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IOT Based Smart Notice Board

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ABSTRACT: IOT is the network of physical "things" or object that contain embedded technology to interface and sense to move with their internal states or the external setting. Automation is the most often spelled term within the field of electronics. The hunger for automation brought several revolutions within the existing technologies. Notice board could be a primary factor in any establishment or public places like bus stations, railway stations, colleges, malls etc. Sticking out numerous notices day to day could be a tough method. In a paperless age, a digital notice board can greatly simplify information distribution by replacing a traditional, analog notice board. The major goal is to develop a workable solution that allows for the gathering of data in real-time, remote-control functionality, secure environmental parameters, and a wireless notice board that shows the messages supplied by the webserver [1]. The components of the system are a breadboard, power supply unit, ESP32, dot matrix display, and jumper wires. Because of the system's intuitive design, users may operate it and send messages from anywhere at any time. A separate person is needed to take care of this notice display. This project is regarding advanced wireless notice board. In IOT based Web Controlled Notice Board, Internet is employed to wirelessly send the message from Browser to the display

I. INTRODUCTION

The 21st century has seen digital advancements reshape how we communicate and store information. Traditional notice boards are labor-intensive to update and limited in reach. This project proposes an IoT-enabled smart notice board that uses cloud technologies for real-time, secure updates. With the integration of Wi-Fi-capable modules like ESP32 and an intuitive web interface, the system addresses these challenges by enabling remote, dynamic communication.
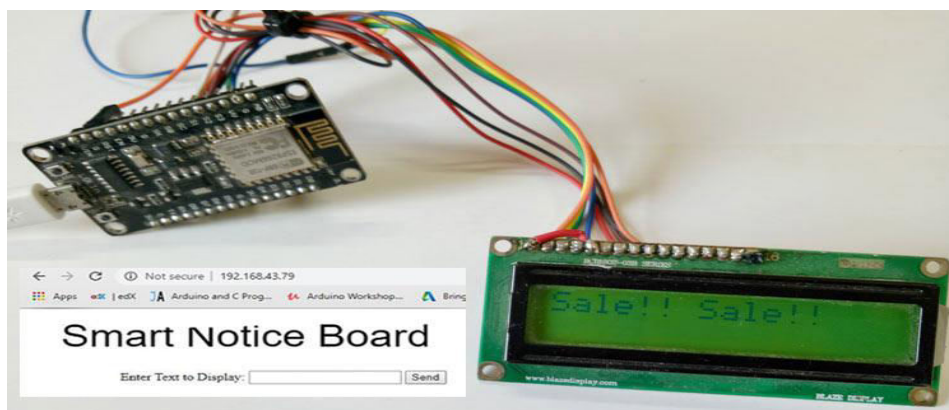

Figure 1: Smart notice boaed

The goal of this system is to provide an automated notification mechanism where users can send and update messages in real-time. The system leverages AI to categorize and prioritize messages, ensuring that critical information is displayed effectively. . Additionally, pins and clips need to be maintained along with every fresh notice paper. A noticeboard requires a lot of human labor and time to maintain properly. In this study, we present a completely new idea of Internet of Things (IOT)-based noticeboards that greatly simplify and expedite the notice-posting procedure. A

user must log in to our system and post a message in order to update a board. An IoT-based notice board's basic idea is to combine conventional noti Unlike traditional notice boards that require manual input, this system allows remote access through an AI-driven interface. . It does this by utilizing the capabilities of ESP8266 or ESP32 modules, which provide built-in Wi-Fi connectivity.

II. LITERATURE REVIEW

- **Cloud Forensics Using VM Snapshots** Deevi Radha Rani and Geethakumari G presented an approach for forensic investigation using snapshots of Virtual Machines (VM). This technique involved storing snapshots as evidence to monitor destructive activities between VMs. The incorporation of Intrusion Detection Systems (IDS) alongside the CSP logs contributed to enhanced security and accountability. *Relevance to Current Research*: The snapshot mechanism could inform techniques for securing IoT systems, ensuring log integrity and addressing unauthorized activities.

