SEA TURTLE HABITANT MONITORING AND TRACKING SYSTEM

Project Proposal Report

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B.Sc. (Hons) Degree in Information Technology

Specializing in Information Technology

Sri Lanka Institute of Information Technology

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Project ID: 24-25J-202

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DECLARATION

We declare that this is our own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of us Knowledge and belief it do not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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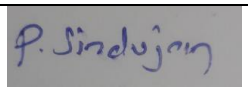
Sindujan.P	IT21158568	

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

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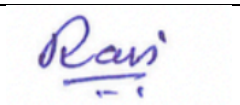
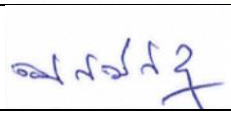
Supervisor	Prof. Ravi Supunya	
Co-Supervisor	Mrs. Bhagyanie Chathunla	

ABSTRACT

Sea turtle conservation is becoming more and more important as a result of growing threats from illnesses and environmental changes, especially in the Sri Lankan waters. Conventional approaches to illness detection in marine turtles are frequently insufficient since they do not provide real-time capabilities, thorough disease insights, or practical treatment suggestions. To fill these deficiencies, this research suggests creating a sophisticated machine learning-based system for illness detection and therapy recommendation.

The main goal is to develop a thorough method for identifying diseases by utilizing information gathered from nearby sea turtle hatcheries and conservation initiatives. With the use of machine learning algorithms, this system will be able to identify illnesses from visual and environmental data and offer precise treatment recommendations in real time. A complete performance tracking and assessment will also be accessible to stakeholders, including as researchers and conservation volunteers, through the integration of the disease diagnosis system with a monitoring platform.

This initiative, which aims to increase public understanding of sea turtle illnesses using accessible technologies, such as QR codes connected to in-depth turtle data, also places a strong emphasis on public interaction and awareness. Scalability, usability, and security are all taken into consideration in the design of the suggested solution, making it suitable for widespread use in a variety of conservation initiatives.

Project planning, data gathering, system design, integration, testing, and continuous monitoring are all part of the technique. According to preliminary assessments, this method has the potential to greatly improve illness identification and treatment procedures, which would raise the likelihood that sea turtles in Sri Lanka would survive.

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1. INTRODUCTIONS

Artificial Intelligence (AI) in wildlife conservation technology presents a great possibility to support conservation efforts for Sri Lanka's endangered species, including sea turtles. Traditional methods of diagnosing and treating diseases in sea turtles generally fall short since they don't have the real-time capabilities and complete insights needed for prompt treatments that might increase survival rates. It is becoming more and more obvious that sea turtle disease management requires a more dynamic, adaptable, and comprehensive approach. This program suggests developing an AI-based disease identification and treatment recommendation system tailored to sea turtles in order to address these problems. This system uses cutting-edge AI technology, such as computer vision and machine learning algorithms, to provide accurate illness diagnoses based visual and environmental data. The effectiveness of conservation efforts will be increased by the fast treatment suggestions made possible by the integration of this technology with a real-time monitoring platform. This initiative's main goal is to increase sea turtle survival rates by deploying AI-powered tools that offer personalized treatment recommendations and real-time illness identification. It is projected that this approach will greatly increase the effectiveness of conservation methods, improving the health of sea turtles and ensuring the long-term viability of conservation initiatives.

1.1 Background and Literature Survey

The incorporation of Artificial Intelligence (AI) into wildlife conservation technologies presents a significant opportunity to enhance efforts aimed at protecting endangered species, such as sea turtles, in Sri Lanka. Conventional methods of disease detection and treatment for sea turtles often fall short, lacking real-time capabilities and comprehensive insights necessary for timely interventions that could improve survival rates. The increasing threats to sea turtle populations from environmental changes, human activities, and diseases underscore the urgent need for a more dynamic, adaptable, and thorough approach to disease management.

Recent studies have highlighted the potential of AI and machine learning in revolutionizing wildlife conservation. AI technologies, including computer vision and predictive analytics, have been successfully applied in various domains, from monitoring wildlife populations to detecting poaching activities. However, their application in disease detection and management for marine species, particularly sea turtles, remains underexplored. Traditional approaches primarily rely on manual observation and limited data, which can result in delayed or inaccurate diagnoses, ultimately reducing the effectiveness of conservation efforts.

