THIAGARAJAR COLLEGE OF ENGINEERING

Department of Information Technology

PROUDLY PRESENTS

iTunes

INNOVATING CREATIVE MINDS

DESIGN THINKING

A CREATIVE ANALYTICAL THINKING

SEP-DEC 2022

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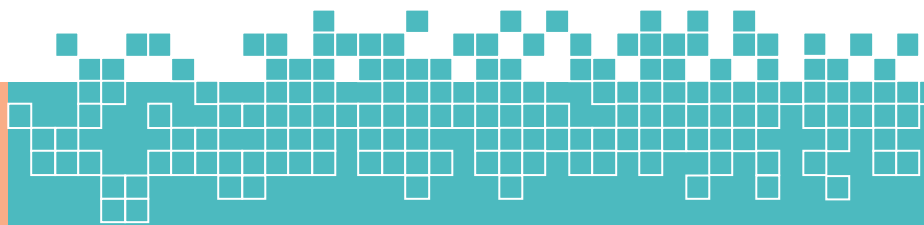**DEPARTMENT OF INFORMATION TECHNOLOGY**

Vision

Become a Centre of Excellence for Information Technology Education and Research

Mission

Academic success is achieved through a well-designed curriculum that is flexible to changing technology needs, competent teachers, and an innovative teaching-learning process.

Promoting collaborative research through special interest groups, state-of-the-art research labs, and industry-institute interactions.

Providing value-added courses in order to generate highly competent and socially responsible information technology professionals and entrepreneurs

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(Assistant Professor, Department of Information Technology)
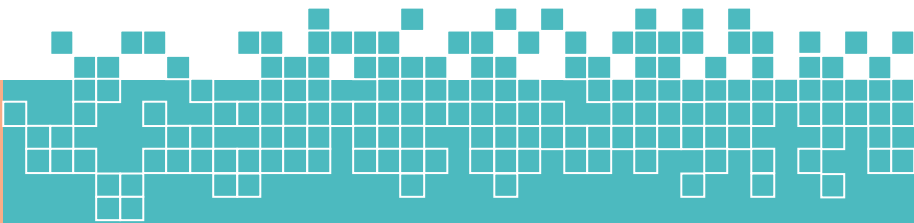
STUDENT EDITORS

Abirami S

Charvi J D

Janani R

Kiranya R

Lithu Varshni V

DESIGNERS

Charvi J D

Editor's desk

Hello, fellow readers! We are delighted to present you with the latest edition of our very own iTunes magazine. We have kept you up to date on what is going on in our department with the help of our students and staff. For each edition, we have got wonderfully written and softly edited articles from students, which have helped you stay current and upgrade yourself. For this edition, we have chosen the design thinking projects of our IT department students. In this, we have summarized the projects to provide you with more precise information about them. The articles presented here are contributions of both staff and students. We would like to thank the faculty coordinators and faculty in charge of iTunes, Dr. D. Tamilselvi and Mrs. S. Thiruchadai Pandesswari, for their assistance and guidance at this auspicious time. I would like to personally thank the iTunes team for beautifully designing this edition and curating articles. We are working harder than ever before to meet your expectations. We also added some quizzes to keep you engaged. We have included some achievement list from both staff and students which is very inspiring. So, for the full experience, take your time and read this edition thoroughly. Thank you very much!

ABIRAMI.S

(3rd year IT- 21IT005)
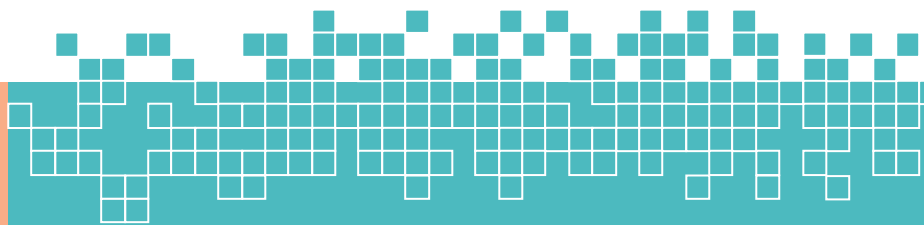
# Automated CCTV tampering detection in ATM using Deep learning algorithms

ABSTRACT OF THE PROJECT:

Today's world is surrounded by the "third eye" watching all of our activities and actions in public. To be trustworthy and strong, a country must provide its citizens with a safe and secure environment. With that said, in banks, closed-circuit television (CCTV) cameras are used to supervise and surveil activities happening around us daily. These cameras are used to prevent threats like robberies, fights, and other similar incidents from happening inside an ATM. But this type of surveillance needs a person to oversee it. Even though a 24/7 supervisor is provided, a camera must exist for this. As a result, a system is required to detect tampering or any disturbance of CCTV cameras automatically. Despite how advanced the concepts of deep learning algorithms are, detecting the tampering of cameras is difficult. Making sure that only the objects present that are close must be detected, including any other physical disturbance of the camera, makes the task challenging. This proposed work focuses on providing a better way for the supervisor to know the state of the camera being used. By applying open-source deep learning algorithms, a multi-class classification is executed, where the data is differentiated as anomalies and the remaining are considered normal. No standard datasets were available for the real-time scenario from any resource; hence, a real-world dataset was created by taking images using a PC camera and through the internet. The algorithm used is YOLOv3, along with the Darknet framework.

OBJECTIVES:

The proposed work satisfies the following objectives:

- To detect the physical tampering of CCTV in highly secured places such as banks and ATMs using a deep learning algorithm by creating a system to detect activities such as tampering by hands or camera defocusing in ATMs.

