

Project ID:

24-25J-262

1. Topic (12 words max)

Safari Scout ("Intelligent guiding, assistive and communication system for tourists")

2. Research group the project belongs to

Autonomous Intelligent Machines and Systems (AIMS)

3. Research area the project belongs to

Internet of Things (IoT)

4. If a continuation of a previous project:

Project ID	
Year	

5. Brief description of the research problem including references (200 – 500 words max) – references not included in word count.

Tourists visiting Sri Lanka often encounter several challenges that detract from their overall experience. The primary issues include poor connectivity, difficulty accessing real-time information, language barriers, and the inability to accurately identify local wildlife and landmarks.

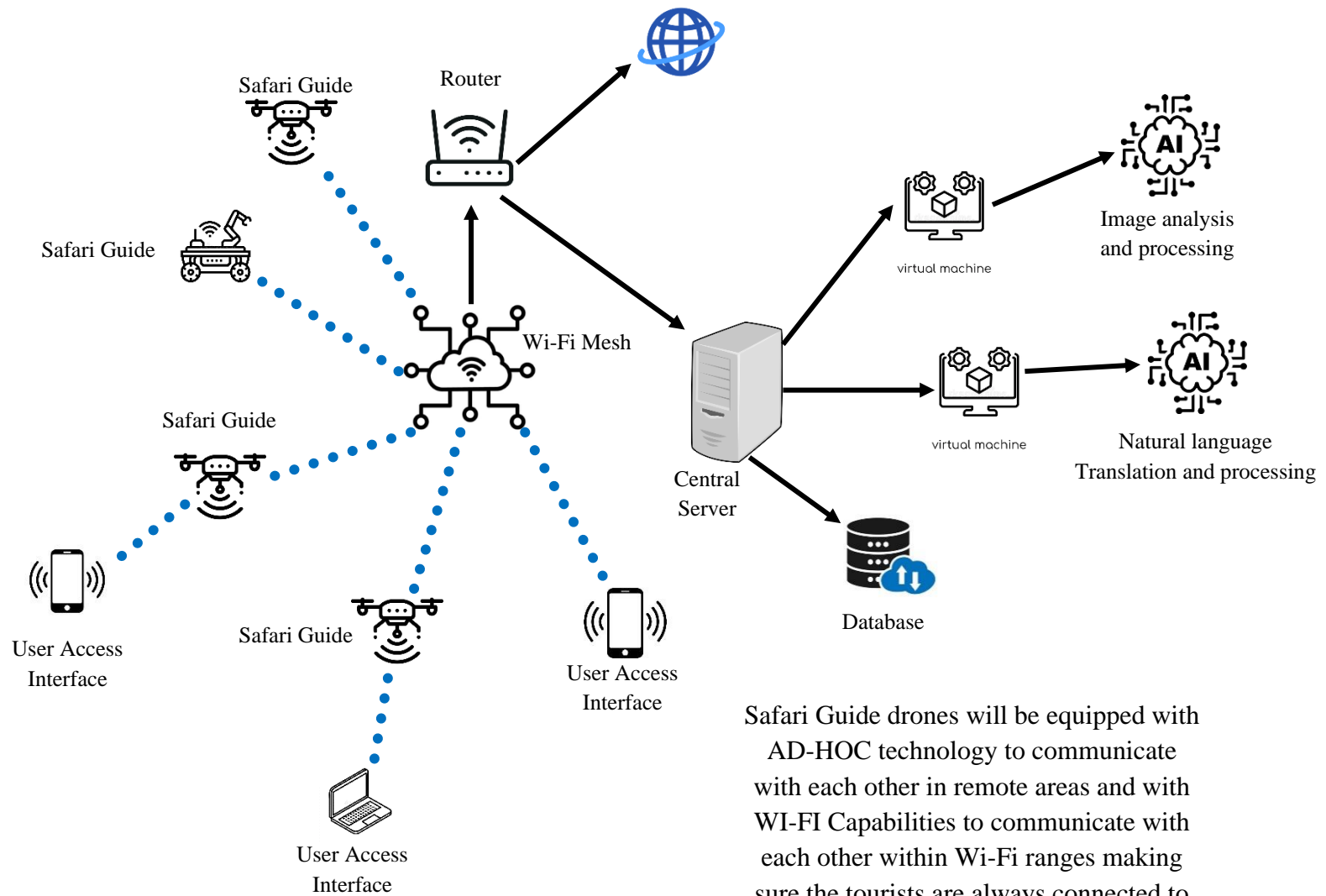
These problems are particularly pronounced in remote and rural areas where traditional tour guides or static maps fall short in providing the dynamic, context-aware assistance that modern travelers seek. Connectivity issues are a significant barrier for tourists, who often rely on their smartphones for navigation, information, and communication. In many remote areas of Sri Lanka, cellular networks are weak or nonexistent, making it difficult for tourists to stay connected and informed. This lack of connectivity can lead to safety concerns, especially in isolated locations where tourists might get lost or face emergencies without the means to call for help. Language barriers further complicate the travel experience for non-native speakers. While English is widely spoken in tourist areas, many rural regions primarily use Sinhala or Tamil. This can make it challenging for tourists to communicate effectively, understand local customs, and fully appreciate the cultural and historical context of the sites they visit. Moreover, Sri Lanka's rich biodiversity and cultural heritage present another set of challenges. Tourists often find it difficult to identify and learn about the various species of flora and fauna, as well as significant landmarks and historical sites. This lack of knowledge diminishes the educational aspect of their visit and can lead to a less fulfilling experience. Current solutions, such as hiring local guides or using printed guides, have their limitations. Local guides might not always be available or affordable, and printed guides quickly become outdated and cannot provide real-time information. Furthermore, static maps and signs fail to offer the interactive and personalized experience that many tourists now expect.