This project aims to address these gaps by developing an AI-based Disease Identification and Treatment Recommendation System specifically designed for sea turtles. By leveraging advanced AI technologies, such as machine learning algorithms and computer vision, the system will provide precise disease diagnoses based on visual and environmental data. The integration of this system with a real-time monitoring platform will enable prompt treatment recommendations, improving the overall efficacy of conservation strategies.

The primary objective of this initiative is to increase the survival rates of sea turtles through the implementation of AI-driven technologies that offer real-time disease detection and personalized treatment suggestions. By enhancing the efficiency and accuracy of disease management, this system is expected to contribute significantly to the long-term success of sea turtle conservation programs in Sri Lanka.

1.2 Research Gap

While AI has been effectively utilized in various areas of wildlife conservation, its application in the real-time detection and treatment of diseases in marine species, particularly sea turtles, remains underexplored. Existing research primarily focuses on AI-driven monitoring systems for population tracking and habitat analysis, but rarely addresses the critical need for integrated disease management solutions. Moreover, there is a significant gap in the literature regarding the use of AI to provide comprehensive, real-time treatment recommendations based on visual and environmental data. Most current conservation technologies lack the ability to offer adaptive, data-driven responses to emerging health issues in sea turtles, often resulting in delayed interventions and suboptimal outcomes. Additionally, the integration of machine learning models with monitoring platforms to deliver actionable insights and treatment suggestions in real-time is a relatively new and underdeveloped area of study.

This project aims to bridge these gaps by developing an AI-based Disease Identification and Treatment Recommendation System specifically for sea turtles. By combining machine learning algorithms, computer vision, and real-time monitoring, this project seeks to create a holistic solution that enhances the effectiveness of sea turtle conservation efforts

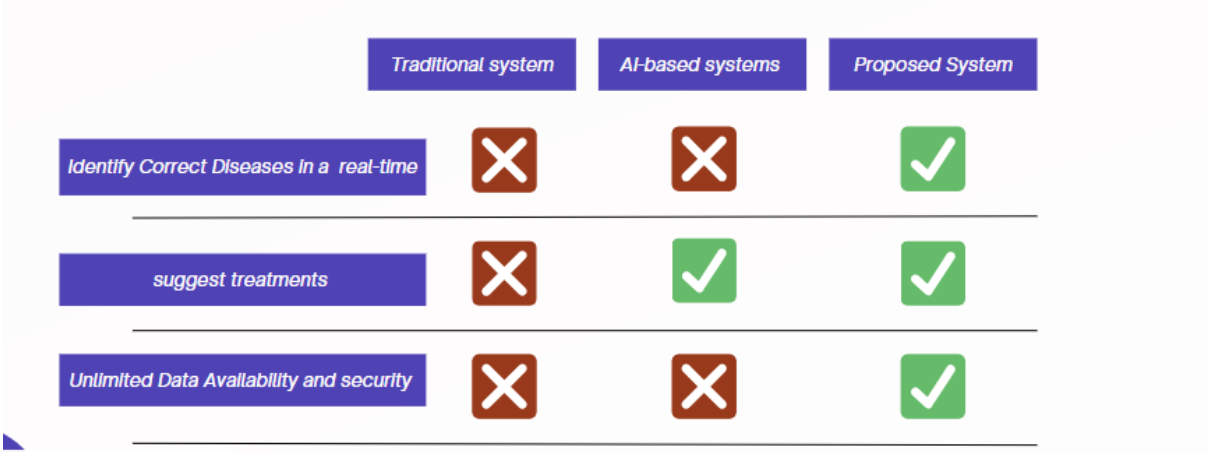

Figure 1 Research Gap

1.3 Research Problem

The fundamental research problem addressed by this project is the lack of a comprehensive AI-based system for real-time disease detection and treatment recommendation in sea turtles. Traditional methods of diagnosis and management of diseases in sea turtles are often manual, subjective and slow, leading to late interventions that can seriously affect the survival of these endangered species. Additionally, existing conservation systems lack the ability to provide tailored, data-driven treatment recommendations that address the specific health needs of each sea turtle. This unique approach does not take into account the unique environmental and biological factors that affect the health of each turtle, resulting in suboptimal treatment outcomes. The proposed solution aims to address these issues by developing an AI-based disease identification and treatment recommendation system that uses machine learning and real-time monitoring to provide accurate intervention time, personalized and on time. The study aims to demonstrate that such a system can significantly improve the survival rates of sea turtles by providing accurate disease diagnoses, personalized treatment strategies and immediate and actionable knowledge.

