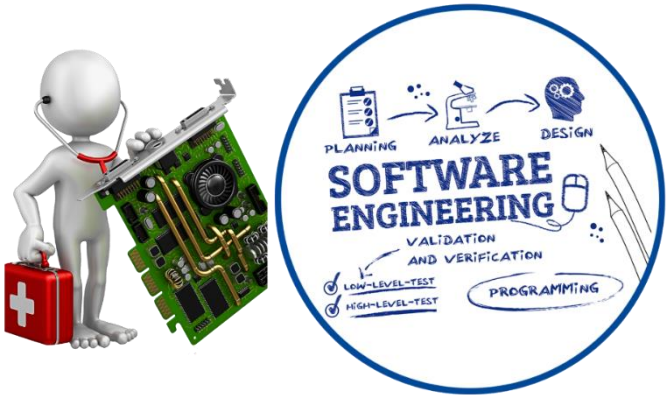
R. C. Patel Institute of Technology, Shirpur

Department of Computer Engineering

TechnoVerse 2021-22



TechnoVerse

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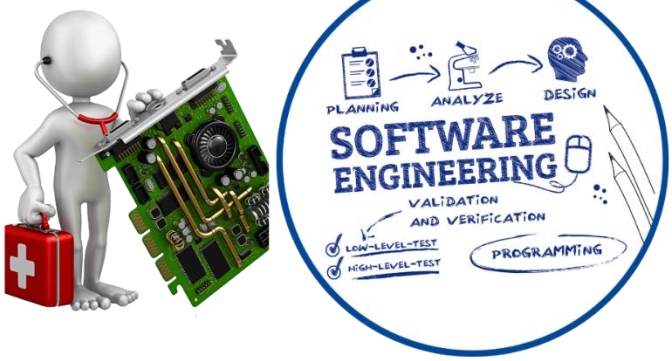

TechnoVerse

Message from HODs Desk

I feel very elated and at the same time privileged to share a few words as yougo through the pages of the magazine **"TechnoVerse"**. Computer department endeavours to help students to seek the best from the surroundings. The knowledge thus gainedbecomes a ladder for them to soar into greater heights. It's often the collective effort that leads to the discovery and fulfilment of aspirations.

I feel proud to be a part of an instrument in moulding the students. Wetry to shape every sphere of a student's personality in the Computer Department. I take this opportunity to express my sincere thanks to all the members of the faculty and auxiliary staff for their sincere contribution in making this Edition.

Dr. Nitin N. Patil

HOD (Computer Engineering)

VISION

To provide prominent computer engineering education with socio-moral values.

MISSION

M1 To provide state-of-the-art ICT based teaching-learning process.

M2 To groom the students to become professionally sound computer engineers to meet growing needs of industry and society.

M3 To make the students responsible human being by inculcating ethical values.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- **PEO1** To provide the foundation of lifelong learning skills for advancing their careers being a professional, entrepreneur and leader.
- **PEO2** To develop computer professionals to fulfill industry expectations.
- **PEO3** To foster ethical and social values to be socially responsible human being.

PROGRAM OUTCOMES (POs)

- **PO1** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
- **PO2** Problem analysis: Identify, formulate, 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 public health and safety, and 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 modelling 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 the 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 the 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 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 (PSOs)

By the completion of Computer Engineering Program, the students will have following Program Specific Outcomes-

- **PSO1** Understanding of the fundamental and advanced concepts of Computer Engineering to analyze and design real world problems.
  PSO2 Ability to provide solutions for problems in various domains like agriculture, healthcare, E-commerce etc.

WIRELESS NETWORK

Introduction

A wireless network is a type of computer network that allows devices to connect and communicate without the need for physical cables or wires. It uses radio waves or infrared signals to transmit data between devices. Wireless networks are commonly used in homes, offices, public places, and other environments to provide internet access and enable device connectivity. The most common type of wireless network is Wi-Fi (Wireless Fidelity), which operates on the IEEE 802.11 standards.

Key components of a wireless network include:

Wireless Access Point (WAP) or Router: It serves as a central hub that connects wireless devices to a wired network or the internet. The router manages network traffic and provides a wireless signal for devices to connect to.

Wireless Network Interface Card (NIC): It is a device installed in computers, laptops, or mobile devices to enable wireless connectivity. NICs receive and transmit wireless signals, allowing devices to communicate within the wireless network.

SSID (Service Set Identifier): It is a unique name assigned to a wireless network, allowing devices to identify and connect to a specific network. Users need to know the SSID and enter the correct password (if applicable) to join a wireless network.