- **Digital Forensic Models for Cloud Introspection** BKSP Kumar Raju Alluri and Geethakumari G proposed models for self-analysis of VMs in the cloud. Their introspection methods—focused on swap space and terminated processes—enabled accurate monitoring and evidence collection for forensic investigations. *Relevance to Current Research*: The detailed monitoring approaches can inspire secure and efficient IoT data handling and device interaction.

- **Assisted Deletion of Related Content** Hubert Ritzdorf, Nikolaos Karapanos, and Srdjan Capkun developed systems to assist users in deleting associated content without impacting user metadata. Their methodology preserved files while providing precision and efficiency during content elimination. *Relevance to Current Research*: Their focus on efficient content management could enhance real-time message updates and security in IoT notice boards.

Relevance to current Research

Your IoT-based smart notice board is highly relevant to current research in several fields. Here's how:
1. **Internet of Things (IoT):**

- **Research in IoT focuses on creating interconnected devices that communicate in real time. Your project fits into this by enabling seamless content updates and control through IoT.**
- **Current studies explore the integration of IoT in educational institutions, workplaces, and smart cities, which are potential applications of your system.**

2. **Smart Cities:**
- **The concept of smart cities revolves around utilizing IoT to improve public services. Smart notice boards enhance communication infrastructure by providing dynamic and instant updates in public spaces, such as transportation hubs or municipal buildings.**

3. **Digital Signage and Dynamic Displays:**
- **Research emphasizes the role of digital signage in increasing user engagement through dynamic content delivery. Your project aligns with this by replacing traditional static boards with digital displays.**

4. **Cybersecurity in IoT:**
- **A significant focus in research is on ensuring secure communication between IoT devices to protect against data breaches. Implementing encrypted protocols in your notice board system contributes to addressing this research gap.**

5. **Green Technology and Energy Efficiency:**
- **Many studies advocate for energy-efficient IoT devices. You can enhance your project's relevance by utilizing components with low power consumption, aligning with the push for sustainable technology.**

III. METHODOLOGY OF PROPOSED SURVEY

In receiver section, PIC microcontroller is connected on GSM module for accessing the sim card. It is a capable little device that enables people of all ages to explore radio waves transmission and reception. We use here embedded C language and GSM protocol as the basic workingprinciple.

The system consists of a sender module (AI-integrated mobile or web application) and a receiver module (a digital display unit). The sender can input messages using voice commands, text input, or automated scheduling. AI processes the messages, prioritizes them, and transmits them to the display. The receiver module uses a microcontroller and a cloud-based server to retrieve and update messages dynamically. The proposed system uses a Super Display Dot matrix and an ESP8266 microprocessor (NodeMCU) due to its versatility, low power consumption, integrated Wi-Fi and Bluetooth capabilities, ample processing power, and support for a wide range of sensors and peripherals.

Isolating Cloud Instance:
- **Network Isolation**: Use Virtual Private Clouds (VPCs) or private subnets to separate instances from public networks.
- **Access Control**: Implement strict Identity and Access Management (IAM) policies to limit who can access the instance.
- **Physical Isolation**: In some cases, dedicated physical servers are used to host isolated instances for maximum security.
- **Tag-Based Automation**: Platforms like AWS allow tagging instances for automated isolation during security events.

Log Model:
1. Definition
- A log model transforms non-linear relationships into linear forms using logarithmic functions. This makes it easier to analyze and interpret data, especially when dealing with exponential growth or decay patterns.

2. Applications
- **Economics**: Used to study relationships like elasticity of demand or supply.
- **Epidemiology**: Helps in modeling the spread of diseases.
- **Market Research**: Analyzes consumer behavior and preferences.
- **Environmental Science**: Models phenomena like population growth or resource depletion.

Regeneration of events:
1. Definition
Regeneration in the context of events involves not just minimizing harm but actively contributing to the restoration and improvement of the environment, community, and economy impacted by the event. It focuses on leaving a positive legacy that extends beyond the event itself.