- To informally inform the officials if the camera is physically threatened in the ATM.
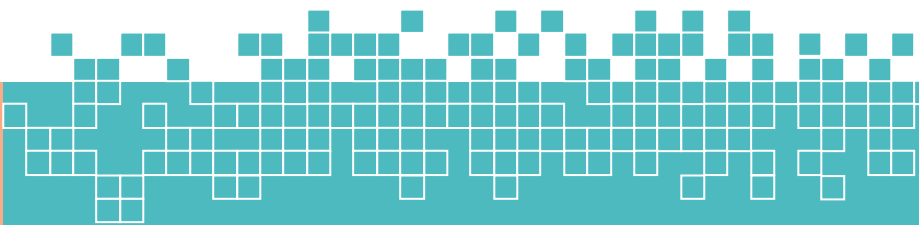
TAMPERING OF CAMERA:

Camera Occlusion:
Camera occlusion is an illegal behavior that prevents the camera from capturing the actual scene by causing a partial or total loss of vision. This might occur by covering the surveillance camera with a hand or any opaque object.

Camera Video Stop:
Stopping camera video is caused by tampering with the wiring and preventing any recording from happening. Some general factors, like insufficient power supply, an unstable network, wiring problems, etc., also cause issues with video loss on CCTV cameras.

Camera Defocus:
When a camera is de-focused, the CCTV recording in the captured scene becomes translucent. As a result, the output gets blurry, making it difficult to analyze the contents of the recording. This unexpected behavior may be the result of equipment damage, a change in camera settings, or adverse weather that affects cameras that are located outdoors, such as fog, raindrops, etc.

Camera Motion:
The security camera's position being off from its initial angle can lead to camera tampering. The redirection of CCTV takes place if and only if the camera is moved by an external source. This occurrence is known as "camera motion."

a) Normal image b) Tampered image

METHODOLOGY:

Our proposed work involves detecting activities such as tampering by hands and objects and camera defocusing in ATMs.

Tampering with a camera is one in which the camera lens is partially blocked by external objects, and camera defocusing refers to a situation in which the camera's viewing angle is abruptly changed by external forces. We are implementing it using YOLO, which is a state-of-the-art, real-time object detection system. It is a real-time object recognition system that can recognize multiple objects in a single frame.
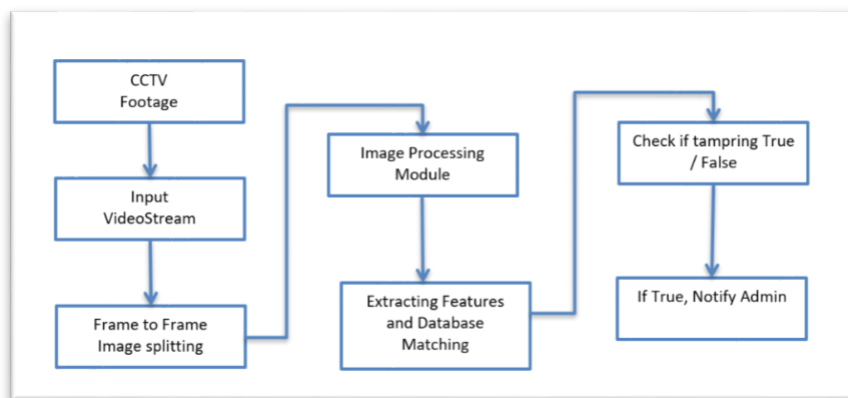
It uses one neural network to process the entire image. The image is divided into regions by this network, which also forecasts bounding boxes and probabilities for each region. The projected probabilities are used to weigh these bounding boxes.

We made use of OpenCV, a programming function package primarily designed for real-time computer vision.

Darknet, an open-source neural network framework, has also been used by us. It is a quick and highly accurate framework for real-time object detection (accuracy for custom-trained models depends on training data, epochs, batch size, and some other criteria; it can also be used for images).

The CCTV footage is delivered after the input video stream has been segmented into frames. The frames are then processed to eliminate sounds and other obtrusions. Additionally, each frame is examined, and if the results match the trained dataset, the footage is deemed to have been altered. The required individual will be called or sent a message informing them of this detection.

The workflow of the proposed system is given below.


Workflow Diagram

COMPARISON MATRICE:

	YOLO	YOLO v2	YOLO v3
Input size	224 x 224	448 x 448	
Framework	Dark net trained on Image Net—1,000.	Darknet-19 19 convolution layers and 5 max pool layers.	Darknet-53 53 convolutional layers. For detection, 53 more layers are added, giving a total of 106 layers.
Small size detection	It cannot find small images.	Better than YOLO at detecting small images.	Better than YOLO v2 at small image Detection.
		Uses anchor boxes.	Uses a residual block.

RESULT:

The dataset of about 1000 images, labelled as blocked, hand, and face, was created due to the unavailability of suitable pre-existing datasets. We used the YOLOv3 version of the real-time object detection system for training, due to hardware constraints, despite YOLOv7's superior performance. The configuration files for YOLO, containing network definitions, hyper-parameters, and anchor settings, were incorporated using the Darknet Framework. For model testing, we used real-time streaming via a PC camera on the PyCharm platform. Alerts for camera tampering are sent using Twilio packages. The model achieved approximately 90% accuracy across various scenarios.

Detection Output
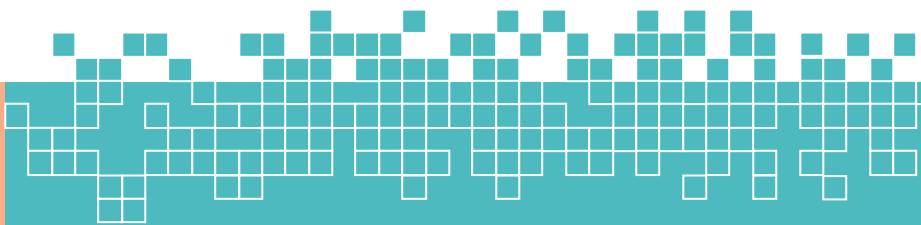
CONCLUSION:

This project was done by the students in the second year of information technology in the year 2022. Deep learning is the subject area for this research. Additionally, they produced a conference paper and presented it at a symposium at Anna University in Chennai.

