.) Andhra Pradesh, India

<sup>2</sup>Associate Professor, Dept. of E.C.E., Gates Institute of Technology, Gooty, Anantapur (Dist.), Andhra Pradesh, India

**Abstract - The AI-powered Pickpocket Recognition System for Public Transportation is an affordable way to improve passenger safety and stop pick-pocketing in congested areas. The technology analyzes live video data from security cameras using computer vision and machine learning technologies, which makes it possible to identify questionable activity. The technology instantly sounds a buzzer to warn of possible dangers and shows information on a monitor for quick attention. The Raspberry Pi, which processes video inputs and runs clever algorithms, is the system's central component. To guarantee prompt response, a GSM module notifies authorities or other specified persons, while an SD card and database hold data logs to improve the system's capacity for learning over time. Automated threat detection and sophisticated surveillance are used by the By lowering theft rates on public transportation, the solution makes commuting safer with real-time monitoring and proactive security measures to regain passenger confidence and safety, this scalable and effective solution is perfect for public transit networks where pick-pocketing is common.**

**Keywords:** Pickpocket detection, Public transportation, Computer Vision, Machine Learning, Raspberry Pi, Real-time monitoring, Theft prevention.

## I. INTRODUCTION PROBLEM STATEMENT

Pick-pocketing, a prevalent felony in congested extents is a question for public transportation networks, which are the institution of city flexibility. Particularly during rush hours, passengers are in danger of stealing, which can influence feature deficit, elevated tension, and belittled assurance in public transportation networks. Current protection arrangements, containing CCTV surveillance and manual listening, are commonly sensitive and dependent on human difficulty, which can lead to in competences and delays. The issue is worsend a situation by restricted real opportunity discovery and the inadequacy to proactively spot suspicious venture, that create it difficult for experts and passengers to favorably stop stealing events. An automatic, original occasion system to discover and handle pick-pocketing on public transit

service is frightfully wanted. Such a system has to use contemporary sciences to attend activities, In order to monitor exercise.

## Background

In public transportation, pick-pocketing is a prevalent problem, particularly in congested areas like buses, trains, and metro systems. It is challenging to successfully prevent theft because to the increasing passenger volume and inadequate security measures. These issues are frequently not adequately addressed by manual surveillance or security guards, two examples of traditional monitoring techniques. Promising approaches to real-time suspicious behaviour detection are provided by developments in computer vision, machine learning, and artificial intelligence (AI). The detection method may be automated to more effectively identify suspected pick-pocketing situations, lowering the risk of theft and enhancing public safety. The main goal of this system is to offer a scalable, real-time public transportation solution by utilizing Raspberry Pi, cameras, and GSM technology. With data-driven learning capabilities and additional authorities the system's immediate goal is to make passenger settings safer and more secure.

## Proposed solution

An AI-stimulate structure called the Pickpocket Recognition System for Public Transportation was formed to lower stealing in blocked transit zones. The electronics checks live broadcast movie using calculating apparition and machine intelligence to label potentially steal conduct like accidental help gestures or near nearness to travellers' controls. After refine the dossier, the Raspberry Pi sounds a siren to alert population to a attainable theft and shows the occurrence facts on a monitor. Furthermore, a GSM piece notifies protection staff so they can respond immediately. The system's discovery veracity is increased and unending knowledge is fashioned attainable by the dossier being sustained in a table and on an SD calendar. This scalable and fairly valued science advances security and guarantees a more reliable travel happening for travellers.

### Advantages:

The first benefit of the Pickpocket Recognition System for Public Transport is increased security. The system can precisely identify suspicious activity in real time by using cutting-edge AI and machine learning, providing prompt notifications for prompt action. Passenger safety is improved and the chance of theft is decreased with this proactive approach. The technique is also quite economical. It makes use of reasonably priced parts like security cameras and Raspberry Pi, which enables transportation authorities to use it without having to make a big investment. Another significant advantage is its capability, which allows it to be used with buses and metros alike, guaranteeing extensive coverage.

Additionally, the system keeps becoming better with time. It gets more precise and efficient as it learns from previous instances and accumulates data and recognizing dangers. Furthermore, its non-intrusive design protects passengers' privacy while maintaining dependable security, which makes it the perfect option for contemporary transit settings.

