Enhancing Tourist Safety Through Crowd Intelligence System: A Case Study of Abha, Saudi Arabia

Tourism is a vital aspect of the economic and cultural landscape of Abha, Saudi Arabia. To ensure the safety and security of tourists, the implementation of the advanced Crowd Intelligence System has been explored. This case study delves into the integration of this system to monitor tourists' behavior and movements from their arrival at the airport throughout their stay in Abha. The primary objective is to detect potential risks or threats and establish digital patterns for devices, enhancing the overall safety and experience for tourists.

This case study serves as a testament to the feasibility and benefits of implementing advanced technologies to enhance security in tourist destinations.

Introduction

Nestled amid the breathtaking landscapes of the Asir Province in Saudi Arabia, the city of Abha has emerged as a magnet for tourists seeking resplendent natural beauty and rich cultural experiences. As the allure of Abha beckons an increasing number of visitors, the imperative to ensure their safety and the security of this burgeoning tourist haven has never been more pressing. This case study meticulously examines the deployment of cutting-edge Geospatial technology and the sophisticated VALOORES Crowd Intelligence System, ushering in a new era of security measures designed to intricately monitor and analyze the behaviors and movements of tourists throughout Abha.

Rising Tourism and Security Imperatives

Abha's ascendancy as a tourist destination has been meteoric, drawing admirers to its mountainous terrains, historical landmarks, and vibrant cultural tapestry. With this surge in popularity, however, comes the responsibility to safeguard the well-being of the burgeoning influx of tourists. Recognizing this imperative, Abha finds itself at the forefront of a paradigm shift in security measures, embracing innovative solutions to address the dynamic challenges posed by the increased tourism flow.

The Holistic Approach: VCIS

At the forefront of Abha's security evolution is the implementation of a state-of-the-art System that transcends conventional security paradigms, leveraging a fusion of Geospatial technology and real-time data analytics. Its overarching objective is to meticulously monitor and analyze the behaviors and movements of tourists, commencing from their arrival at the airport and extending throughout their exploration of Abha's enchanting tourist attractions.

Enhancing Security Through Digital Patterns

VCIS not only aims to detect potential risks or threats promptly but also seeks to establish digital patterns for the myriad of devices dispersed strategically across the city. This digitized network, interwoven with the city's fabric, forms a comprehensive web of surveillance and insights, fostering a secure environment for tourists and residents alike.

The Crucial Role in Securing Abha

As Abha navigates the delicate balance between promoting tourism and safeguarding its visitors, this case study sheds light on the transformative impact of advanced Geospatial technology. By providing a nuanced understanding of tourist behaviors, predicting potential threats, and establishing digital patterns, this holistic approach not only fortifies the safety of tourists but also contributes to the overall resilience and sustainability of Abha as a premier tourist destination.

Story

The inception of VCIS solution at an Operation Control Room in Abha signifies a proactive and sophisticated approach to managing tourism-related security challenges. Beyond the conventional focus on within-city monitoring, this operation casts a wider net by scrutinizing the origins of tourists, with particular emphasis on countries facing sanctions, instability, or holding political and ideological conflicts with Saudi Arabia. This strategic expansion aims not only to detect potential security threats but also to predict and prevent terrorist activities. Moreover, the operation positions itself as a crucial tool in the aftermath of incidents, intending to assist law enforcement in solving crimes related to or impacting tourists. Integrating this within the VCIS system, provides a dynamic and comprehensive understanding of the tourism scenario in Abha, empowering authorities to make informed decisions in real-time, thereby ensuring the safety and security of tourists and residents alike. This initiative not only reflects a commitment to safeguarding the region but also showcases the integration of advanced technologies for a more resilient and responsive security apparatus.

Valoores Crowd Intelligence System is a cutting-edge platform designed to collate and analyze a diverse array of data sources, including geospatial data, Call Detail Records (CDR), and CCTV surveillance.

Airport Arrival Monitoring

- Cameras and sensors are strategically placed at key points in the airport to track the influx of tourists.
- Facial recognition technology is employed to identify individuals and match them against watchlists for security purposes.
- The system analyzes crowd density and movement patterns to identify any irregularities.