Security Protocols: Wireless networks can be secured using encryption protocols such as WEP (Wired Equivalent Privacy), WPA (Wi-Fi Protected Access), or WPA2. These protocols help prevent unauthorized access and protect the data transmitted over the network.

Range and Coverage: The range of a wireless network depends on factors like the power of the access point, interference from other devices, and physical obstacles. The coverage area can be extended by adding additional access points or using wireless network extenders.

Wireless networks offer several advantages, including mobility, convenience, and flexibility. However, they can also be susceptible to interference, limited range, and potential security risks if not properly secured. Overall, wireless networks have revolutionized how we connect and communicate, enabling seamless internet access and device connectivity in various settings.

Advantages of Wireless Networks:

Mobility: Wireless networks provide freedom of movement since devices can connect without the need for physical cables. Users can access the network and internet from anywhere within the network's coverage area, allowing flexibility and convenience.

Easy Installation: Setting up a wireless network is generally easier and faster than running cables throughout a building. This makes it simpler to expand or modify the network as needed, without the hassle of dealing with physical connections.

Scalability: Wireless networks can accommodate a large number of devices, making them highly scalable. Additional devices can join the network without the need for extensive infrastructure changes, as long as the network has sufficient capacity.

Cost-effective: Wireless networks can be cost-effective, especially in situations where running physical cables is impractical or expensive. They eliminate the need for extensive cabling infrastructure, reducing installation and maintenance costs.

Convenience: Wireless networks enable easy and convenient access to the internet and network resources. Users can connect their devices without being constrained by cables, allowing for seamless connectivity in various environments.

Disadvantages of Wireless Networks:

Limited Range: Wireless networks have a limited range compared to wired networks. The signal strength decreases as you move farther away from the access point, and physical obstacles like walls or buildings can further reduce the range.

Interference: Wireless networks can be prone to interference from other devices operating on the same frequency range, such as microwaves, cordless phones, or other Wi-Fi networks in close proximity. Interference can degrade the network performance and cause connectivity issues.

Security Risks: Wireless networks are more vulnerable to unauthorized access compared to wired networks. If not properly secured, wireless signals can be intercepted by attackers, potentially compromising sensitive data. It is essential to implement strong security measures such as encryption protocols (e.g., WPA2) and strong passwords to mitigate these risks.

Speed and Performance: In certain scenarios, wired networks can offer higher speeds and more consistent performance compared to wireless networks. Factors such as distance from the access point, signal interference, and network congestion can impact the speed and reliability of wireless connections.

Network Congestion: In densely populated areas or environments with numerous wireless devices, the network can become congested, leading to slower speeds and decreased performance. This is especially true in public places like airports, cafes, or stadiums, where multiple users are connecting simultaneously.

It's important to consider these advantages and disadvantages when implementing a wireless network to ensure it meets your specific requirements and provides a balance between convenience, security, and performance.

conclusion

wireless networks have revolutionized the way we connect and communicate. They offer numerous advantages, including mobility, easy installation, scalability, cost-effectiveness, and convenience. Wireless networks provide the flexibility to access the internet and network resources from anywhere within their coverage area, making them ideal for homes, offices, and public spaces.

However, wireless networks also have some disadvantages. They have a limited range compared to wired networks, can be susceptible to interference, and may pose security risks if not properly secured.

Additionally, the speed and performance of wireless connections can be affected by factors like distance, interference, and network congestion.

Overall, wireless networks have become an integral part of our daily lives, providing us with the freedom to connect our devices wirelessly and enabling seamless internet access. By understanding the advantages and disadvantages, individuals and organizations can make informed decisions about implementing and managing wireless networks to suit their specific needs while balancing factors such as convenience, security, and performance.