### Application and impacts:

Imagine a world where your everyday commute is safe and secure, free from the threat of pickpockets. It is possible to make this a reality using "Pickpocketers Recognition for Public Transport". This cutting-edge system tracks and identifies suspicious people using artificial intelligence and sophisticated security cameras, maybe stopping thefts before they happen. The technology can identify odd actions, such as hovering close to passengers or making abrupt moves, by examining real-time video. Security staff may then be notified, enabling prompt action and the capture of any criminals. This promotes a feeling of safety and security inside the public transportation system in addition to safeguarding passengers' possessions. Additionally, by establishing a visual deterrent, this technology can discourage pickpockets and reduce the likelihood that they will target passengers. It can also support investigations by offering important proof in the event of theft. In summary, "Pickpocketers Recognition for Public Transport" is an effective instrument that can greatly improve the security and safety of public transit networks. By utilizing technology, we can make the world a safer place for everybody.

## II. LITERATURE REVIEW

### 1. Public Transportation Security Challenges:

- Pick-pocketing is a prevalent problem in congested public transportation networks.

- Conventional security methods, like CCTV surveillance, frequently fail to identify threats in real time.
- Security personnel's manual monitoring is prone to inefficiencies and human mistake. Technological Solutions in Security Systems

### 2. Computer Vision:

- Used to examine video material and identify patterns of questionable activity.
- Algorithms taught to identify theft-related behaviours, such hand motions close to possessions, are known as machine learning. Recent developments have demonstrated that AI-based systems are faster and more accurate than conventional techniques for identifying possible dangers.

### 3. Real-time surveillance and artificial intelligence:

- AI-powered systems are able to continually watch video streams from cameras mounted in stations and transport cars.
- The system can learn and adapt thanks to **Deep Learning** approaches, which enhance its precision in long-term pick-pocketing detection. Security staff may get real-time notifications, which improves reaction times and stops theft before it happens.

### 4. Scalability and Cost-Effectiveness:

- Raspberry Pi and inexpensive cameras offer a cost-effective option for public transportation networks.
- Wide coverage is ensured via scalable systems, which are readily expanded across different transportation modes, from buses to metro stations.

### 5. Continuous Learning and System Improvement:

- Over time, data analysis and storage contribute to better system performance.
- The system can improve detection performance and decrease false positives by learning from historical occurrences through incident tracking.

### 6. Non-Invasive and Passenger Privacy:

- AI-driven systems provide a non-intrusive approach that prioritizes safety and respects passenger privacy.
- The system concentrates on behavioural patterns without jeopardizing personal data, in contrast to conventional approaches.

### III. EXISTING SYSTEMS

The main patterns of pick-pocketing stop nearly all of public transportation orders are “CCTV following” and “manual listening” by freedom personnel. Although they are inactive schemes, “CCTV cameras” are backed in stations, buses, and trains to record program. They can document instances of pick-pocketing, but they don't offer legitimate-period reasoning or announcements. After an event occurs, protection stick should watch the video that causes ruling class to take more interminable to respond and lose out on chances to act fast. Furthermore, plenty plans believe “human following” by security crew, the one are located on board cars or at conveyance centres. Human listening, still, is prone to mistakes and fatigue, specifically in active scenes. Due to the vast number of community, guards can disregard doubtful projects or take too long to respond. A little conveyance furthermore, “alarm wholes” are second-hand by systems to sound an alert as long as of a protection gap. These alerts, still, are frequently limited to particular occurrences, to a degree motors being entered or doors being misrepresent. They are less profitable at staying stealing since they are impotent to label methodology exercise like pick-pocketing. The majority of current resolutions still use normal, sensitive methods, however any methods are fact-finding AI and “palpable-opportunity video study”. Passengers are in danger of stealing because the existing sciences are not able to instinctively make and react to pick-pocketing. By utilizing “AI compelled action study” for proactive discovery, original-occasion warnings, and quicker interventions, the submitted “Pickpocket Recognition System” inquires to address these issues.