PROJECT DONE BY:

Lakshmi Priyanka Sri   **Bhuvaneshwari S**   **Ananthika S**
(21IT057)   **(21IT023)**   **(21IT010)**

MENTOR: Mrs.K.V UMA(Assistant Professor-IT Department)

**CHARVI J D**
(3rd year IT-21IT025)

Ticket system using Radio Frequency identification and near-field communication

ABSTRACT OF THE PROJECT:

Nowadays, Passengers face certain difficulties like cash availability, and ticket maintenance while they travel on the bus and we don't have a flexible and versatile Bus Ticket Management System. A bus ticketing system using Radio Frequency Identification (RFID) is an innovative solution that aims to streamline the process of ticketing in public transportation, specifically buses. RFID, a technology that uses electromagnetic fields to automatically identify and track tags attached to objects, enables fast, contactless, and secure ticketing transactions. So, They proposed the idea of using a passenger card to automate the bus ticket booking process on a cloud platform without the use of traditional tickets.

SOCIETAL NEED:

- Implementing a cashless transaction system in public transportation allows passengers to pay for their fares using digital methods like contactless cards, mobile wallets, or QR codes.
- This eliminates the need for physical cash and the rush to buy tickets from conductors.
- This approach offers convenience by speeding up boarding, removing the need for exact change, and reducing crowding during peak times. It's a modern and hygienic way to pay for travel, benefiting both passengers and transportation authorities.
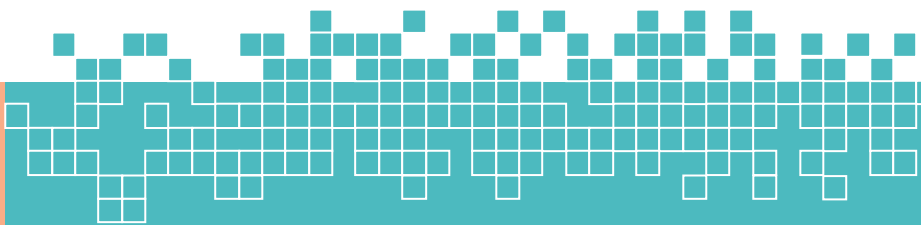
How does it work?
- Scanning the QR code with the passenger card
  - ➢ Entering the bus
  - ➢ Leaving the bus
- Entry and exit detection
- Automated Bill amount calculation
- Amount deduction and updation

SCOPE:
This aims to improve the experience of passengers on buses. This aims to automate the bus ticket booking process without the use of traditional tickets.

1. Efficiency in Boarding:
RFID-enabled bus ticketing allows passengers to simply tap their RFID cards or devices to quickly board buses. This speeds up the boarding process and reduces waiting times.

2. Cashless Transactions:
Similar to contactless payment methods, RFID tags enable cashless transactions. Passengers can preload their RFID cards with funds and use them for seamless fare payments.

3. Reduced Operating Costs:
Automating fare collection with RFID reduces the need for conductors or ticket sellers, leading to cost savings for transportation providers.
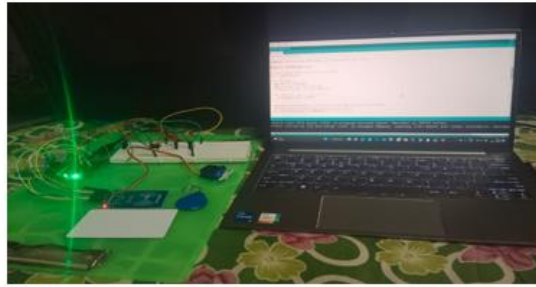
4. Accessibility and Inclusion:
RFID cards can be designed for easy use by people with disabilities, ensuring a more inclusive transportation system.

5. Accessibility and Inclusion:
RFID cards can be designed for easy use by people with disabilities, ensuring a more inclusive transportation system.
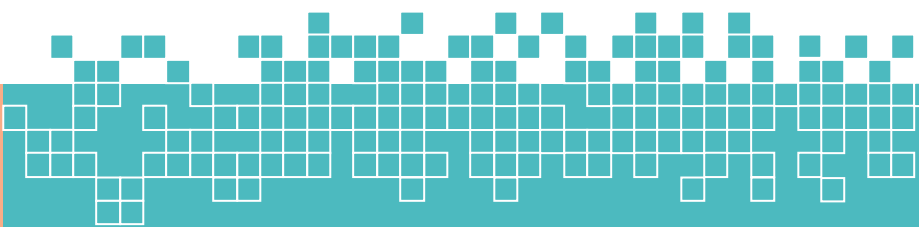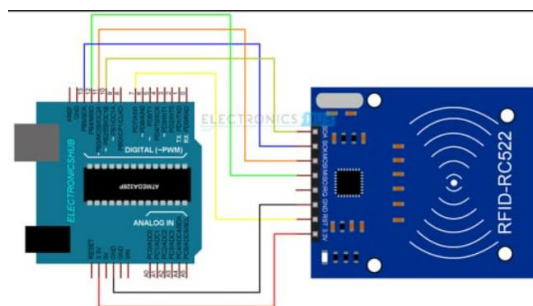
PROTOTYPE:

IMPLEMENTATION:

1. RFID Tag Infrastructure:
Procure RFID tags and readers suitable for the buses and stations.
Set up RFID readers at entry and exit points of buses and transit stations.

