Project ID: 24-25J-087

1. Topic (12 words max)

Virtual Reality for Immersive Training on Handling and Identifying Venomous Snakes in Sri Lanka

2. Research group the project belongs to

Software Systems & Technologies (SST)

3. Research area the project belongs to

Augmented/Virtual Reality (A/VR)

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.

Snakebite envenomation poses a significant health challenge in Sri Lanka, a country where venomous snakes are not only prevalent but often found in close proximity to human habitats. Encounters with these snakes frequently lead to severe health consequences, including fatalities, due to the potent nature of the venom and the rapid progression of symptoms following a bite. The traditional methods used to educate individuals about handling and identifying these dangerous reptiles are limited and inherently risky. Typically, these methods involve either theoretical instruction without practical experience or direct interaction with live snakes, both of which fail to adequately prepare individuals for real-life encounters. The theoretical approach lacks the hands-on experience necessary for effective learning, while direct interaction poses significant safety risks.

Moreover, there is a lack of comprehensive, hands-on training tools that can simulate the experience of dealing with venomous snakes in a safe and controlled environment. This gap in training resources leads to insufficient preparedness among individuals who are likely to encounter these snakes, including farmers, wildlife workers, and even general community members in rural areas. The absence of effective educational tools exacerbates the danger, increasing the likelihood of improper handling and misidentification of venomous species, which can result in higher incidences of snakebites and improper medical responses.

The health systems in Sri Lanka are also strained by the high incidence of snakebites, which require urgent and specialized medical treatment. Many victims, due to a lack of proper training and awareness, do not receive timely and appropriate care, leading to complications and preventable deaths. Furthermore, the economic burden on families and the healthcare system is significant, as treatments for snakebites are costly and recovery periods can be prolonged, affecting the productivity and well-being of victims.

Therefore, there is a critical need for research into innovative educational solutions that can effectively bridge the gap between theoretical knowledge and practical skills in handling and identifying venomous snakes. Enhancing understanding and preparedness through advanced educational tools is essential to reduce the risks associated with snakebites and improve overall public safety in Sri Lanka.

References:

1. Warrell, D. A. (2010). Snake bite. The Lancet, 375(9708), 77-88.

2. Chippaux, J. P. (2017). Snakebite envenomation turns again into a neglected tropical disease! Journal of Venomous Animals and Toxins including Tropical Diseases, 23(1), 38.

3. Kasturiratne, A., Wickremasinghe, A. R., De Silva, N., Gunawardena, N. K., Pathmeswaran, A., Premaratna, R., ... & De Silva, H. J. (2008). The global burden of snakebite: a literature analysis and modelling based on regional estimates of envenoming and deaths. PLoS Medicine, 5(11), e218.

4. Fry, B. G., Vidal, N., Norman, J. A., Vonk, F. J., Scheib, H., Ramjan, S. F., ... & Kochva, E. (2006). Early evolution of the venom system in lizards and snakes. Nature, 439(7076), 584-588.

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

To address the challenges of educating people on handling and identifying venomous snakes in Sri Lanka, we propose developing a comprehensive VR-based educational platform. This immersive solution will have three primary components:

Tools and Techniques for Catching Snakes: The VR simulation will teach users to use snake hooks and tongs to safely catch and transport venomous snakes. By providing real-time feedback and interactive scenarios, users will learn the correct techniques and safety protocols, reducing the risks associated with traditional training methods.

Identifying Snakes and Studying Anatomy: Users will be able to identify venomous snakes based on detailed 3D models highlighting skin patterns, scales, and head shapes. The VR environment will also include interactive modules on snake anatomy, focusing on critical structures such as venom glands. This will ensure accurate identification and deepen users' understanding of snake biology.

Effects of Snake Bites on the Human Body: The platform will feature a 3D model of the human body, demonstrating the physiological effects of snake venom. Users will observe the progression of symptoms and the impact on various organs through interactive timelines. Additionally, the simulation will provide information on first aid and medical treatments, enhancing preparedness for snakebite emergencies.

This VR-based approach offers a safe, engaging, and comprehensive educational tool, aimed at improving public safety, supporting conservation efforts, and fostering a deeper understanding of venomous snakes in Sri Lanka.