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Chetan Kantilal Patil

SY-Computer

FLOW CONTROL: STOP & WAIT PROTOCOL

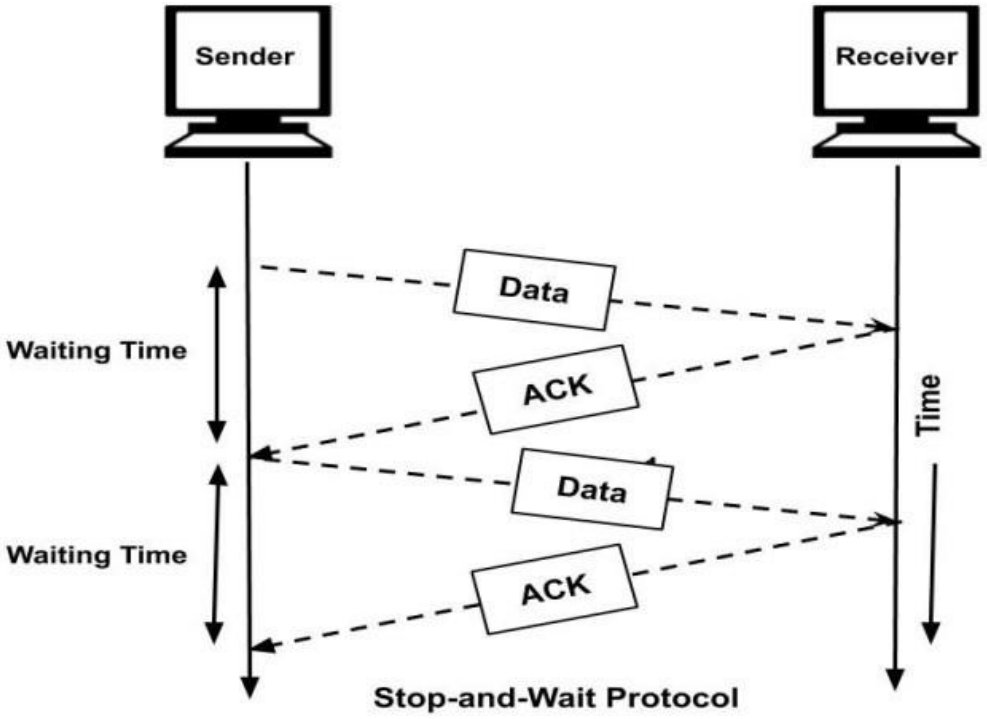
Introduction

It is a collection of processes that tells the sender how much data it can send before the data destroys the receiver. The receiving device has finite speed and limited memory to save the data.
Thus, the receiving device should be able to instruct the sending device to stop the transmission temporarily before the limits are arrived.
There is another essential problem in the data link design to manage the cost of data communication between two source and destination hosts. If the conflict between the source and destination hosts data sending and receiving speed, it will make packets drop at the receiver end.
The transport entity uses a changed form of sliding window protocol for flow control. This flow control is needed because the transport layer can experience back strength from the network layer.
In the structure, the window size is variable and composed by the receiver. A credit assigned is transmitted to the receiver's sender, which denotes how some TPDUs can be received by it.
Flow control is design issue at Data Link Layer. It is a technique that generally observes the proper flow of data from sender to receiver. It is very essential because it is possible for sender to transmit data or information at very fast rate and hence receiver can receive this information and process it. This can happen only if receiver has very high load of traffic as compared to sender, or if receiver has power of processing less as compared to sender. Flow control is basically a technique that gives permission to two of stations that are working and processing at different speeds to just communicate with one another. Flow control in Data Link Layer simply restricts and coordinates number of frames or amount of data sender can send just before it waits for an acknowledgement from receiver. Flow control is actually set of procedures that explains sender about how much data or frames it can transfer or transmit before data overwhelms receiver. The receiving device also contains only limited amount of speed and memory to store data. This is why receiving device should be able to tell or inform the sender about stopping the transmission or transferring of data on temporary basis before it reaches limit. It also needs buffer, large block of memory for just storing data or frames until they are processed.

Stop-and-Wait Flow Control:

This method is the easiest and simplest form of flow control. In this method, basically message or data is broken down into various multiple frames, and

then receiver indicates its readiness to receive frame of data. When acknowledgement is received, then only sender will send or transfer the next frame. This process is continued until sender transmits EOT (End of Transmission) frame. In this method, only one of frames can be in transmission at a time. It leads to inefficiency i.e. less productivity if propagation delay is very much longer than the transmission delay and Ultimately. In this method sender sent single frame and receiver take one frame at a time and sent acknowledgement(which is next frame number only) for new frame.



The above diagram explains the normal operation in a stop-and-wait protocol. Now, we will see some situations where the data or acknowledgment is lost and how the stop-and-wait protocol responds to it.

Advantages:

1. This method is very easiest and simple and each of the frames is checked and acknowledged well.
2. This method is also very accurate.
3. The main advantage of this protocol is the accuracy. The next frame is sent only when the first frame is acknowledged. So, there is no chance of any frame being lost.