Tourist Destinations

- High-traffic tourist destinations in Abha are equipped with smart surveillance systems.
- Mobile applications are provided to tourists, offering interactive maps and guidance, while collecting anonymized data on their movements.
- Behavioral analysis algorithms identify deviations from typical patterns, alerting security personnel to potential risks.

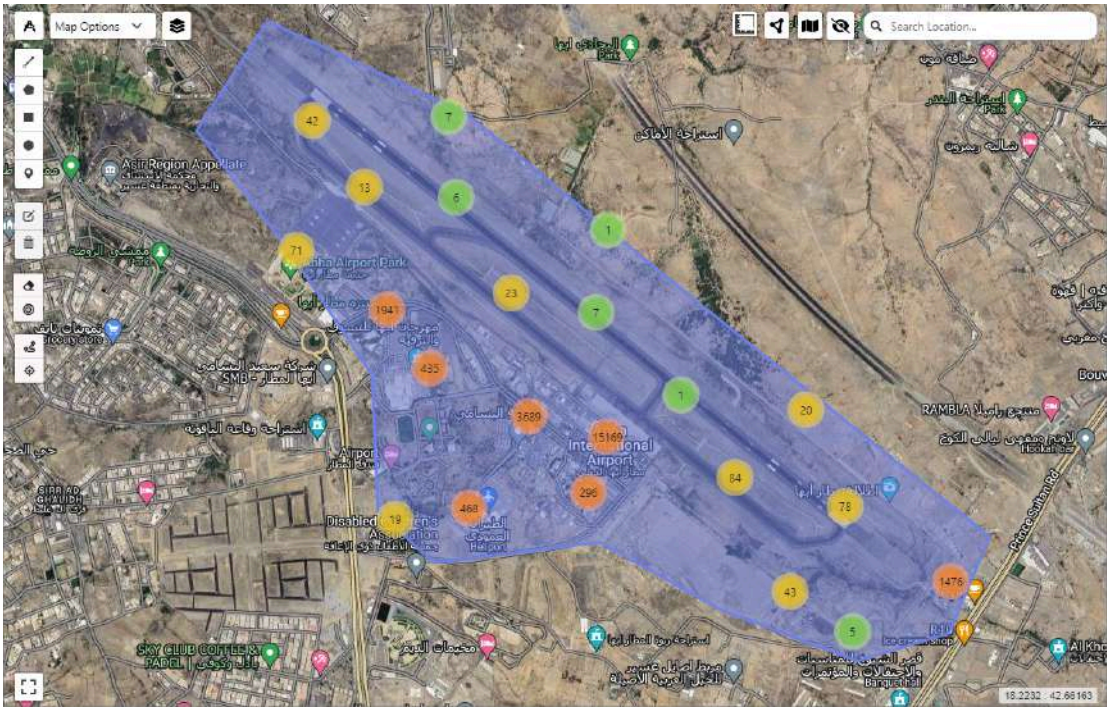
Risk and Threat Detection

- The Crowd Intelligence System employs machine learning algorithms to recognize patterns associated with potential threats.
- Anomalies such as overcrowding, erratic movements, or unusual gatherings trigger immediate alerts to security personnel.
- Integration with local law enforcement allows for swift responses to identified risks.