2. Passenger RFID Cards:
Issue RFID cards to passengers. These cards can be reusable and reloadable.
Link each RFID card to a unique identifier in the system.

3. Fare Management System:
Develop or implement a fare management software system.
Integrate the system with the RFID card database.

4. Boarding Process:
Passengers tap their RFID cards on the readers as they board the bus. The reader deducts the appropriate fare from the card balance based on the fare calculation rules.

5. Security and Privacy:
Implement encryption and security measures to protect cardholder data. Comply with privacy regulations to ensure passenger information is handled appropriately.

6. User Support:
Establish customer support for issues related to RFID cards, balances, and transactions. Provide clear instructions for using the RFID cards.

7. Continuous Improvement:
Gather feedback from passengers and staff to identify areas for improvement.
Regularly assess the system's efficiency and effectiveness and make necessary enhancements.
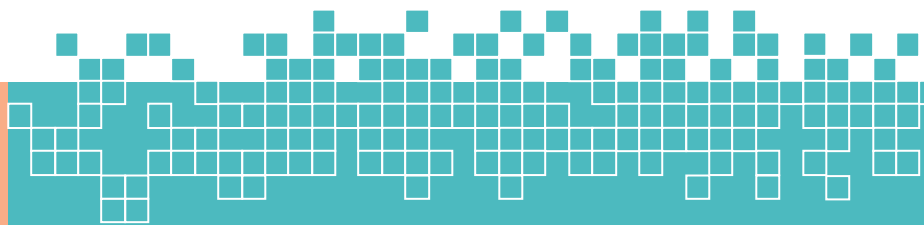
CONCLUSION:
This is one of the projects which was done by the students in the second year of information technology in the year 2022. This project falls within the IOT domain. This will make the passenger's experience incredibly comfortable and easy during traveling.

DONE BY:

Charvi J D	**Berlin kirubha M**	**Madhumitha J**
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MENTOR: Mrs. K. Indira(Assistant Professor)

ABIRAMI.S
(3rd year IT- 21IT005)

Decentralized Online Ride Booking Application

ABSTRACT OF THE PROJECT:

This project proposes the development of a decentralized online ride booking system using blockchain technology and smart contracts. The system aims to provide a more efficient, transparent, and secure platform for users to book rides without the need for intermediaries. Built on a decentralized blockchain network like Ethereum, the system enables peer-to-peer transactions between riders and drivers, reducing transaction costs and ensuring a fair marketplace. By recording all transactions immutably on the blockchain, it enhances security for both parties. Additionally, the system incorporates a reputation system for drivers and a rating system for ride experiences to ensure high-quality service. Through decentralizing data and being open-source, the platform promises to be tamper-proof and accessible for contributions from the community. Overall, this project seeks to revolutionize the ride booking industry and advance transportation with its innovative, secure, and user-centric approach.

OBJECTIVES:

The proposed work satisfies the following objectives:

- To decentralize the entire ecosystem, thereby providing additional security features and flexibility.
- To implement data security means and higher user control of their own data over the network.
- To give higher emphasis on Children and Women Safety by implementing standard procedures.
- To ease the financial transactions, along with the disabilities and inconsistencies that are prevalent in existing systems.

METHODOLOGY:

The methodology for developing the decentralized online ride booking system involves a systematic approach to address the project's objectives. It begins with a thorough analysis of user requirements and industry trends. The most suitable blockchain platform is selected, and the system architecture is designed to facilitate peer-to-peer transactions between riders and drivers using smart contracts. Development includes creating secure and efficient smart contracts, integrating them with the blockchain, and designing a user-friendly interface. Robust testing, security measures, and a reputation system for drivers are implemented to ensure a transparent and fair platform. Accessibility features, documentation, and open-source contributions are considered, along with legal compliance. User education and onboarding are prioritized to ensure a smooth transition. Through this comprehensive methodology, the project aims to successfully develop and deploy a decentralized ride booking system that revolutionizes the industry with efficiency, transparency, security, and inclusivity.

CONCEPTUAL DESIGN:

The quick request functionality

RESULT:

- The implementation of a decentralized online ride-booking system results in a notable reduction in transaction costs for both riders and drivers. By eliminating intermediaries from the ride-booking process, users can now enjoy more affordable rides while drivers earn higher returns for their services.
- With the utilization of blockchain technology, the ride-booking process experiences a significant boost in transparency and security. All transactions are permanently and immutably recorded on the blockchain, ensuring a trustworthy and tamper-proof platform that instills confidence in both riders and drivers.
- The introduction of a decentralized model creates a fairer marketplace for riders and drivers alike. By enabling peer-to-peer transactions and eliminating intermediaries, the system fosters a level playing field where both parties can engage directly, leading to better pricing and improved opportunities for drivers.
- The system's focus on inclusivity and accessibility is exemplified by its integration of options for wheelchair accessible vehicles. This enhancement ensures that people with disabilities have equal access to ride-booking services, promoting a more inclusive and equitable transportation platform.
- Users benefit from a more user-friendly and efficient ride-booking system, as the platform boasts a user-friendly interface and real-time ride tracking capabilities. These features enhance the overall user experience, making the process of booking rides seamless and convenient for all users.

CONCLUSION:

In conclusion, the development of a decentralized online ride-booking system holds great promise in revolutionizing the ride-hailing industry. By leveraging blockchain and smart contract technology, the system aims to address the limitations of centralized platforms, offering lower costs, enhanced security, and increased transparency for riders and drivers. Moreover, the system's focus on inclusivity by providing accessibility options for people with disabilities is commendable and will cater to a broader user base.