Disadvantages:

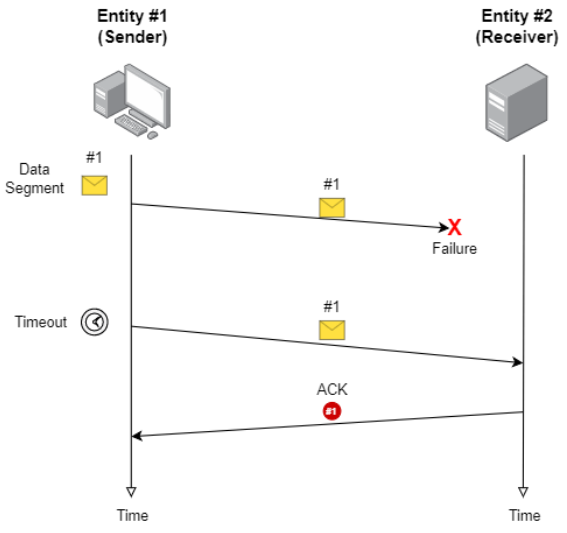
1. This method is fairly slow.
2. In this, only one packet or frame can be sent at a time.
3. It is very inefficient and makes the transmission process very slow
4. f the distance between the sender and the receiver is large then the propagation delay would be more than the transmission delay. Hence, efficiency would become very low.
5. After every transmission, the sender has to wait for the acknowledgment and this time will increase the total transmission time. This makes the transmission process

Failure Cases

Of course, both the transmissions of data segments and ACK can fail. In such cases, the sender transmits the same message again to the receiver entity. The stop-and-wait mechanism infers that a transmission failed based on timeouts. We have three main message-transmitting failure types:

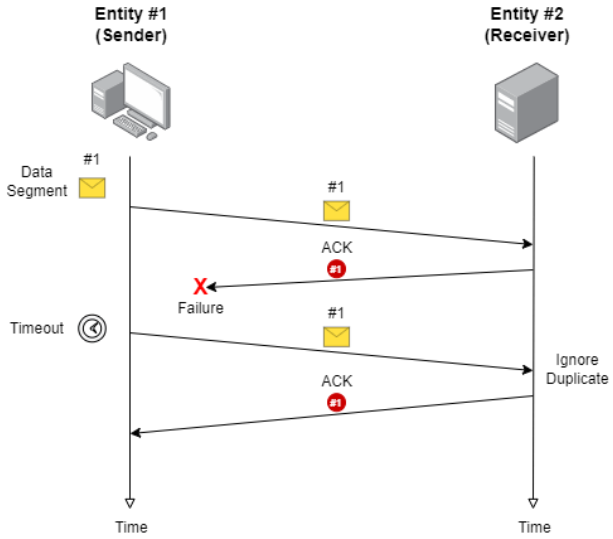
i. not receiving a data segment in the destination;
ii. not receiving the ACK message in the source, and
iii. receiving an ACK message after the timeout event.

If a data segment does not reach the destination, a timeout event will occur in the sender entity, thus indicating that the ACK message never arrived. In such a case, this entity will send the message again. We can see this scenario in the image next:

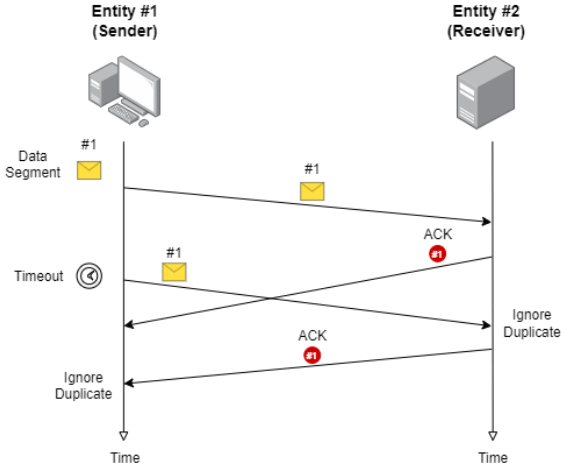


A second case is when the data segment reaches the destination, but there is a failure in the ACK message transmission. So, a timeout occurs on the sender side, which retransmits the data segment. Thus, the receiver will get

a duplicate segment, ignore it, and send the corresponding ack message again. We can check the described scenario in the following image:



Finally, the third scenario we'll study is when the ACK messages arrive after the timeout. In such a scenario, the sender retransmits the data segment, receiving the ack from the first transmission after that. At this point, the sender entity can already send the following segment. The other entity will receive a duplicate packet, ignore it, and send a new ACK. So, the sender will receive a duplicate ACK message, ignoring it.
The image next shows the last message-transmitting failure scenario:



It is important to note that potential problems related to data segment transmission can happen. For example, when the receiver entity gets different segments with the same sequence number in the second or third

scenario, caused due to some interference in the transmission. We can use other strategies to detect and correct data errors in these scenarios.