Scenario

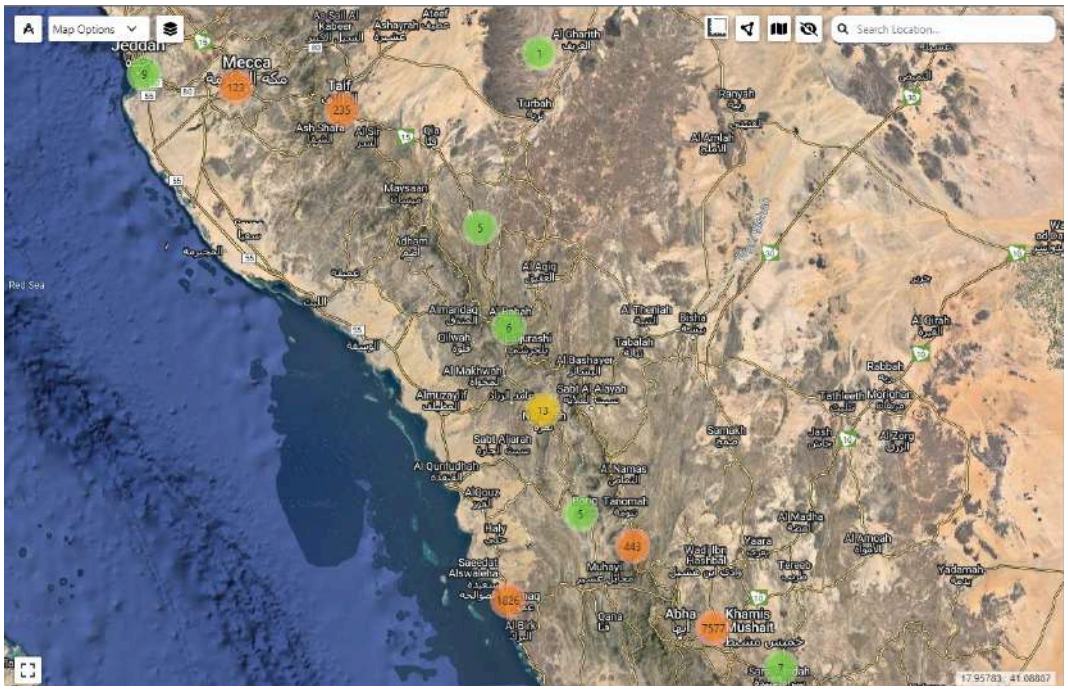
This initiative goes beyond mere headcount, delving into the qualitative aspects of the observed activities. Through the upcoming, we aimed to discern the nature of interactions, identify key points of interest, and assess any irregularities or noteworthy patterns that could impact the overall operational efficiency of Abha Airport.

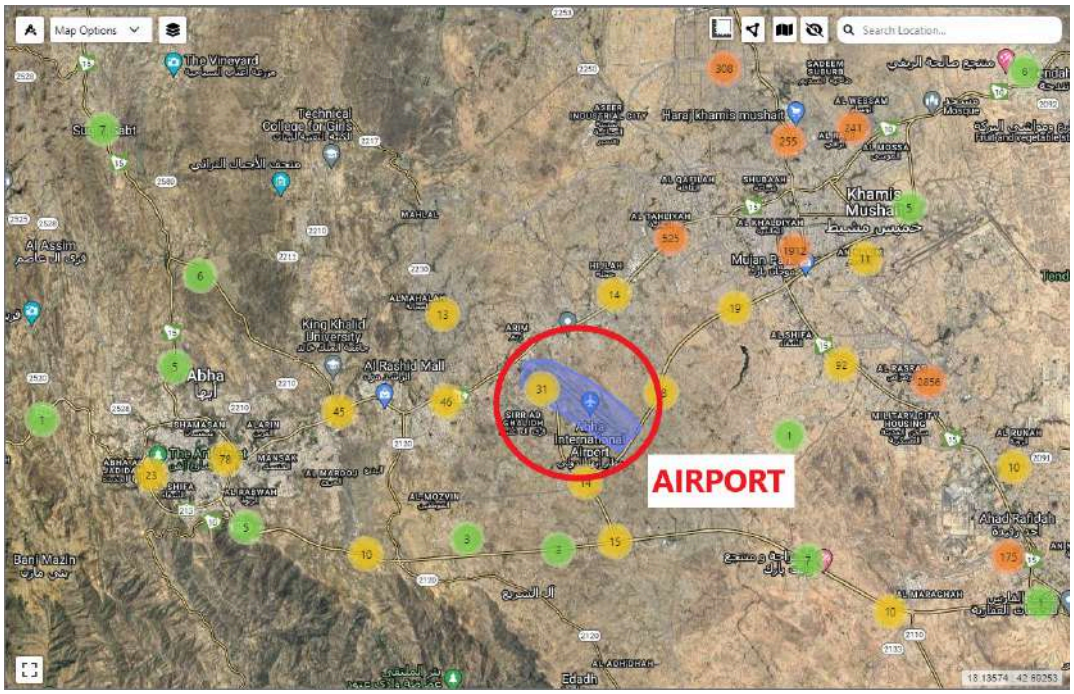
We executed an Activity scan encompassing Abha Airport with the objective of comprehensively assessing the density and crowd dynamics in the area. This strategic initiative involved a systematic and thorough examination of the airport's surroundings. *(Abha airport activity scan)*
The results are as shown in the screenshot below:



Moreover, the granular insights gained from this Activity scan empower further investigations into specific devices or entities. Whether it involves tracking the trajectory of particular devices, monitoring suspicious activities, or scrutinizing anomalies within the scanned data, this information becomes a springboard for targeted queries.

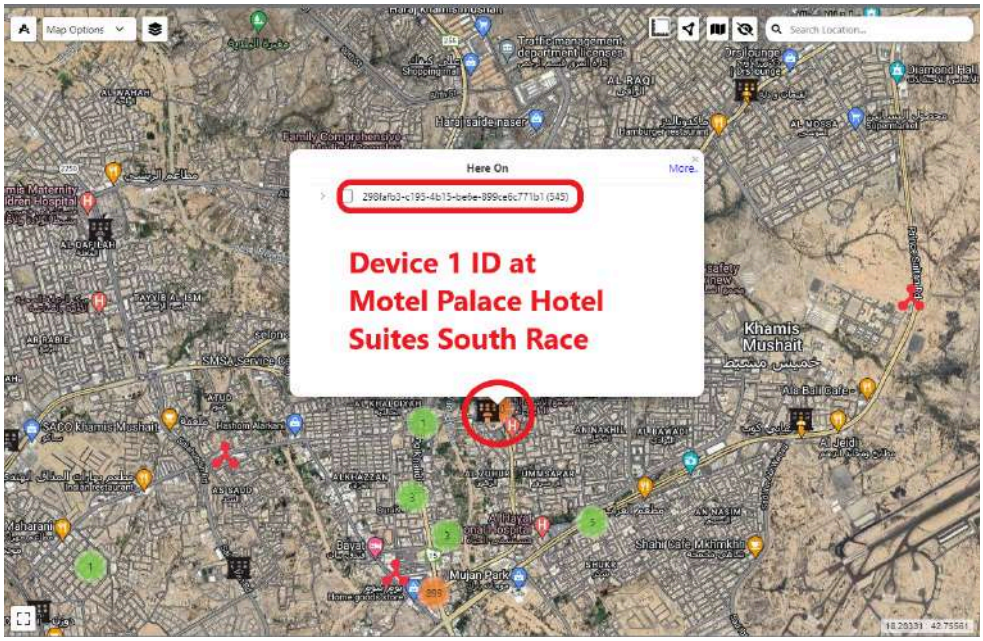
We selected all the devices detected in the previous query and executed a “Device History” DH to actively gain insights into their movements and destinations.
(Abha Airport Tourist Mapping; Simulation 2)





Following the previous Activity Scan around Abha Airport, our focus shifted to a targeted approach, honing in on individual devices within the observed crowd. By monitoring the movements of certain devices, we sought to unravel specific patterns, behaviors, and destinations. We selected five device IDs and conducted a Device History query on each, revealing the distinct hotels to which they were traced. The screenshots below display the diverse destinations these devices journeyed to.