While the potential benefits are significant, successful implementation and adoption will require overcoming challenges, including user education and onboarding. Legal and regulatory considerations are also crucial to ensure a smooth and compliant rollout. Nevertheless, if these hurdles are tackled effectively, this innovative project has the potential to create a fairer, more efficient, and user-centric ride-booking ecosystem, benefiting all stakeholders involved.
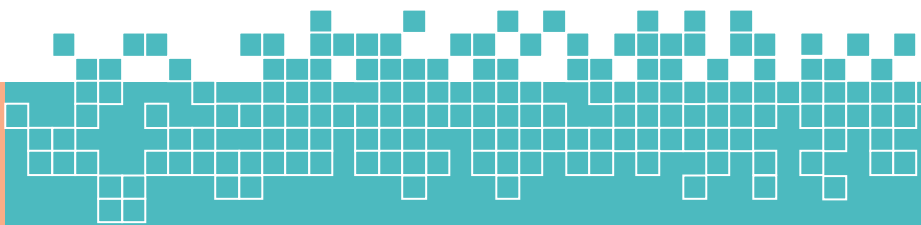
PROJECT DONE BY:

Hariharan VJ	Gowsigan M	Raghul R	Sachin Somi
(21IT037)	(21IT035)	(21IT077)	(21IT132)

MENTOR: Mr.P.Manoj Kumar(Assistant Professor-IT Department)

LITHU VARSHNI V
(3rd year IT-21IT059)

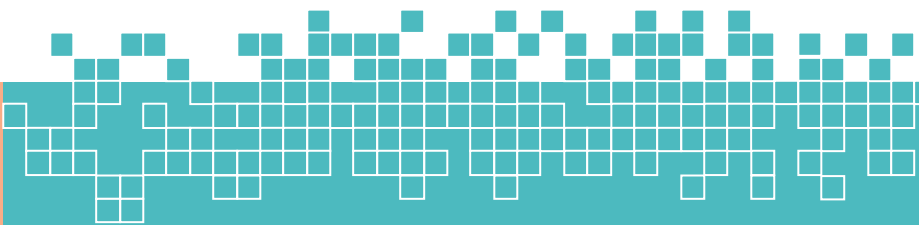# Intelligent Traffic Management System

ABSTRACT OF THE PROJECT:

This article presents an Intelligent Traffic Management System (ITMS) that employs Fog nodes installation and game theory approaches to optimize road traffic control and enhance operational efficiency. Utilizing a game theory technique known as deferred acceptance, the system maps fog nodes to the nearest cameras, strategically allocating cameras based on priority lists and traffic conditions. By processing critical data at the edge through fog nodes, the ITMS efficiently manages traffic and reduces the cloud's workload. The system boasts advanced vehicle detection and tracking capabilities, along with the estimation of key vehicle safety metrics. Through real-time audio and visual alerts, the ITMS proactively informs commuters about road traffic conditions, enabling them to reroute their vehicles and avoid congestion ahead of time. By seamlessly integrating fog computing and game theory, the proposed ITMS empowers drivers to make informed decisions, leading to effective traffic congestion mitigation and an overall improved commuting experience. This research highlights the potential of fog-based ITMS as a viable solution to address traffic challenges and enhance traffic management efficiency.

OBJECTIVES:

The proposed work satisfies the following objectives:

1. To increase the efficiency of the existing automatic traffic signaling system.
2. To connect all the cameras to appropriate fog nodes which processes the data streams coming from cameras and intimidate if the road capacity exceeds a certain value.
3. To effectively perform this,it's suggested to use a game theory approach called deferred acceptance to map a fog node to the nearest camera.
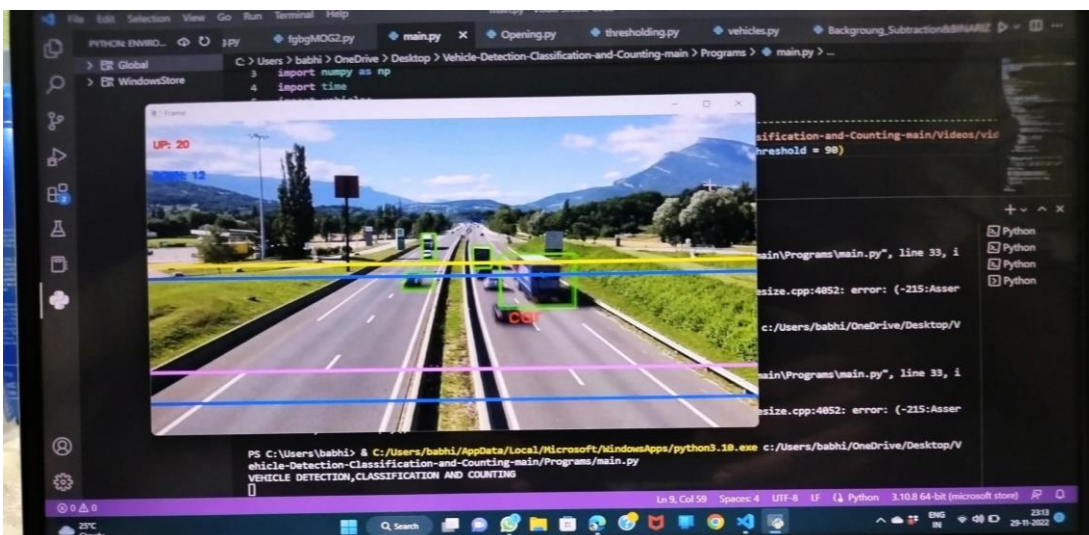
METHODOLOGY:

The methodology employs cutting-edge technologies and data-driven strategies to create a safer, more efficient, and smarter traffic management system. Real-time data from traffic cameras is collected to monitor traffic conditions and air quality. Machine learning algorithms analyze this data to predict traffic patterns and identify congestion-prone areas. The system dynamically adjusts traffic signals in real time, prioritizing smooth traffic flow and facilitating the passage of emergency vehicles, such as ambulances. Commuters are empowered with timely and accurate information through mobile applications and digital displays, enabling them to make informed decisions and select alternative routes to avoid congestion. The solution adopts a hybrid fog and cloud computing approach, minimizing time latency by processing critical tasks at fog nodes at the edge of the network, while cloud servers handle more complex computations. Automation of certain traffic management tasks, including signal control and real-time alerts, reduces the workload of traffic police officers, allowing them to focus on critical situations like emergency response and accident management.