Addressing these issues requires an innovative approach that leverages modern technology. An AI-based guidance system can provide a comprehensive solution by offering Wi-Fi access points for improved connectivity, GPS capabilities for accurate navigation, and real-time recommendations and information. By incorporating image recognition and machine learning, the system can help tourists identify wildlife and landmarks, enhancing their educational experience. Translation services can bridge language gaps, making information accessible in multiple languages.

This research aims to develop an AI-based tourist guidance system that will expand the coverage of locations that are currently unreachable, especially those that are hindered by poor road conditions and natural obstacles like dense forests, mountains, and rivers. These GPS and camera equipped Safari Scout can travel through difficult terrains where standard infrastructure is impracticable. By doing this, they can guarantee that visitors to these isolated areas have access to essential services and connectivity, collect and transmit real-time information, and offer emergency assistance. With this capability, tourists can explore and take in more of Sri Lanka's natural beauty without being constrained by challenging terrain, improving safety and accessibility.

References

- [1] "Digital image processing using machine learning - researchgate." [Online]. Available: https://www.researchgate.net/publication/334352633_Digital_Image_Processing_Using_Machine_Learning.
- [2] "Image Processing Technology based on machine learning." [Online]. Available: https://www.researchgate.net/publication/358613391_Image_Processing_Technology_Based_on_Machine_Learning.
- [3] "Localized FM Digital Audio Broadcasting using WIFI Mesh Networks." [Online]. Available: https://www.researchgate.net/publication/356625995_Localised_FM_Digital_Audio_Broadcasting_using_WiFi_Mesh_Networks.
- [4] "Dust Monitoring and processing system based on WIFI Mesh Network ..." [Online]. Available: https://www.researchgate.net/publication/350395857_Dust_monitoring_and_processing_system_based_on_WiFi_Mesh_network_distributed_backup_routing_algorithm.
- [5] "Reducing Power Consumption in Wired Networks"[Online]. Available: https://www.researchgate.net/publication/356109191_Reducing_Power_Consumption_in_Wired_Networks
- [6] "A depth-controlled and energy-efficient routing protocol for underwater ..." [Online]. Available: <https://journals.sagepub.com/doi/full/10.1177/15501329221117118#:~:text=A%20routing%20technique%2C%20which%20is,to%20the%20minor%20depth%20node>.



Safari Guide drones will be equipped with AD-HOC technology to communicate with each other in remote areas and with WI-FI Capabilities to communicate with each other within Wi-Fi ranges making sure the tourists are always connected to the network.

6. Brief description of the nature of the solution including a conceptual diagram (250 words max)

The suggested strategy involves AI-based safari guidance device that can give access to any location where tourists can access physically due to natural obstacles and poor road conditions. The device will work in strong WLAN network in popular tourist destinations in Sri Lanka using with cameras, sensors, GPS modules, and Wi-Fi transceivers that manages by a centralized server with AI algorithms for real-time decision-making and recommendations, AI-based image recognition, language translation services and GPS integration, Data aggregation and management systems for real-time information updates and in addition to facilitating real-time data sharing between other devices. The device will act as a Wi-Fi node providing a connectivity to the WLAN in the area that connects to the other “safari guide” devices and smart phones in the networks providing a reliable data transfer and communication system for the tourists in the area to track wildlife, share their user experience and communicate with other tourists for information and send SOS messages in case of an emergency.