Features

The features of Stop and Wait Protocol are as follows –

1. It is used in Connection-oriented communication.
2. It offers error and flows control.
3. It can be used in data Link and transport Layers.
4. Stop and Wait ARQ executes Sliding Window Protocol with Window Size

Conclusion

In this tutorial, we studied the stop-and-wait ARQ mechanism. Initially, we got some background concepts regarding the context in which ARQ mechanisms are employed in modern networks. Then, we explored the stop-and-wait mechanism, understanding how it works in multiple scenarios. Finally, we investigated some advantages and disadvantages of stop-and-wait and its relation with other ARQ options and networking algorithms.

We can conclude that stop-and-wait is not a feasible mechanism for production networks. However, it is relevant in introducing ARQ mechanisms, highlighting their most essential concepts. So, stop-and-wait has an important application in the educational field.

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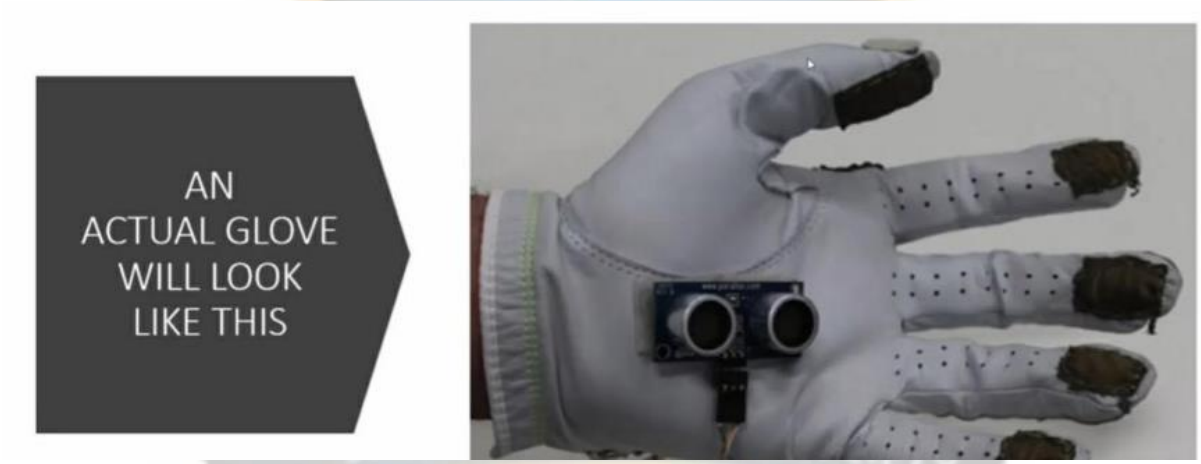
Divya Subhash Patil

SY-Computer

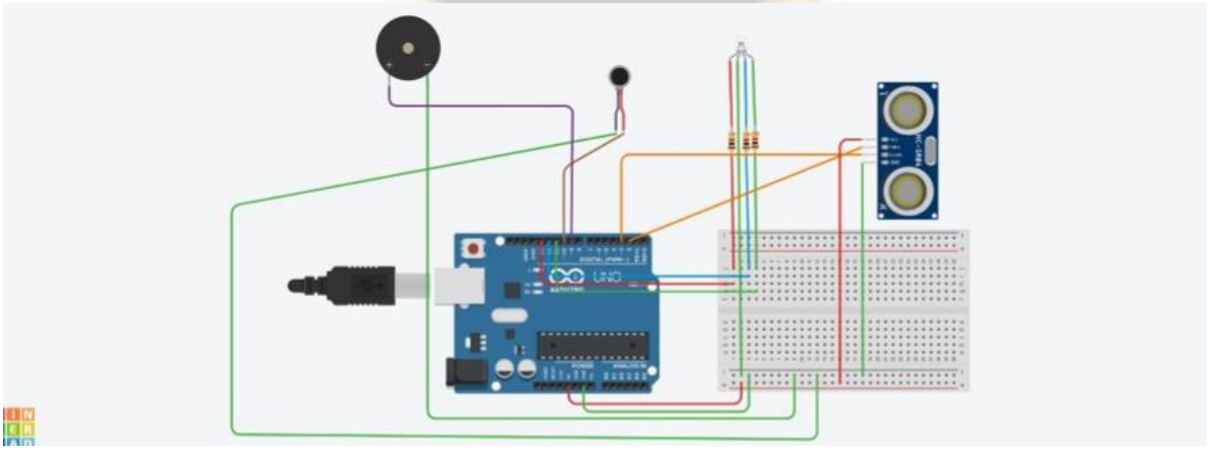
THIRD EYE FOR BLIND WITH VIBRATING UTRASONIC GLOVE

What Actually it is?

The “Third Eye For Blind with Vibrating Ultrasonic Glove”, is designed to help the blind to overcome the lack of visual sense, by using other senses like sound and touch. It uses audio and vibration signals to notify the user about upcoming hurdle. As the distance between glove and obstacle decreases, frequency of both audio and vibration signals increases. Thus the system helps to ease the navigation process for the needy.