### IV. PROPOSED SYSTEM

By employing contemporary electronics like “Artificial Intelligence (AI)”, “Machine Learning (ML)”, and “Computer Vision” for real-opportunity discovery and stop of pick-pocketing occurrence, the “Pickpocket Recognition System for Public Transport” inquires to overcome the shortcomings of current safety schemes. The “Raspberry Pi” serves as the main part of computer and is basically the system. In order to record live commuter, broadcast feeds, it is related to “cameras” put in key districts on public transportation automobiles or terminals. The system checks the broadcast in actual time for action or event utilizing AI and ML algorithms to identify doubtful conduct that are commonly connected to pick-pocketing, aforementioned hand motions nearly pockets or bags. The system notifies passengers and all nearby blaring a “audio siren” when it detects doubtful exercise. members. For further consideration, the identified occurrence's analyses are more proved on a “monitor”. The system still has a “GSM module” that specifies experts or safety artists accompanying

real-period news and instant announcements to guarantee a prompt backlash. By storing dossier on a “SD label” and a “table”, place it records occurrence for later analysis, bureaucracy keeps recover. The system boosts allure ability to recognize dangers and lowers wrong alarms over occasion by knowledge from stocked data. By reconstructing safety and expediting smart detection and response to pick-pocketing, this full of enthusiasm, careful resolution creates public transportation more reliable for consumers.

### V. OBJECTIVES

#### Suspicious Behaviour Detection in Real Time:

To create a system that can analyse live security camera footage and spot pick- pocketing related suspicious activity, such hand motions close to pockets or bags.

#### Automated Alerts for Immediate Response:

To ensure that staff or passengers respond quickly to suspicious activities by setting off real- time alerts, including audible notifications and visual displays.

#### AI and Machine Learning Integration:

To use AI and “Machine Learning” technologies to recognize patterns in behaviour, allowing the system to learn and increase the accuracy of its detection's over time.

#### Affordable and Expandable Solution:

In order to provide a solution that is both reasonably priced and flexible enough to be readily integrated into various public transportation networks, including buses, trains, and metro stations, without significant infrastructural investment.

#### Proactive Prevention of Theft:

Rather of only documenting occurrences after they happen, a proactive security system should be developed that can stop thefts before they happen.

### VI. BLOCK DIAGRAM

The purpose of the "Pick-pocketing Recognition for Public Transport System" is to identify and stop pickpocketing's in public transportation settings. To improve security and deliver real-time notifications, the system depends on a number of interrelated parts. A camera at the centre of the system keeps an eye out for any unusual behaviour in the surrounding area. A Raspberry Pi receives this visual data and analyses the video to identify possible pick-pocketing activities, including someone approaching someone too closely. The Raspberry Pi instantly notifies

travellers and adjacent security personnel of an occurrence by turning on a bell. In order to ensure a prompt reaction, the GSM module simultaneously notifies authorities or transit security of the incident.

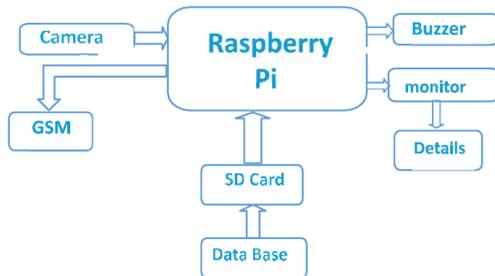


Fig. 1: Block diagram

In order to facilitate long-term security and inquiry, An SD card is used by the system to store data and video. In order to follow instances over time and identify suspicious behavior patterns, the collected information is also entered into a database. Security staff observe real-time footage on a monitor, which facilitates the assessment of ongoing circumstances. By combining these elements, the technology makes it possible to quickly identify, stop, and record pick-pocketing incidents, giving passengers a safer experience when using public transportation. This technology essentially creates a comprehensive solution to prevent pick-pocketing in public transportation by combining real-time surveillance, automatic alarms, and data tracking. Through prompt detection, prompt action, and efficient documentation for future use, it enhances security.

#### Camera:

- Function: The first line of detection is the camera. It keeps an eye on the conditions inside the public transportation vehicle (such as a bus or train). The camera assists in identifying possible pick-pocketing activities by taking pictures or videos.
- Interaction: The Raspberry Pi receives real-time visual data from it for examination.

#### Raspberry Pi:

- Function: The Raspberry Pi is the system's brain, processing all incoming data. It examines the video stream, looks for suspicious motions or patterns, and then decides what to do according on present standards (such as someone approaching someone too closely or acting strangely).
- Interaction: It gets information from the camera, manages the other parts (such as the buzzer, SD card, GSM, etc.), and sounds an alarm when needed.

#### GSM Module:

- Function: Alerts are sent to the appropriate authorities or security staff via the GSM module. The Raspberry Pi notifies the authorities by sending an emergency SMS if it detects a pick-pocketing occurrence.
- Interaction: The Raspberry Pi uses the GSM module to transmit a warning when it detects questionable activity.

