

Internet of Things Intercommunication Using SocketIO and WebSocket with WebRTC in Local Area Network as Emergency Communication Devices

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Abstract—The Emergency Intercom System (EIS) is a communication and video conferencing system designed to enhance emergency response in areas, such as malfunctioning lifts. This paper presents a feasibility analysis of EIS as internet of things device, focusing on the utilization of WebRTC over WebSocket, Socket.io, and LAN device hostname assignment. The study evaluates performance metrics including latency, throughput, dropped calls, lost packets, audio and video quality, resource utilization, and network bandwidth. The results indicate that EIS offers acceptable latency, sufficient throughput for simultaneous calls, minimal dropped calls and lost packets, and satisfactory audio and video quality. The system demonstrates effective communication and video conferencing capabilities, making it a promising solution for improving emergency response in areas. The findings highlight the potential for further research to optimize performance, address security considerations, and extend the system's applicability in diverse emergency scenarios.

Keywords—WebRTC, Socket.io, Internet of Things

I. INTRODUCTION

Malaysia has undergone remarkable growth and progress in recent years, as evidenced by the proliferation of skyscrapers across the country. According to the latest rankings by the Council on Tall Buildings and Urban Habitat (CTBUH), Malaysia has secured an impressive position in the global landscape of tall structures. It currently holds the sixth rank for the number of completed buildings over 150 meters in height, positioning it as one of the tallest cities in the world [1]. Furthermore, Malaysia claims the fourth position as the tallest city in Asia, further highlighting its prominence in the region [1]. Many of these buildings are equipped with elevators or lifts, which are used by a large number of people on a daily basis.

In the context of Malaysia's thriving skyscrapers, it is important to recognize the significance of elevators as essential transportation systems. However, it is crucial to acknowledge that elevators can provoke anxiety and discomfort for individuals with conditions like agoraphobia or claustrophobia. Addressing these psychological factors is vital to foster inclusive environments within Malaysia's tall structures.

Agoraphobia and claustrophobia, two common anxiety disorders, can significantly affect individuals' lives. Agoraphobia is the fear of being trapped in situations where escape is challenging or impossible during a panic attack, leading individuals to avoid crowded or confined spaces. While not all individuals with agoraphobia are triggered by elevators, the enclosed nature of elevators can induce anxiety for some. Similarly, claustrophobia centers around the fear of enclosed spaces, and elevators, being small and confined, have the potential to trigger claustrophobic reactions. Considering the prevalence of these anxiety disorders, addressing the psychological impact of elevators becomes vital, particularly in high-rise buildings where elevator usage is widespread. Understanding and addressing these concerns promotes the well-being of elevator users and fosters inclusive environments in skyscrapers and tall structures [12].

According to the New Straits Times (NST) article from 2012 to October 2018, there have been a total of 52 reported incidents involving elevators and 33 involving escalators in Malaysia, according to the Occupational Safety and Health Department. Of these incidents, six resulted in death, six in permanent physical disability, and 58 in sustained injuries without permanent disability [6]. NST also reported in October 2022, six people, including a two-year-old girl, were riding in a lift at a condominium in Brickfields, Malaysia when the lift suddenly fell from the eighth floor to the ground floor. The incident resulted in a woman and a man suffering from broken legs, while the other passengers were not injured [2].

Therefore, the Emergency Intercom System (EIS) is the latest technology developed to resolve and handle elevator communication issues. It utilizes a local area network (LAN) for faster response, less disruption, and lower costs while maintaining high availability without the need for an internet connection. EIS allows passengers to contact security in case of an emergency through video calling.