Circuit Diagram



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Simran Soni

TY-Computer

CITIZEN SAFETY APP FOR PROTECTION AGAINST CYBER CRIMES

How it could detect fraudulent activities:

a) Mobile Number: The app could use machine learning algorithms, such as clustering or classification models, to identify suspicious mobile numbers based on various features, such as call or text frequency, call duration, and location. These models could be trained on a large dataset of mobile numbers associated with known fraudsters to accurately detect and flag suspicious numbers in real-time.

b) SMS Headers: The app could use regular expressions or other pattern matching algorithms to analyze the headers of incoming SMS messages and identify suspicious or illegitimate sources. These algorithms could be trained on a large dataset of known fraudulent SMS headers to accurately detect and flag potential fraudsters.

c) URL Links: The app could use a URL scanner, such as Google's Safe Browsing API, to check the safety of links contained in incoming messages. The scanner could use machine learning algorithms, such as deep learning models or anomaly detection techniques, to detect and flag suspicious links based on various features, such as URL structure, domain reputation, and content. The app could also use supervised learning models to classify URLs as safe or suspicious based on historical data.

d) UPI addresses and Bitcoin Wallet Address: The app could use a combination of machine learning algorithms and databases of known fraudulent addresses to identify and flag suspicious transactions. For example, it could use clustering or anomaly detection algorithms to detect patterns of fraudulent activity, such as unusually large transactions or repeated transactions to the same address. It could also use databases of known fraudulent addresses to compare incoming transactions and identify potential fraudsters.

e) SMS Templates: The app could use natural language processing (NLP) techniques, such as sentiment analysis or text classification, to analyze the content and structure of incoming SMS messages and identify suspicious patterns.

Use Cases :

Emergency Response Services: Emergency response services such as police, fire, and ambulance can use a fraud detection app to identify false emergency calls or reports. The app can analyze call data, location information, and other relevant data to detect any suspicious activity, such as fake reports, prank calls, or misuse of the emergency system.

Disaster Response: Disaster response organizations such as the Red Cross or FEMA can use a fraud detection app to identify fraudulent donation campaigns or relief efforts. The app can analyze social media posts, news reports, and other relevant data to detect any suspicious activity, such as fake donation campaigns, fraudulent relief efforts, or misuse of disaster funds.

Public Transportation: Public transportation systems such as buses or trains can use a fraud detection app to identify potential safety hazards or security breaches. The app can analyze CCTV footage, passenger data, and other relevant data to detect any suspicious activity, such as overcrowding, unauthorized access, or suspicious behavior.

Community Safety: Communities and neighborhoods can use a fraud detection app to identify potential safety hazards or criminal activity. The app can analyze social media posts, crime reports, and other relevant data to detect any suspicious activity, such as gang activity, drug trafficking, or violent crime.

Health and Safety: Health organizations and hospitals can use a fraud detection app to identify potential health and safety risks. The app can analyze patient data, public health data, and other relevant data to detect any suspicious activity, such as outbreaks, fraudulent health claims, or misuse of medical resources

Technology stack :

1.Programming Language: Python

2.Machine Learning Libraries: Scikit-learn or TensorFlow

3.Natural Language Processing Library: NLTK

4.Database: MongoDB or PostgreSQL

5.Mobile App Development Framework: Flutter or React Native

6.Version Control System: Git

Team members : Amanjot Singh (Team Leader) , Harshal Patel , Yugandhar chaudhari, Jayesh Wagh , Shivani Chaudhari , Prit Chaudhari

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ADVANCED CCTV ANALYTICS SOLUTION

Description: An advanced CCTV analytics solution refers to a system that leverages cutting-edge technologies and algorithms to analyze and interpret video footage captured by CCTV cameras. It goes beyond traditional surveillance by providing automated and intelligent insights to enhance security, safety, and operational efficiency. Our solution involves using machine learning algorithms and object detection techniques to analyze live CCTV feeds and detect incidents related to street crime, violence, burglary, theft, infiltration, unauthorized access, etc.

Understanding the Problem

- Traditional CCTV systems lack intelligent capabilities for video analysis.
- Limited effectiveness in detecting and preventing security breaches and incidents.
- Manual monitoring and analysis processes are time-consuming and prone to human error.

The Solution: Unveiling Our Innovation

1. Video Processing and Enhancement
2. Object Detection and Tracking
3. Intrusion Detection
4. Facial Recognition
5. Crowd Analysis
6. Anomaly Detection
7. Heat Mapping
8. Integration with Other Systems

Statistics and Impact

- Studies show that CCTV analytics can significantly improve security outcomes.
- Reduction in crime rates, improved incident response times, and enhanced situational awareness.