By doing this, it enhances travel time, alleviates congestion, improves air quality, and establishes a more efficient and sustainable urban transportation system that benefits the general public.

CONCEPTUAL DESIGN:

RESULT:

The result of this system are:

- The air quality is improved because slow-moving vehicles don't cause much air pollution to the environment.
- The traffic speed is controlled as a whole and the manual need for humans to control the traffic is reduced.
- The traffic can be easily managed by just getting the data to use different routes accordingly and reduce congestion
- It is easier to quickly provide an ambulance in case of any accidents.

CONCLUSION:

In conclusion, the Intelligent Traffic Management System (ITMS) utilizing Fog nodes installation and game theory approaches has demonstrated significant potential in optimizing road traffic control and alleviating congestion. Through a comprehensive evaluation of road capacities and traffic statistics, the system has proven effective in reducing traffic congestion and enhancing overall traffic management efficiency.

In summary, the ITMS demonstrates great promise in transforming traffic management and lays the groundwork for its potential widespread adoption in urban regions. With ongoing refinements and strategic improvements, the ITMS holds the potential to revolutionize traffic control and contribute to more efficient and sustainable transportation systems in the future.

PROJECT DONE BY:

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(21IT004)	(21IT080)	(21IT086)

MENTOR: Ms. S. Thiruchadai Pandeeswari(Assistant Professor-IT Department)

KIRANYA R
(3rd year IT-21IT054)
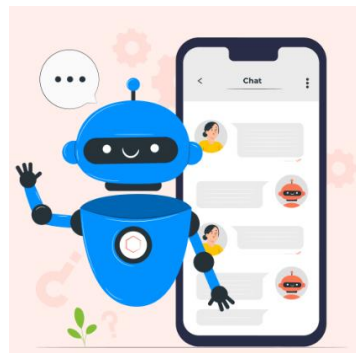
Information Chatbot

ABSTRACT:

An Information Chatbot for Thiagarajar College of Engineering is a computer-based system that provides a conversational interface for students, faculty, and staff to quickly and easily access helpful information about the college. The chatbot is integrated with existing college systems and provides a more efficient way to access information about TCE. The system draws on natural language processing and machine learning technologies to understand user requests and provide personalized responses. It is designed to provide accurate and up-to-date information about the college, including degree programs, courses, faculty, sig, and facilities, as well as helpful links to relevant websites. The chatbot also helps to reduce the workload of college staff by providing quick and easy access to frequently asked questions. By providing a more convenient and personalized experience, the Information Chatbot for TCE can help to improve the overall user experience for students, faculty, and staff. The Chatbot uses Natural-Language-Processing(NLP) for its inter-activeness with the user.

INTRODUCTION:

A chatbot is a computer program that simulates and processes human conversation (whether written or spoken), allowing humans to interact with digital devices as if they were conversing with real people.

Chatbots can range from simple programs that respond to a single-line query to sophisticated digital assistants that learn and evolve to provide increasing levels of personalization as data is collected and processed. Chatbots make it possible to provide customer service and support 24 hours a day, seven days a week. They also free up phone lines and are far less expensive in the long run than hiring support staff.

OBJECTIVES:
The main motive and objective of our project is to design and deploy a fully functional chatbot for the college website thereby making the website simpler and user friendly. The chatbot allows the users to get accurate information thereby saving time and an accessible channel to find answers to their questions.

PURPOSE OF THE WORK:
A college chatbot typically serves as a virtual assistant for students and other members of the college community. It can provide information on a wide range of topics, including course schedules, financial aid, and campus events. Additionally, it can help users navigate the college's website and other online resources. Some chatbots are designed to be conversational, allowing users to ask questions in natural language and receive responses in kind, while others rely on more structured inputs and outputs. Overall, the main purpose of a college chatbot is to make it easier for students and other members of the college community to access the information they need and perform tasks more efficiently.