Conceptual chart

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

Herpetology:

Expertise Needed: Knowledge of venomous snake species, their behavior, habitat, and anatomical features is essential. Herpetologists will provide critical insights into the characteristics and handling techniques of snakes specific to Sri Lanka.

Data Requirements: High-resolution images and detailed descriptions of skin patterns, scales, head shapes, and other distinguishing features of venomous snakes.

Medical Science:

Expertise Needed: Understanding the physiological effects of snake venom on the human body, including symptoms, progression, and treatment protocols. Medical professionals will contribute to the development of accurate and comprehensive educational content on snakebites and first-aid procedures.

Data Requirements: Medical data on the impact of various snake venoms, timelines of symptom progression, and best practices for first aid and medical intervention.

Virtual Reality Development:

Expertise Needed: Skills in 3D modeling, animation, and interactive simulation design are crucial. VR developers will create realistic, immersive environments and ensure that interactions within the VR scenarios are intuitive and educational.

Data Requirements: Technical specifications for VR hardware and software, detailed design plans for 3D models of snakes and human anatomy, and user interface design guidelines.

Safety and Ethical Standards:

Expertise Needed: Knowledge of safety protocols and ethical guidelines for handling venomous snakes. Experts will ensure that all educational content adheres to high standards of safety and ethical treatment of wildlife.

Data Requirements: Safety protocols for snake handling, ethical guidelines for wildlife interaction, and emergency response procedures.

Educational Design:

Expertise Needed: Experience in instructional design and educational technology to create engaging and effective learning modules. Educational designers will structure the content to maximize learning outcomes and user engagement.

Data Requirements: Best practices in educational technology, user engagement metrics, and feedback mechanisms for continuous improvement of the learning platform.

Objectives and Novelty

Main Objective			
Develop an immersive VR platform for handling, identifying, and understanding venomous snakes in Sri Lanka.			
Member Name	Sub Objective	Tasks	Novelty
Dhananjaya W A B P	Tools and Techniques for Catching Snakes	1. Design and create physical prototypes of snake hooks and tongs and link it with the VR environment. 2. Develop guidelines for safe handling and include emergency procedures in the VR training. 3. Implement VR scenarios for practicing snake catching techniques and incorporate real-time feedback and tips within the VR environment.	• Combine physical tool creation with VR demonstrations, providing a comprehensive understanding of their use and application.
Dilshan K A R	Identifying Snakes and Studying Anatomy	1. Develop detailed VR models of snakes highlighting distinctive features. 2. Design tutorials on identifying snakes based on visual and morphological characteristics such as skin patterns, scales, and head shapes. 3. Research methods for safe venom extraction. 4. Develop a VR simulation for venom extraction procedures.	• Provide an immersive look into the internal structure of snakes. • Developing a VR simulation for venom extraction procedures.

| Balasuriya B L D C | Effects of Snake Bites on Human Body | 1. Show the progression of effects of snake venom on the human body and design VR scenarios showing the impact of snake venom on the various organs of the human body within a 3D model.
2. Implement interactive timelines of symptom progression.
3. Develop modules on first aid and medical treatment for snake bites and include information on long-term effects and recovery. | • Show real-time effects of venom on different organs and systems within a 3D model.
• Provide a detailed timeline of symptoms, enhancing user understanding of the urgency and progression of treatment. |

8. Supervisor checklist

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

Yes		No	

b) Does the proposed topic exhibit novelty?

Yes		No	

c) Do you believe they have the capability to successfully execute the proposed project?
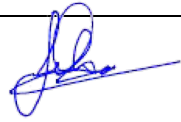
Yes		No	

d) Do the proposed sub-objectives reflect the students' areas of specialization?

Yes		No	

e) Supervisor's Evaluation and Recommendation for the Research topic:

> Panel suggestions included. Recommend to accept.

9. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor	Mr.	Ishara	Gamage	
Co-Supervisor	Mr.	Didula	Chamara	
External Supervisor				
Summary of external supervisor's (if any) experience and expertise				

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

The Review Panel Details

Member's Name	Signature

***Important**:

1. According to the comments given by the panel, make the necessary modifications and get the approval by the **Supervisor** or the **Same Panel**.

2. If the project topic is rejected, identify a new topic, and follow the same procedure until the topic is approved by the assessment panel.