GPS integration offers precise navigation assistance, guiding tourists through unfamiliar terrains safely and efficiently. Additionally, they will offer real-time location tracking, which will improve visitor safety by facilitating prompt emergency response. Based on user preferences and past data, the device will use machine learning algorithms to provide specific suggestions on local restaurants, cultural sites, and attractions. This feature makes use of information from both proprietary and open databases to guarantee that the data is up-to-date and useful.

The Safari Guide built-in image recognition technology will let visitors recognize local landmarks and wildlife. This educational feature will enhance the visitor experience by offering comprehensive information about the highlighted subjects.

The Safari guide will have AI-based real-time translation capabilities to help tourists overcome language barriers by delivering information in their preferred languages. This guarantees inclusivity and accessibility, serving a wide variety of guests.

In summary, the solution greatly improves visitors travel experiences in Sri Lanka by combining several innovative technologies into a single, intuitive system. The technology makes the whole experience more enjoyable and informative by guaranteeing connectivity, offering useful information, and enhancing safety. A highly sophisticated solution that can offer comprehensive help and guarantee tourists have a secure, educational, and entertaining experience is desperately needed considering the problems faced in Sri Lankan tourism industry.

7. Brief description of specialized domain expertise, knowledge, and data requirements (300 words max)

- **Drone Technology and Navigation:** Proficiency in creating and utilizing drones with the ability to navigate on their own and communicate with visitors. To maintain safe and effective operations in a variety of contexts, this involves having a solid understanding of drone hardware, flight dynamics, and control systems.
- **GPS and Location-Based Services:** Accurate positioning and route planning for drones depend on an understanding of GPS technology and how it is incorporated into the drone's navigation system. Comprehending geographic information and cartographic instruments amplifies the efficacy of location-based services offered to travelers.
- **Networking and Wireless Communication:** Proficiency with network optimization and wireless communication protocols, such as Wi-Fi and LTE, is necessary to configure drones as mobile Wi-Fi access points. For travelers visiting both crowded tourist places and isolated areas, this guarantees dependable connectivity.
- **AI and Recommendation Systems:** Developing recommendation systems that make use of both public and private information requires a strong foundation in artificial intelligence (AI). This calls for proficiency in computer vision, natural language processing (NLP), and machine learning algorithms to provide individualized travel suggestions based on past trends and real-time data.
- **Language Translation and Cultural Sensitivity:** NLP approaches are used to provide accurate and contextually relevant translations when developing language translation capabilities for drones. Comprehending cultural sensitivities and indigenous practices guarantees that the drone's advice and interactions honor and adjust to a variety of cultural contexts.
- **Image Processing and AI:** Proficiency in computer vision techniques and image recognition algorithms is required. This calls for the ability to evaluate visual data taken by the drone's onboard cameras to recognize potential impediments, landmarks, and things of interest in real time.
- **Access to the following data is required:**
 - **Real-time and Historical Traveler Data:** Utilizing visitor preferences and behavior to offer tailored advice and navigation support.
 - **Geospatial and Mapping Data:** For precise location-based services and GPS guidance.

8. Objectives and Novelty

The primary goal of the Safari Scout Guide project is to use innovative AI-based IoT device to improve tourist's overall experience, safety, and satisfaction in safari trips in Sri Lanka. To guarantee a seamless, smooth, informative, and safe journey, this involves offering real-time information, connectivity, and help in remote safari locations.