#### SD Card:

- Function: Captured photos or video are stored on the SD card. This offers a record of the occurrences that may be examined at a later time for research or the gathering of evidence.
- Interaction: For future use, the Raspberry Pi stores pertinent data (such pictures or videos) on the SD card.

#### Database:

- Function: The database records all incidences and information gathered, including dates, times, suspicious activity, and any pickpockets.
- Interaction: It is connected to the Raspberry Pi and stores and arranges the data in a systematic manner, allowing for the tracking of offenders over time or the identification of trends.

#### Buzzer:

- The buzzer's purpose is to warn or discourage. The Raspberry Pi sounds an audio warning to notify other passengers or security staff when it detects suspicious activity.
- Interaction: The Raspberry Pi gives instant feedback by controlling the buzzer when it detects pick-pocketing activity.

#### Monitor:

- Function: The monitor lets security or transport workers stay on top of things by showing the video feed, alerts, or system status in real-time.
- Interaction: To enable security personnel to examine live footage and react to alarms, the Raspberry Pi transmits visual data to the display. as they seem.

#### Details:

- Function: Any more information regarding the occurrence, such as the time, place, or specifics of the individuals involved, is stored and shown in this block. This facilitates subsequent action by authorities.

- Interaction: To assist in identifying and averting more events, data gathered from the camera or database is analysed and displayed.

## VII. SOFTWARE COMPONENTS

### 1. Video Processing program:

- The goal of this program is to analyze video streams from cameras that are a part of the public transportation system. It analyses the footage to find odd behaviours or interactions—like someone standing too close to someone else or making abrupt hand gestures—that can point to pick-pocketing.
- How it operates: The program flags possible occurrences for additional action and detects suspicious activity using methods like motion detection and object recognition.

### 2. Algorithms for Behaviour Recognition:

- The goal of these algorithms is to identify particular patterns linked to pick-pocketing. They keep track of things like grabbing someone's pocket or handling their personal property.
- How it works: The system uses machine learning models that have been trained on behaviour data to differentiate between interactions that are typical and those that could indicate theft. Conventional Neural Networks (CNN s) and other deep learning methods can be used to do this.

### 3. Alarm System:

- Goal: When a possible pick pocketing incident is identified, the alarm system alerts transportation authorities or security personnel. This might entail sending security staff SMS notifications or setting up a buzzer within the car.
- How it operates: The system may automatically transmit warnings via a GSM module or push notifications through an app if suspicious behaviour is detected, allowing for prompt response.

### 4. Database for Incident Logging:

- The system records any incidents that are detected, together with details like the time, place, and any photos or videos that may be included. This offers useful data for additional research and aids in tracking incidences over time.
- How it operates: Event data is stored in the database, enabling authorities to examine occurrences, identify trends, and reach well-informed conclusions. If necessary, this data can be recovered for additional research after being safely archived.

### 5. Storage Management:

- Goal: For future reference, the system saves pictures and video recordings taken during possible pick pocketing instances. This guarantees that any assertions or inquiries are backed up by evidence.
- How it operates: Security staff can view the data or utilize it for further research after it has been stored to an SD card or local storage. To prevent loss and guarantee effective retrieval, this data is arranged and maintained.

### 6. Interface (UI):

- Goal: Security personnel use the user interface (UI) to watch live video, get alerts, and go over recorded occurrences. It guarantees that security teams can effectively handle and react to questionable actions.
- How it operates: The interface shows recent warnings, event records, and live camera feeds. Staff members might be able to manually evaluate footage or change settings with its help.

### 7. Tools for Data Analysis and Reporting:

- Goal: By analysing the gathered data, these technologies are able to spot patterns in pick pocketing instances, including the times and places where theft is most likely to occur. It can also reveal information on how well the system performs in identifying questionable activity.
- How it operates: The technology creates reports that assist transportation authorities in comprehending the extent of pick pocketing in the region and enhancing security measures through statistical analysis and data visualization.