- ***DH Device 1***

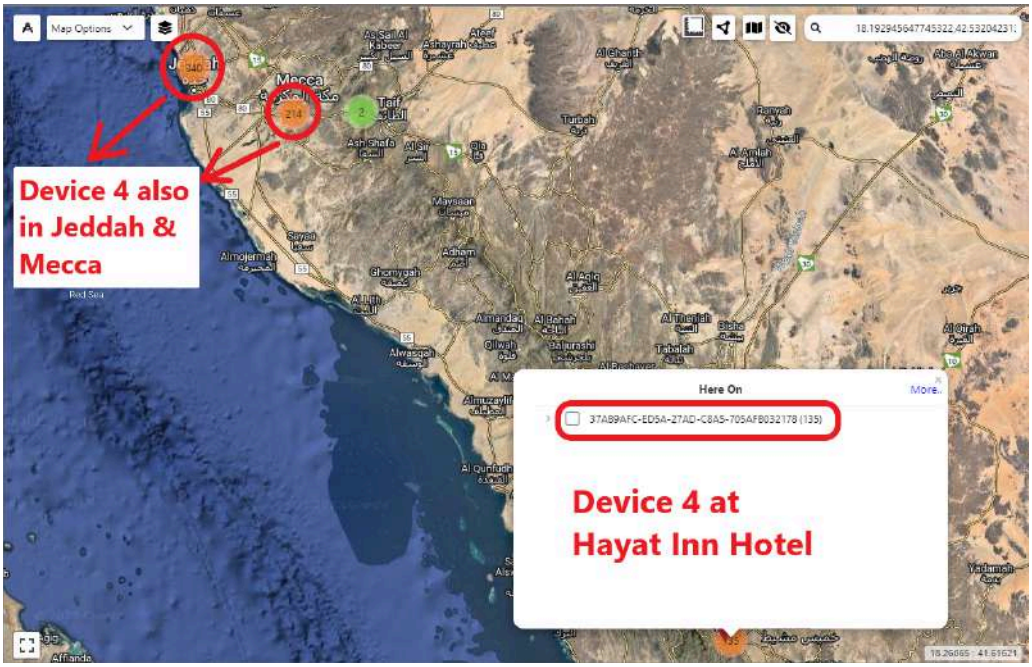


- ***DH Device 2***

- ***DH Device 3***

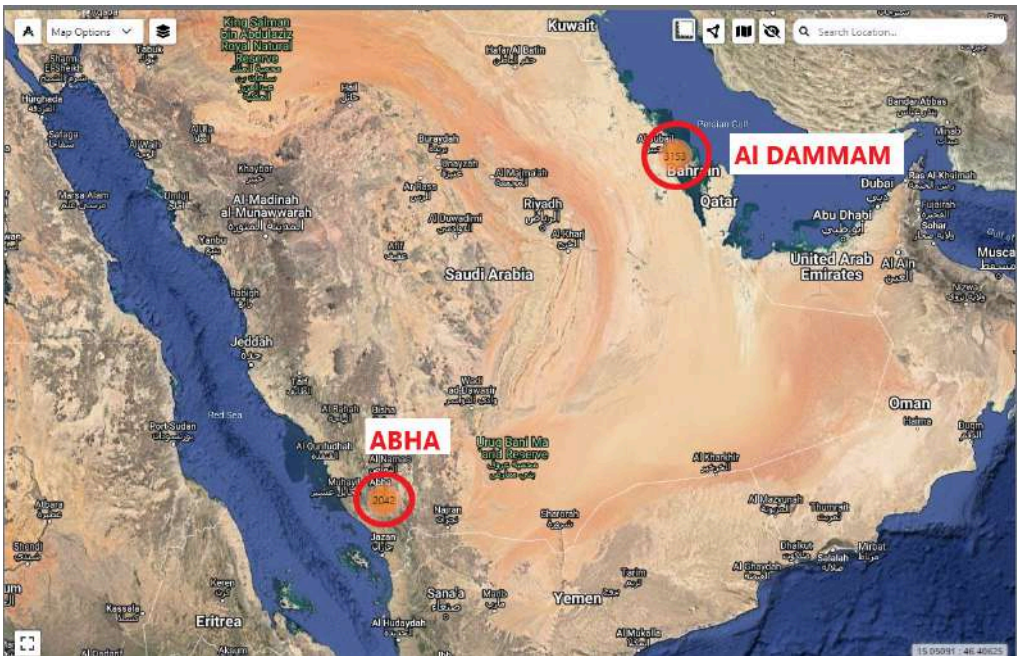
The limited number of hits detected at the Abha Crown Hotel raises concerns and prompts suspicions. This anomaly suggests that the respective device may be consistently turned off, a behavior not typical for a tourist. The irregular pattern of activity deviates from standard travel behavior, warranting further investigation into the device's usage and potential implications.