2. Key Principles
- **Ecological Enhancement**: Events are designed to restore natural habitats, increase biodiversity, and improve ecosystem services. For example, planting trees or creating green spaces around event venues.
- **Community Engagement**: Collaborating with local communities to ensure events meet their needs and contribute to their well-being. This includes sourcing materials locally, providing employment opportunities, and respecting cultural heritage.
- **Circular Economy Practices**: Minimizing waste by promoting the reuse and recycling of materials. This involves reducing single-use items and implementing comprehensive recycling programs.
- **Carbon Positivity**: Going beyond carbon neutrality by implementing strategies that result in a net reduction of atmospheric carbon dioxide, such as reforestation or investing in renewable energy.
- **Education and Advocacy**: Using events as platforms to raise awareness about regenerative practices and inspire attendees to adopt similar approaches.

3. Applications

- **Urban Regeneration**: Events like the Olympics or cultural festivals are used to revitalize urban areas, stimulate investment, and improve infrastructure.
- **Sustainable Event Planning**: Incorporating regenerative practices into event planning to ensure long-term benefits for the environment and society.

Forensic Investigation using VM Snapshots as Evidence:

1. Purpose in Your Project

- VM snapshots can capture the current state of your smart notice board system, including memory, disk, and configuration, for analysis in case of a security breach or malfunction.
- These snapshots serve as evidence for forensic investigations, helping you understand system behavior during unusual events.

2. Applications

- **System Monitoring**: Use VM snapshots to record the state of your IoT server during normal operation and compare it with the state after a suspected intrusion or error.
- **Troubleshooting**: Identify bugs or anomalies by reverting to snapshots from before and after an issue.
- **Incident Analysis**: Analyze snapshots to detect unauthorized access attempts or malware within your system.

3. Tools

- **HyperShot Model**: Specifically designed for forensic investigations in virtualized environments.
- **Volatility Framework**: Excellent for analyzing memory dumps from snapshots.
- **LibVMI**: Useful for introspecting VM state directly.

4. Benefits

- Offers a tamper-proof method to preserve evidence.
- Enables detailed investigation without disrupting live operations.
- Provides insights into enhancing the security of your IoT system.

5. Challenges

- Storing snapshots can be resource-intensive; efficient storage strategies are crucial.

IV. CONCLUSION AND FUTURE WORK

Conclusion

The **IoT-based smart notice board** project successfully addresses the challenges of traditional notice boards by providing a modern, dynamic, and efficient communication platform. With its real-time update capabilities, secure communication, and potential for multi-location deployment, the system offers significant advantages for educational institutions, public spaces, and corporate environments. This project not only demonstrates the practical application of IoT technologies but also contributes to the ongoing research in smart systems, secure communication, and energy efficiency.

The project highlights the integration of innovative features, such as remote content management and scalable architecture, which align with current trends in IoT research and smart city development. The findings and implementation serve as a stepping stone for further advancements in this domain.

Future Work

Several opportunities exist to enhance and expand the functionality of the smart notice board:

1. **Enhanced Security Protocols**: Implementing blockchain for data integrity and exploring advanced encryption methods to ensure even higher levels of secure communication.
2. **Energy Efficiency**: Incorporating solar-powered systems or low-energy hardware to make the project more sustainable.
3. **Interactive Features**: Adding voice recognition, touchscreens, or QR code scanning capabilities to improve user interaction.
4. **Machine Learning Integration**: Using AI models to predict and schedule notices based on user activity patterns or preferences.
5. **Scalability**: Adapting the system for large-scale deployments, such as city-wide networks of smart notice boards.

6. **Accessibility Features**: Including text-to-speech or multi-language support to make the system inclusive for all users.
7. **Remote Forensic Monitoring**: Leveraging VM snapshots and virtual machine introspection (VMI) for real-time system analysis and post-event forensic investigations.

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