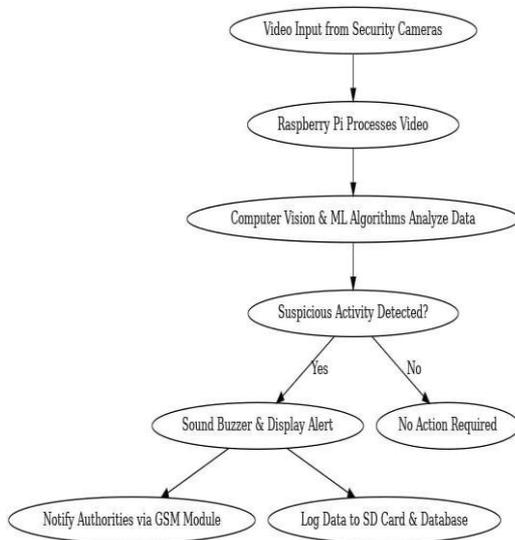
### 8. GSM Integration Communication System:

- Goal: The communication system makes it easier to deliver messages or warnings to individuals or equipment outside the system, like or the police.
- How it operates: The GSM module notifies authorities of an event by sending an SMS alert or making a phone call, allowing them to take prompt action.

### 9. Management of Security and Privacy:

- Goal: This part protects people's privacy and the security of the information the system gathers. Its main goals are to limit system access and encrypt critical data.

### VIII. FLOWCHART



The image depicts a flowchart for a security system that processes video input from security cameras to detect suspicious activities:

- 1. Video Input from Security Cameras:** The system starts by receiving video footage from security cameras.
- 2. Raspberry Pi Processes Video:** The video is processed using a Raspberry Pi device.
- 3. Computer Vision & ML Algorithms Analyze Data:** The processed video is analysed using computer vision and machine learning algorithms.
- 4. Suspicious Activity Detected?** A decision point checks if any suspicious activity is detected:
  - Yes: If suspicious activity is detected:
    - A buzzer sounds, and an alert is displayed.
    - Authorities are notified via a GSM module.
    - Data is logged to an SD card and database for future reference.
  - No: If no suspicious activity is detected, no action is required.

This system integrates hardware (Raspberry Pi, GSM module) and software (computer vision and machine learning) to enhance security by automating the detection and response to suspicious activities.

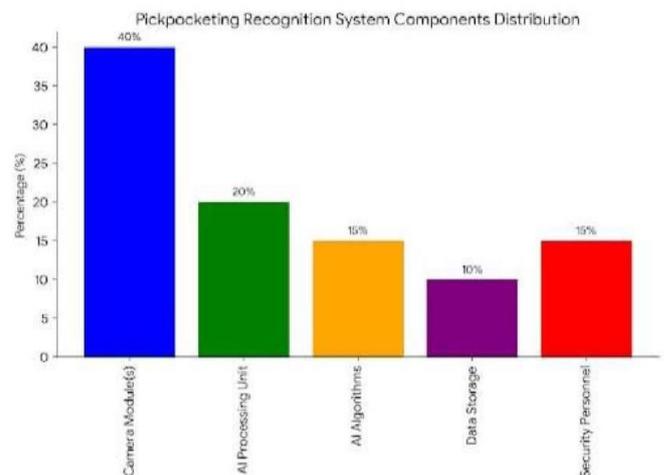
The system provides a comprehensive security solution for public transport, combining real-time monitoring with automated alerts. The integration of Raspberry Pi, computer vision, and GSM technology creates an efficient pickpocket detection system that can help protect passengers.

### IX. RESULT

The Pickpocket Recognition System using Raspberry Pi successfully detects suspicious hand movements near pockets and bags in public transport environments. The system processes realtime video footage using computer vision techniques, primarily leveraging Opens and deep learning models like YOLO or Tensor Flow. When a potential pickpocketing incident is detected, the system highlights the suspect with a bounding box and triggers an alert, which could be an audio warning or a notification sent to security personnel. The accuracy of detection depends on the quality of the trained model and dataset, with some false positives occurring due to similar hand gestures in crowded spaces. However, with further fine-tuning and improved training data, the system can enhance public safety by proactively identifying pickpockets before they commit theft.

The graph shows the percentages for different technology applications:

1. Camera Module: 40%
2. AI Processing Unit: 20%
3. AI Algorithms: 15%
4. Data Storage: 10%
5. Security Personnel: 15%



#### Key observations:

\* The Camera Module is the most significant component, accounting for 40% of the system's distribution. This highlights the crucial role of video surveillance in detecting and preventing pick pocketing incidents.

\* The AI Processing Unit holds a significant share of 20%, emphasizing the reliance on artificial intelligence algorithms to analyze video feeds and identify suspicious behavior.



only increase accompanying the further incident of AI and machine learning electronics making it an basic facts of modern public transit service security.