- ***DH Device 4***

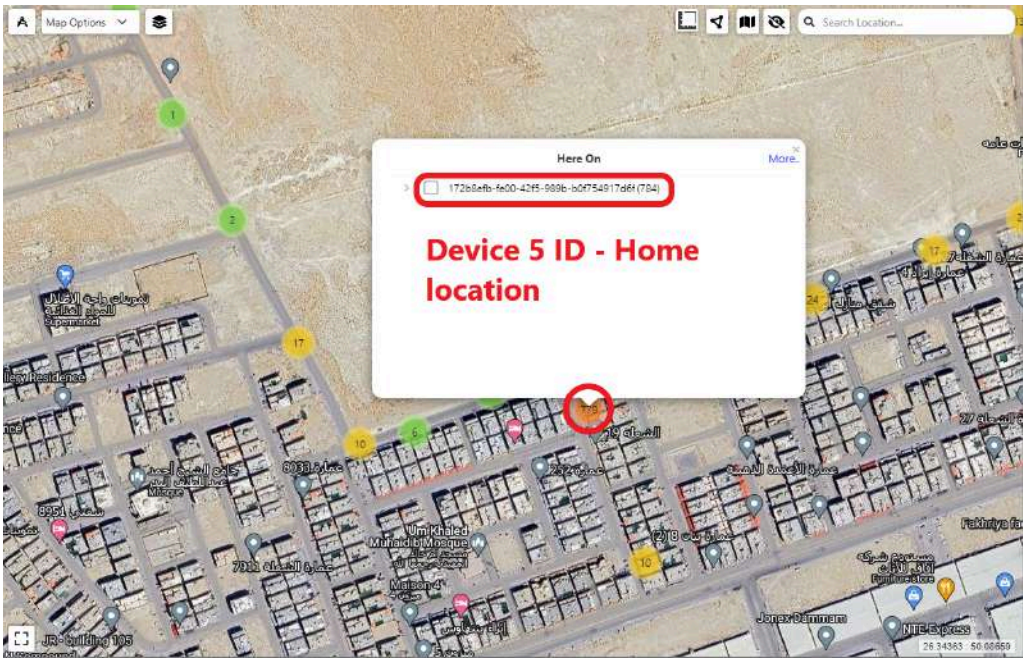


This targeted investigation allowed us to delve deeper into the dynamics of individual activities, providing a more nuanced understanding of the broader operational landscape. The tracked devices serve as key points for analysis, enabling us to discern unique trajectories and potential points of interest within the airport area.