RESULTS AND DISCUSSION:
We have created an application with the help of RASA Framework which is an open source and uses NLP to interact with users and provide the desired information. This RASA Framework is integrated with Python backend, webhook is used to deliver the query of the user to the server. We have used Natural language processing as a pre-trained artificial intelligence module so that we could use its pre-trained neural networks to answer the user's query with efficiency and accuracy. We also made some custom modules/entities such as details, time-table, etc. in the nlp module to make it ample to answer college-related queries. This application would be available on the college website, for this purpose we have created a static web page to mimic the college website. This webpage is built using HTML with bootstrapping and the design part is done with help of html css.
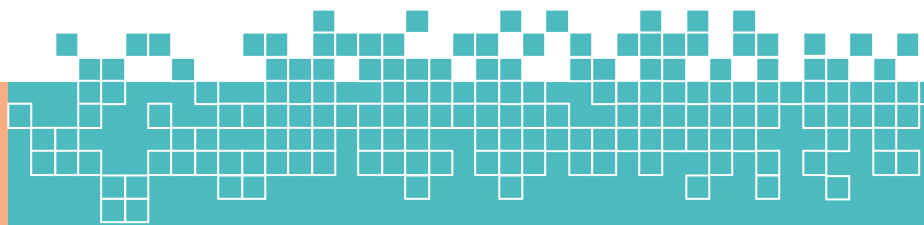
CONCEPTUAL DESIGN:
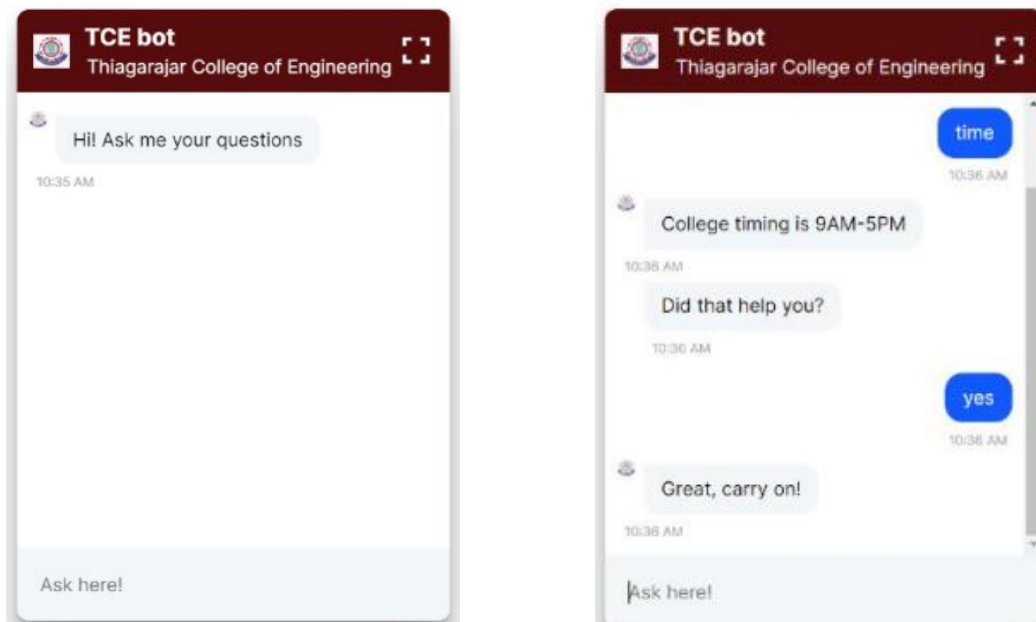
CONCLUSION AND FUTURE ENHANCEMENTS:

We get to the conclusion through the proposed study and research that the new proposed system will benefit the college system by resolving several significant shortcomings in the retrieval of information from the website. Using the results of the aforementioned study, we can improve the chatbot and help the college facility serve all website visitors. The challenges that the students and parents face during the busiest admissions periods will be lessened by this effort. We are planning to make the chatbot voice-enabled and we are working on bringing recommendations based on the text entered by the users. We are also planning to develop the chatbot so that it will be more interactive and user-friendly.

PROJECT DONE BY:
ARJUN PRITHVI V (21IT014) SHRIRAM RS (21IT096) VIKRAM SD (21IT119)

JANANI R
(21IT044-III YEAR)

AICTE SPICES:

AICTE SPICES provides financial support to institutions for developing student clubs that would help students grow effectively by promoting their interests, creativity, and ethics.

Since 2015, the IoT club of the Department of Information Technology has had a history of winning Hackathons at the national and international levels. In addition, the club has hosted hackathons at the national and international levels, including the 36-hour Honeywell hackathon in 2019 and the TCE-HBTU hackathon in 2022, and so on.

The Department of Information Technology's IoT Club was qualified for the AICTE SPICES SCHEME last year, in May 2022, with financial support of one lakh for a one-year duration. Our management also graciously contributed to the IoT Club to facilitate bigger IoT-based events.

The AICTE SPICES scheme expects to help student clubs to be a facilitating entity for the pursuit of individual interests, creative work, showcasing talent, networking and teamwork opportunities, social experience; organization and management skills, exposure to professional ethics, and many more.

The IoT club has been organizing various events under the scheme like the IOT FEUD where the students were waging war against each other to win a word-based game using IoT in various domains.

IoT - Treasure Hunt where the students searched for the IoT sensors used in our college based on hints related to the Ponniyin Selvan movie.

Blogathon is another event where students were encouraged to write technical articles with the IoT theme.

Another interesting event is the Storage Wars where the students made bids on quiz boxes containing IoT Questions and solved real-time IoT scenarios.

In the IDEATION BOOTCAMP, Mr. Vishal Nair, a start-up industry specialist, taught the students how to turn their ideas into products.

Followed by the camp, the participants of the ideation boot camp presented their refined product ideas which were evaluated by the TCE TBI CEO Mr.Sebin.
Recently a notable 36 hrs hackathon was sponsored by Survey Sparrow called "Battle of Brackets - the campus clash" where AI and IoT-based survey systems were proposed by the students of our college.

Apart from conducting events, the club also sponsored the participation of students in various workshops, and conference publications in Higher learning institutes and also motivated the students to participate and win prizes from other competitions like PALS innowah.
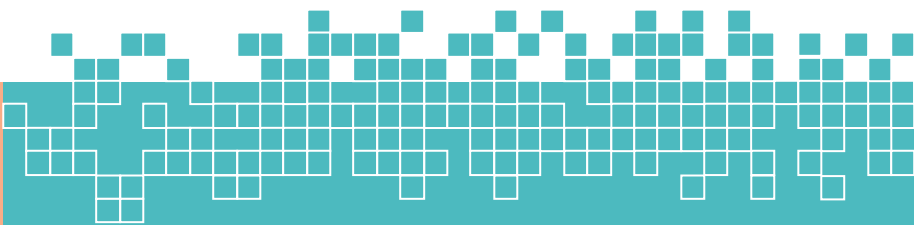
IoT expo is also a part of the AICTE SPICES IoT Club where 50 teams from 9 different departments and Thiagarajar Mills school presented their IoT Product Ideas in Engineering. We believe we have done our best to foster the skills in the students.