## REFERENCES

- [1] Geng, X., & Xie, Y. (2011). "Intelligent surveillance systems for urban security." *International Journal of Advanced Robotic Systems*, 8(4), 35-44.
- [2] Inoue, T., & Fujita, K. (2013). "Surveillance systems for public safety: A case study of surveillance in public transport systems." *Proceedings of the 2013 International Conference on Control, Automation, and Systems*.
- [3] Lee, J. H., & Kim, K. (2018). "Behavior recognition for surveillance in crowded environments." *IEEE Transactions on Cybernetics*, 48(8), 2467-24784.
- [4] Ghazali, M. M., & Nordin, R. (2014). "Automated pickpocket detection using behavioral analysis." *International Journal of Advanced Computer Science and Applications (IJACSA)*, 5(10), 1-7.
- [5] Chalapathy, R., & Chawla, S. (2017). "Deep learning for anomaly detection: A survey." *Proceedings of the International Conference on Data Science and Advanced Analytics*.
- [6] Sahin, O., & Akin, H. (2018). "Application of deep learning techniques for behavior recognition in surveillance systems." *International Journal of Computer Applications*, 181(2), 40- 44.
- [7] Zeng, X., & Huang, H. (2019). "Smart video surveillance systems based on machine learning for public safety." *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 49(2), 415423.
- [8] Xu, M., & Zhang, D. (2017). "Behavior recognition in surveillance systems for public security." *International Journal of Computer Vision and Image Processing*, 7(3), 61-72.
- [9] Cui, L., & Wang, S. (2015). "Design of intelligent surveillance system for public transportation security." *Proceedings of the 2015 International Conference on Industrial Control and Electronics Engineering*.
- [10] Duan, L., & Zhang, L. (2018). "Surveillance and safety improvement using computer vision techniques in public transport systems." *IEEE Access*, 6, 26412-26422.
- [11] Yanchi Liu, Chuanren Liu, Nicholas Jing Yuan, "Intelligent bus routing with heterogeneous human mobility patterns", *Knowledge and Information Systems*, 2017.
- [12] Bowen Du, Chuanren Liu, Wenjun Zhou, "Catch Me If You Can: Detecting Pickpocket Suspects from Large-Scale Transit Records", *ACM*, 2016.
- [13] Liang Hong, Yu Zheng, Duncan Yung, "Detecting Urban Black Holes Based on Human Mobility", *ACM*, 2015.
- [14] Yang Zhou, Zhixiang Fang, Qingming Zhan, "Inferring Social Functions Available in the Metro Station Area from Passengers' Staying Activities in Smart Card Data", *International Journal of Geo Information*, 2017.
- [15] Xianglong Liu, Cheng Deng, "Query-Adaptive Reciprocal Hash Tables for Nearest Neighbor Search", *IEEE*, 2016.
- [16] Nassir, N.; Hickman, M.; Ma, Z.L. Activity detection and transfer identification for public transit fare card data, *Transportation*, 2015.
- [17] Tu, W.; Cao, J.; Yue, Y.; Shaw, S.-L.; Zhou, M.; Wang, Z.; Chang, X.; Xu, Y.; Li, Q. "Coupling mobile phone and social media data: A new approach to understanding urban functions and diurnal patterns". *International. J. Geogr. Information Science*, 2017.
- [18] El Mahrsi, M.K.; Come, E.; Oukhellou, L.; Verleysen, "M. Clustering Smart Card Data for Urban Mobility Analysis. *IEEE Trans*", *Intel. Transp. Syst.* 2017.
- [19] Ma, X.; Liu, C.; Wen, H.; Wang, Y.; Wu, Y.J. "Understanding commuting patterns using transit smart card data". *J. Transp. Geogr.* 2017.
- [20] Gong, Y.; Lin, Y.; Duan, Z. "Exploring the extemporization structure of dynamic urban space using metro smart card records".

### Citation of this Article:

Venkata Srikar Reddy, Dr. S.A.K. Jilani, K. Srividya, M. Yashwanth Kumar, B. Krishna Prasad, & P. Vijay kumar. (2025). AI Powered Pick Pocketers Identification System for Public Transport. *International Current Journal of Engineering and Science - ICJES*, 4(4), 35-42. Article DOI: <https://doi.org/10.47001/ICJES/2025.404006>

\*\*\*\*\*