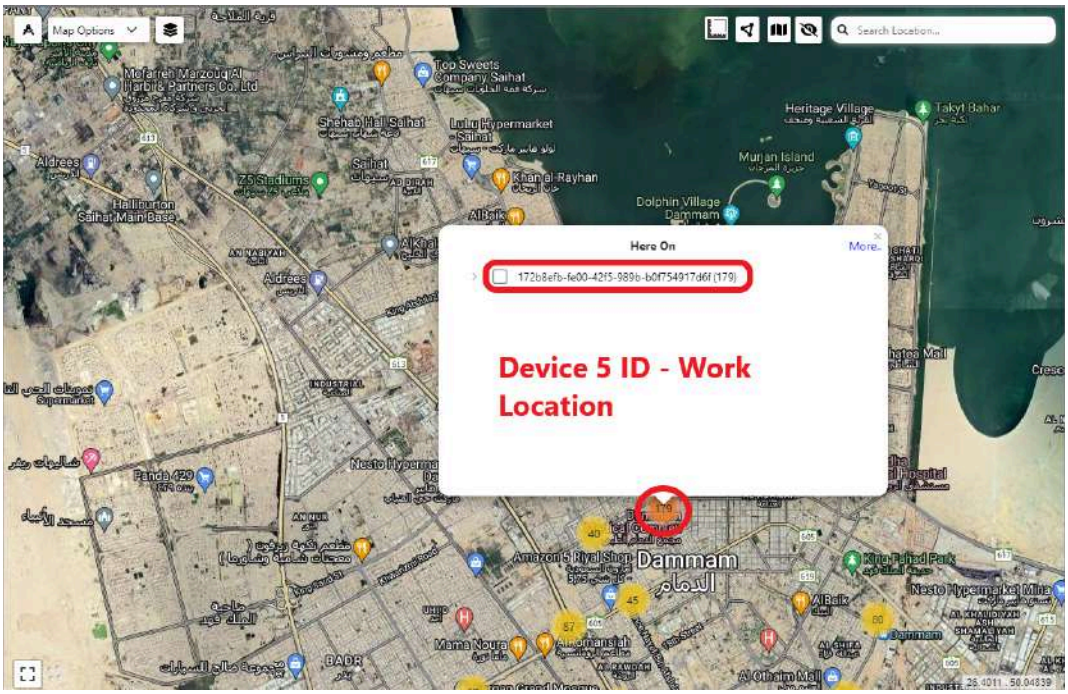
- ***DH Device 5***



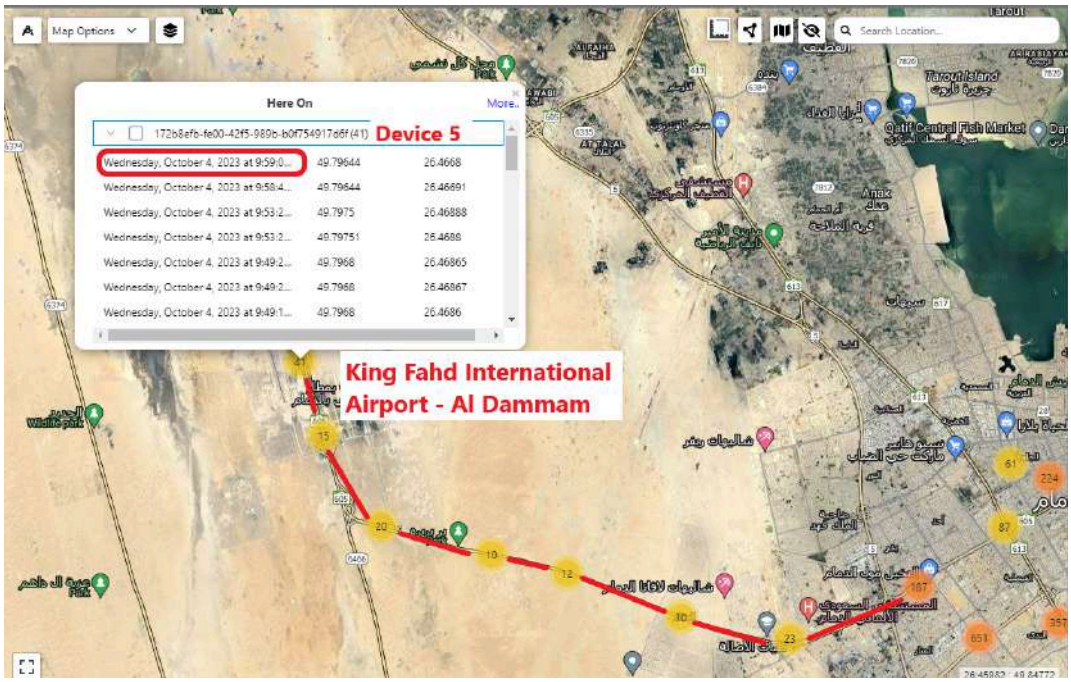
He lives in Al Dammam, building al Choola 17, near Em Khaled Muhaidib Mosque



He works at the Dammam Medical Complex.