Member Name	Sub Objective	Tasks	Novelty
Rajapaksha P.K IT21255724	<ul style="list-style-type: none"> • Design and deploy AD-HOC networks to ensure consistent connectivity with other Safari Scouts. • WLAN network for communication between servers including central server and VM infrastructure. 	<ul style="list-style-type: none"> • Security and vulnerability analysis and implement security measures and encryption protocols to ensure data protection for the Safari Scout. • Implement a Safari scout as an access point node in Wi-Fi mesh that connects all Safari scouts in the area. • Design and distribute surveys to collect data from authorities and tourists about their knowledge in local hotels, local items prices in tourism areas and the price scams they face every day because of the lack of knowledge in local prices and implement the average price database for local items on the server. 	<p>AD-HOC will enable the tourists to communicate with others in the Safari area.</p> <p>ESP8266 will reduce the cost of implementing a Wi-Fi mesh in the WLAN and with a rechargeable battery that is directly connected to the solar panel to improve the overall performance and battery life of nodes in Wi-Fi mesh.</p>

<p>Vaffa M.A.M.A IT21307812</p>	<ul style="list-style-type: none"> • Develop and implement natural language processing (NLP) systems that connect with Safari Scout and Scout mobile app and give the user language translation experiences. 	<ul style="list-style-type: none"> • Develop an AI-Based Language communication and processing system. • Develop the main database to store data on the main server • Web Interface and mobile application development for Safari Scout that connects to the Server and gives reliable experience for the user. • Database Implementation, data analysis, Data and Storage management for data collections and processing data based on user requests to ensure data integrity and accessibility for the users. 	<p>Utilize machine learning algorithms for voice commands to control the safari guide and offers real-time recommendations on nearby attractions, dining options, cultural sites based on user preferences and historical data and language translation.</p>
<p>Indunuwan K.M.I.G.U IT21454578</p>	<ul style="list-style-type: none"> • Design and deploy an innovative hardware framework for the Safari Scout guidance system, integrating advanced obstacle and animal recognition capabilities along with an intelligent SOS system feature that alerts local authorities for emergency rescue, guiding rescue teams directly to the user's location. 	<ul style="list-style-type: none"> • Implement the advanced SOS system and implement the animal recognition and obstacle avoidance sensors, cameras and other hardware components that are connected to safari scout. • Design and distribute surveys to collect data from authorities and tourists about the main goals and expectations in safari tours to implement required sensors and components to the Safari Scout. 	<p>Equip safari scouts with emergency response features, allowing tourists to quickly summon help if needed from local authorities and ensure real-time location tracking to facilitate swift assistance in case of emergencies.</p>

<p>Alwis M.A.M.D.S IT21260360</p>	<ul style="list-style-type: none"> • Develop and implement AI algorithms for image capture and recognition and continuously update and maintain the image recognition database and maintain GPS tracking systems for accurate location services to share images and location information with other users inside the WLAN. 	<ul style="list-style-type: none"> • Ensure high accuracy and real-time processing capabilities from server to Safari Scout. • Design and distribute surveys to collect data from authorities and tourists about their interest in the popular areas that they like to visit in Sri Lanka add the details about it to the language processing system that translates into various languages. 	<p>The safari scout system offers dynamic, context-aware assistance and it adapts to the tourists' location, preferences, and real-time environmental factors, providing highly personalized and relevant information compared to traditional static maps, and provide the last known location on rare species and users inside the WLAN in case of emergencies.</p>
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9. Supervisor checklist

- a) Does the chosen research topic possess a comprehensive scope suitable for a final-year project?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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- b) Does the proposed topic exhibit novelty?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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- c) Do you believe they have the capability to successfully execute the proposed project?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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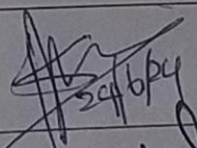
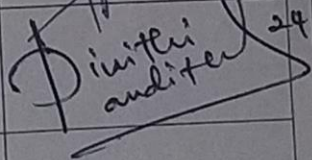
- d) Do the proposed sub-objectives reflect the students' areas of specialization?

Yes	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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- e) Supervisor's Evaluation and Recommendation for the Research topic:

<p>Recommended</p>

10. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor	Ms.	Shashika	Lokeniyana	
Co-Supervisor	Ms.	Dinithi	Pandithage	
External Supervisor				
Summary of external supervisor's (if any) experience and expertise				

24/6/2024

262

This part is to be filled by the Topic Screening Panel members.

Acceptable: Mark/Select as necessary

Topic Assessment Accepted	
Topic Assessment Accepted with minor changes (should be followed up by the supervisor)*	✓
Topic Assessment to be Resubmitted with major changes*	
Topic Assessment Rejected. Topic must be changed	

* Detailed comments given below

Comments

System Diagram should be Re-drawn
Mem 3 should not only do configs-
~~Re~~ Power supply to the devices?

The Review Panel Details

Member's Name	Signature
Ms. Anuradha Jayakody.	
Ms. Shashika Lokanayake	
Ms. Hansika Mahendikera	