- Cost savings through optimized resource allocation and proactive threat identification.

User Scopes and Impact

- Various industries can benefit from advanced CCTV analytics solutions:
- Security companies and organizations with large surveillance networks.
- Retail stores for crowd management and customer behavior analysis.
- Transportation hubs for monitoring passenger flow and detecting anomalies.
- Smart cities for traffic management and public safety.
- Enterprises for access control and perimeter security.

Conclusion

In conclusion, our project offers valuable insights and enhanced security capabilities. Challenges include accuracy limitations, processing power, privacy concerns, and compliance. Proper system design, ongoing maintenance, and adherence to regulations are crucial. Despite challenges, the positive impact on security, safety, and efficiency is significant.

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Team Member 2: Salunkhe Vinay Punjabrao

Team Member 3: Patil Hemant Bhimrao

Team Member 4: Chavan Rutuja Vinod

Team Member 5: Mahajan Dishant Satish

FISHING DETECTION SOLUTION

Introduction :

This report's goal is to give a thorough description of how the Phishing Detection Solution was created. By utilizing machine learning techniques, this method seeks to create a system that can accurately identify and stop phishing assaults.

Description:

Design and develop a technological solution for AI-enabled Phishing Links Detection and Alert System. The solution should be able to identify the source of phishing attacks in web pages, email apps, social media, instant messenger apps, text messages etc. The solution may be in the form of a desktop/mobile application or a web browser plugin.

Structure of the System :

Following are the elements of the system architecture:

- Sending emails to the Phishing Detection Engine is the responsibility of the email receiver.
- Machine learning methods are used by the phishing detection engine to examine the contents and characteristics of incoming emails.
- Based on the results of the machine learning algorithms, the decision module assesses the possibility that an email is a phishing attempt.
- Alert System: Warns administrators and users of potential phishing dangers and takes preventative action to stop attacks.

Dependencies:

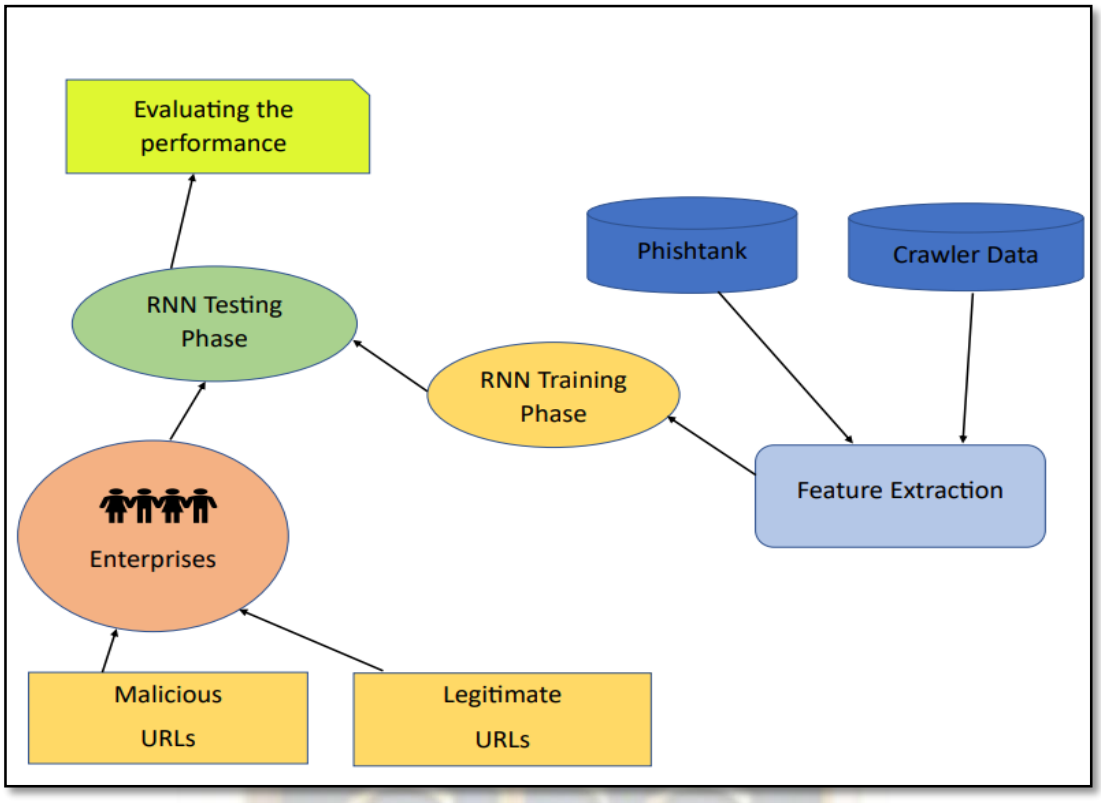
- **Data:** A large and varied dataset of recognized phishing emails and authentic emails is crucial for the development of the Phishing Detection Solution. The machine learning models must be trained using a high-quality dataset that accurately depicts real-world phishing attempts.
- **Machine Learning Algorithms:** The availability and applicability of machine learning methods for email analysis and classification are essential to the project's success. The chosen algorithms need to be