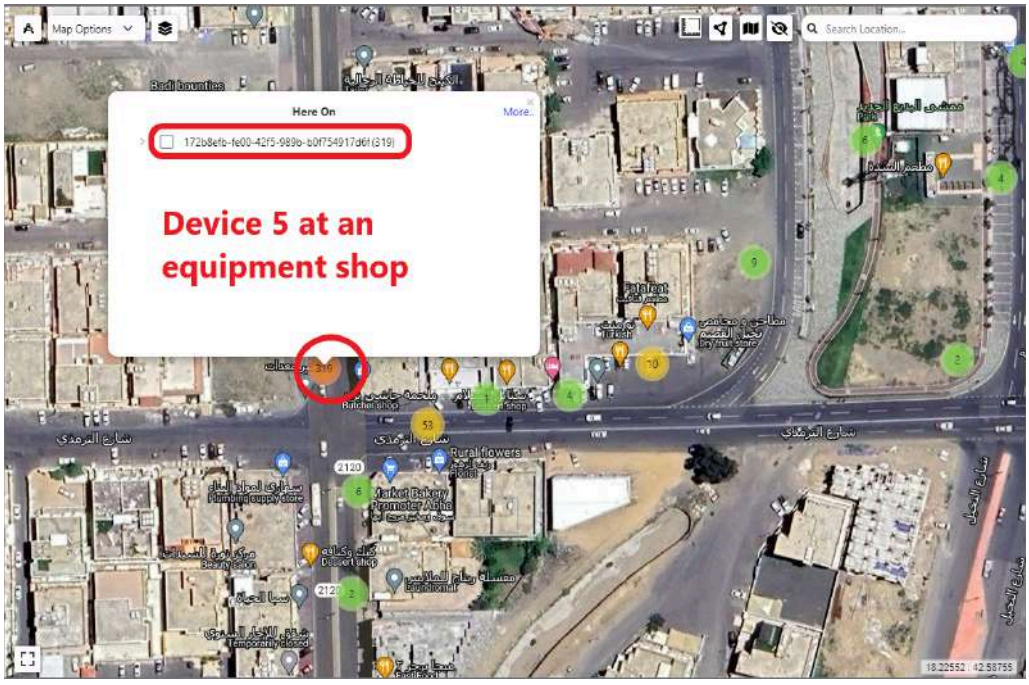


He moved to King Fahd International Airport in Al Dammam on October 4 at 9:41 p.m. and took off at 10:37 a.m.



He arrived at the Abha Airport on October 5 around 1 pm

Tracked movements reveal a pattern of visits to various locations in Abha, specifically related to the contracting industry, involving equipment rental, electrical supplies, and cables. This sequence suggests a potential engagement with the procurement or utilization of construction-related resources.



This suggests a notable connection between the device and areas integral to construction and upkeep services in the region. The purpose behind these visits or the nature of the device's involvement in such locations may merit further investigation due to the touristic nature of Abha.

Conclusion

The implementation of the Valoores Crowd Intelligence System (VCIS) in Abha represents a pioneering effort to leverage advanced technology and data analytics to bolster security for the city's booming tourism industry. This case study exemplifies VCIS's transformative potential in establishing a robust digital security infrastructure.

Through comprehensive monitoring from airport arrival to tourist hotspots, VCIS enables real-time tracking of crowd dynamics, identification of anomalies, and proactive mitigation of potential risks. The integration of facial recognition, crowd analysis, and behavioral algorithms creates a multi-layered security apparatus adaptable to Abha's evolving tourism landscape.

The granular analysis of device movements and activity patterns demonstrates VCIS's intelligence-gathering capabilities, empowering authorities with data-driven insights for informed decision-making and resource allocation. Furthermore, seamless integration with law enforcement fosters rapid response mechanisms, enhancing overall resilience.

As Abha's allure as a destination grows, the deployment of VCIS signifies a commitment to sustainable tourism growth and unwavering dedication to public safety. By harnessing cutting-edge technologies, this initiative sets a benchmark for proactive, adaptable security measures tailored to the complexities of the tourism sector, fortifying Abha's reputation as a secure and welcoming destination.