Abirami S (3rd year IT- 21IT005)
Lithu Varshni V (3rd year IT- 21IT059)
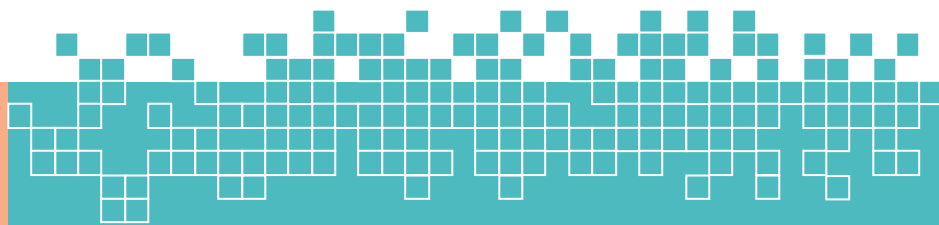
QUIZ TIME!

1. Which country hosted the 2022 Winter Olympics?

2. In which month of 2022 did Apple introduce the iPhone 14 series?

3. SpaceX achieved a major milestone by conducting the first crewed mission to which planet using the Starship spacecraft?

4. In 2022, a historic mission successfully intercepted and redirected an asteroid. What was the name of this mission?

5. What encryption method enhances IoT security?

6. What technology enables self-executing contracts?

7. The 2022 Consumer Electronics Show (CES) featured innovative technologies, including AI-driven devices and smart home solutions. Where is CES typically held?

8. Which wireless technology continued to expand globally in 2022, with more regions rolling out networks and devices?

9. The Nobel Prize winners for various categories were announced in which month of 2022?

10. In 2022, which company became the world's first trillion-dollar company, achieving a historic market capitalization milestone?
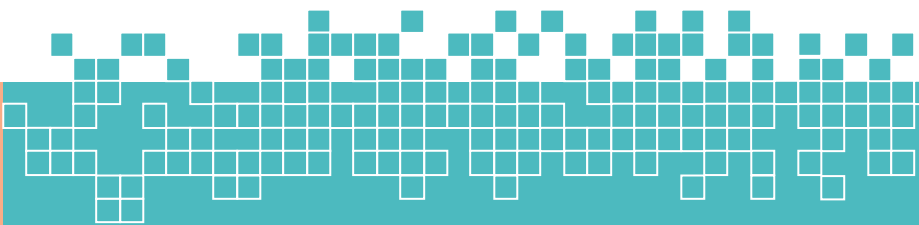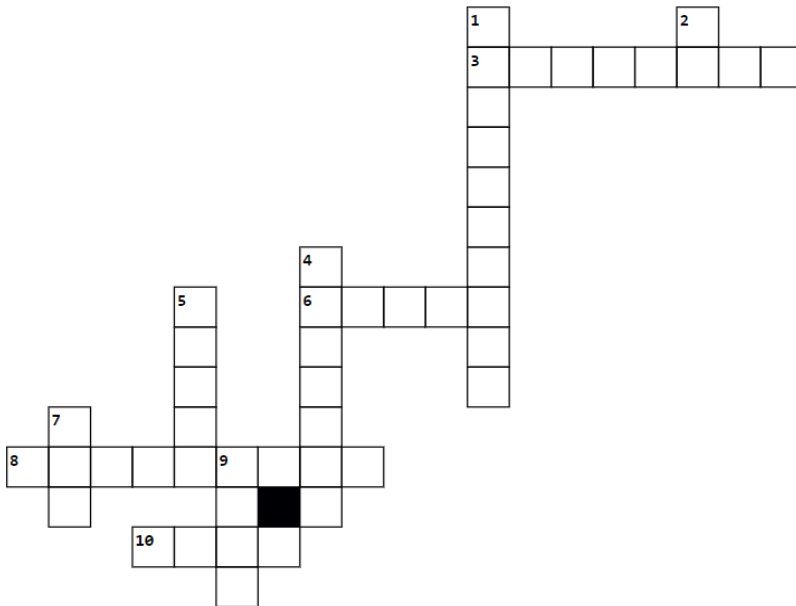
ACROSS:
1. **3.** The organization that awarded the Nobel Prize in 2022
2. **6.** Country that hosted the 2022 Winter Olympics
3. **8.** Month of 2022 when Apple introduced the iPhone 14 series
4. **10.** The historic mission in 2022 that intercepted and redirected an asteroid

DOWN:
1. **1.** Technology enabling self-executing contracts
2. **2.** Wireless technology that expanded globally in 2022
3. **4.** Month in which Nobel Prize winners were announced in 2022
4. **5.** Company that became the world's first trillion-dollar company in 2022
5. **7.** Encryption method enhancing IoT security
6. **9.** SpaceX achieved a major milestone by conducting the first crewed mission to this planet

ANSWERS:
China
September
Mars
DART (Double Asteroid Redirection Test)
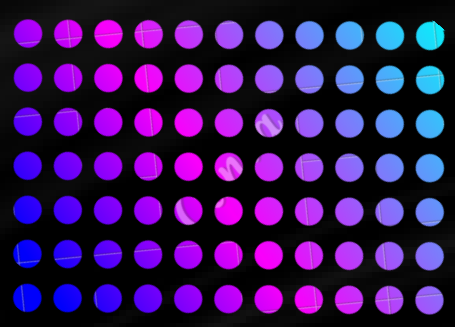AES (Advanced Encryption Standard)
Blockchain
Las Vegas
5G
October
Apple

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