able to handle the complexity of email data and distinguish between authentic and phishing emails.

- **Resources for computation:** Machine learning model development and training can be computationally demanding. To efficiently manage the processing and training of the models, sufficient computational resources, such as high-performance servers or cloud computing services, are needed.
- **Expertise:** A team with experience in machine learning, data analysis, cybersecurity, and software development is needed to design a reliable phishing detection solution. It's crucial to have knowledgeable people who can employ the proper strategies and comprehend the subtleties of phishing attempts.

Showstoppers:

- Datasets that are insufficient or of poor quality can have a significant negative influence on the performance of machine learning models if they are difficult to get or if they lack diversity and accuracy. An excessive amount of false positives or false negatives might result from training data that is inaccurate or biased, making it difficult to detect phishing attempts.
- Lack of computing Resources: A lack of computing resources might impede progress by delaying the building and testing of machine learning models. Longer development periods and compromised real-time email processing are also possible outcomes of insufficient resources.
- Inefficient machine learning models: The Phishing Detection Solution's overall performance may be harmed if the chosen machine learning algorithms are unable to accurately analyzed email content and attributes. The models must exhibit high accuracy and reliability as well as be able to generalize well to fresh, unforeseen phishing attempts.
- Limited Awareness and User acceptance: The efficacy of a solution, even one that is well-established, depends on the level of user awareness and acceptance. The effectiveness of the system may be lowered if users are improperly using the solution or are not properly trained to recognise phishing attempts.



The Phishing Detection Solution implementation entails a number of crucial phases. An outline of the procedure is given below:

Data gathering and preparation:

- Assemble a thorough database of both trustworthy and known phishing emails.
- By organising the data, removing duplicates, and assuring data quality, preprocess the dataset.

Development of a machine learning model:

- Choose the best machine learning algorithms for classifying and analysing emails.
- Create training, validation, and testing sets from the dataset.
- Utilise the training dataset to train the machine learning models.
- Utilising the validation dataset, assess the performance of the models and make any necessary adjustments and optimisations.

Implement email classification and analysis:

- Create tools or procedures to extract pertinent information from incoming emails.

- Integrate machine learning models into the system to distinguish between legitimate communications and phishing attempts in emails.
- Use linguistic analysis and link/attachment checking to improve the classification's accuracy.

Alert system and preventative measures:

- Implement the capability to quarantine suspicious emails automatically.
- Create systems to prohibit particular email addresses or domains linked to phishing attacks.
- Integrate the alert system to instantly alert administrators and users about potential phishing risks.

Reporting and Analysis:

- To produce thorough reports on phishing attempts and their results, create a reporting module.
- Utilize data analysis tools to spot attack trends, emerging patterns, and potential weaknesses.

Adaptation and Integration:

- The organization's current email infrastructure should be integrated with the Phishing Detection Solution.
- Customize the system to comply with particular organizational policies and business standards.

User Education and Information:

- Conduct training sessions and awareness campaigns to inform users of phishing scams and how to use the solution correctly.
- To help users comprehend and take advantage of the possibilities of the system, offer resources and documentation that are easy to use.

Tests and Quality Control:

- To assure the functionality, performance, and dependability of the solution, do thorough testing, including unit, integration, and system testing.
- Address any defects or problems that have been found, then make the required adjustments.

Implementation and Ongoing Improvement:

- In the production environment, deploy the phishing detection solution.
- Keep an eye on the system's efficiency and performance at all times.
- As new phishing methods arise, update the system and take into account user comments.

Conclusion:

The Phishing Detection Solution is a comprehensive system that effectively detects and prevents phishing attempts by combining machine learning algorithms, preventative measures, and user awareness. The approach greatly lowers the chance of falling for phishing scams by analyzing email properties, categorizing emails, putting proactive safeguards in place including quarantining questionable emails and banning dangerous URLs, and increasing user awareness. It improves overall cyber security by shielding businesses and individuals from potential data breaches, financial losses, and reputational damage.

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