2. OBJECTIVES

2.1 Main Objectives

This project's primary objective is to create and put into use an AI-based system for illness detection and treatment recommendations that is tailored especially for the preservation of sea turtles. The technology seeks to greatly increase sea turtle survival rates by offering individualized treatment suggestions and precise real-time illness identification. The system offers adaptable, data-driven solutions that satisfy each turtle's particular health needs by utilizing cutting-edge AI technology, such as computer vision and machine learning algorithms. By addressing the drawbacks of conventional techniques and promoting the long-term viability of sea turtle conservation initiatives, this strategy will provide a more effective, efficient, and proactive conservation plan.

2.2 Specific Objectives

- Development of AI-powered disease identification and treatment modules: Create advanced AI algorithms to analyse visual and environmental data to accurately detect diseases in sea turtles in real time. It applies machine learning models that provide accurate diagnoses and personalized treatment recommendations.

- Integrate real-time data monitoring and analysis: Use computer vision and data analysis to continuously monitor sea turtle health. Develop a system that integrates real-time environmental and health data to provide timely interventions and adaptive treatment strategies.

- Design and implement a real-time treatment recommendation system: Create a user-friendly platform that provides immediate treatment suggestions and actions based on AI-driven analysis. Ensure that the system provides conservators with timely and appropriate information for effective disease management.

- Improve conservation effectiveness and efficiency: Integrate features that improve the effectiveness of disease management and response, including automated alerts and detailed health reports. Aim to optimize the curation process by providing accurate, data-driven insights.

- Ensuring the ethical implementation of AI: establishing and enforcing ethical guidelines for the use of AI in marine conservation, with a focus on fairness, transparency and the protection of sensitive data. It addresses potential issues related to the impact of AI on natural behaviours and ecosystems.

- Evaluate system performance and impact: Conduct a comprehensive test and evaluation of the AI-driven system to assess its effectiveness in improving sea turtle health outcomes. Compare system performance with traditional storage methods to demonstrate their benefits.

- Ensure adaptability and scalability of the system: design the system to be flexible and scalable, allowing it to adapt to different contexts and types of storage. Ensure that the technology can be extended to other regions or marine species if successful.

3. METHODOLOGY

3.1 System Diagram

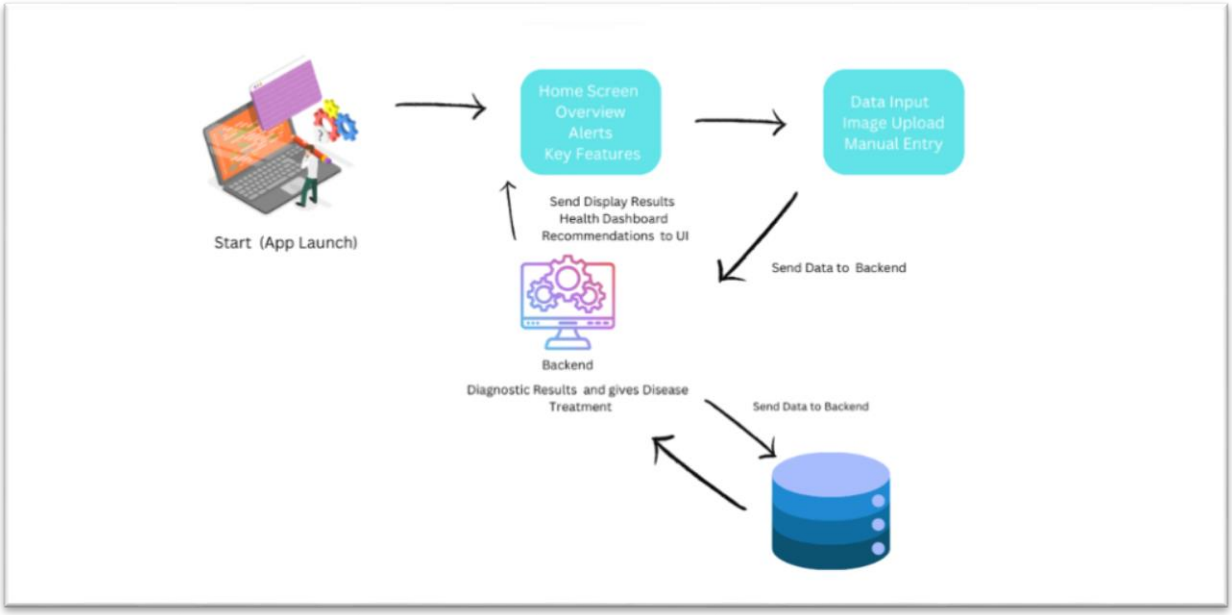

Figure 2 System diagram

Developing the AI-based disease identification and treatment system for sea turtles involves several key steps. Initially, the project focuses on the design of the system architecture, detailing how components such as the disease identification module, the treatment recommendation engine and the real-time monitoring platform are integrated. . Then, comprehensive data on the health of sea turtles, including visual images and environmental conditions, are collected, which are then pre-processed to prepare the training of the AI model. Advanced machine learning algorithms and computer vision techniques are used to create models for accurate disease detection and personalized treatment recommendations. These models are rigorously tested and refined to ensure accuracy and reliability. The last step is the integration of these components into a cohesive system, followed by extensive tests to evaluate their effectiveness compared to traditional methods. Continuous monitoring and iterative improvements are implemented based on feedback and performance metrics to improve the functionality of the system and its impact on sea turtle conservation...

4. PROJECT REQUIREMENTS

4.1 Functional Requirements

- **Automated Disease Detection:** Automatically diagnose diseases in sea turtles using machine learning and computer vision.
- **AI-Driven Treatment Recommendations:** Provide personalized treatment suggestions based on disease diagnosis and environmental data.
- **Real-Time Monitoring:** Continuously monitor sea turtle health and issue alerts for anomalies.
- **Data Management and Reporting:** Generate reports and analytics on disease detection, treatment outcomes, and conservation efforts.
- **Multilingual Support:** Offer system interfaces and data inputs in multiple languages.
- **Scalability:** Handle increasing data and user load without performance issues.
- **Progress Tracking:** Monitor and report on treatment effectiveness and health improvements.
- **User Authentication:** Ensure secure access for conservationists, researchers, and administrators with role-based controls.

4.2 Non-Functional Requirements

• Performance**:** The system must process user interactions, such as disease detection and treatment recommendations, in under two seconds. It should support up to concurrent users without performance degradation.

• Reliability**:** Ensure a high availability rate with a target uptime of 99.9%. Implement robust error-handling to minimize disruptions and allow smooth recovery from unexpected issues.

• Scalability**:** The system must scale vertically and horizontally to handle growing numbers of users, data, and content. It should integrate seamlessly with new modules or external tools.

• Security**:** Use industry-standard encryption protocols (e.g., SSL/TLS) to protect data during storage and transmission. Implement secure login procedures, including two-factor authentication (2FA) for sensitive operations.

• Usability**:** Provide an intuitive, user-friendly interface for easy navigation by users. Follow accessibility standards to ensure that the system is usable by individuals with disabilities.

• Maintainability**:** Design the system to be modular for easy updates and maintenance. Provide thorough documentation for both users and developers to facilitate ongoing support and development.

• Compatibility**:** Ensure the system is compatible with a wide range of devices and browsers, including computers, tablets, and mobile devices, to accommodate diverse user needs.

5. GANTT CHART

Figure 3 Gantt chart

6. BUGET AND JUSTIFICATION

Since the outcome of the proposed model is a software-based solution, there are no hardware components connected to the implementation. The primary source of the cost will be the subscription fees to the cloud provider for the computing power of the virtual machines. However, there will be some other costs expected to as be given in the table below.

Table 1 Budget and Justification

Type	Cost
Internet use and web hosting	6000 LKR
Publication costs	12110 LKR
Stationary	5500 LKR
TOTAL	***23610 LKR***

This amount may differ according to the economic crisis

7. REFERENCE LIST

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