Solution Statement and Subsystem Breakdown

Solution Statement

This project proposes a humane and integrated deterrent solution designed to protect penguin colonies from honey badgers. The approach combines real-time animal detection, automated species identification, and visual deterrents specifically flashing lights. By activating these visual deterrents only when a honey badger is positively identified, the system ensures minimal interference with penguins. This targeted strategy is intended to effectively discourage honey badger intrusions while maintaining a safe and undisturbed environment for the penguin population.

Subsystem Breakdown

The proposed solution is structured into three complementary subsystems, each managed by a specific team member:

1. Sensing Subsystem (Georgene de Wet)

The sensing subsystem will deploy motion detection sensors and thermal cameras strategically positioned along the existing penguin colony fence. The motion detection sensors provide energy-efficient, reliable detection of animal movement. To enhance accuracy, especially during night time or in challenging weather conditions, thermal cameras will detect the presence of animals through their unique heat signatures, reducing the likelihood of false detections due to environmental factors or penguins.

2. Software and Identification Subsystem (Arend Jacques du Preez)

This subsystem will be responsible for processing sensor data in real-time to distinguish honey badgers from penguins and other wildlife. Utilizing advanced, lightweight artificial intelligence and machine learning methods suitable for low-power hardware, this subsystem will rapidly and accurately classify the animals detected. Upon positive identification of a honey badger, the software subsystem will promptly signal the visual deterrent subsystem for activation.

3. Camera Tracking and Visual Deterrent Subsystem (Abdul-Mateen Kader)

The camera tracking subsystem will continuously track the movements of detected honey badgers outside the protected area, enabling precise targeting of deterrents. Once the presence of a honey badger is confirmed, this subsystem will activate flashing lights to immediately deter the animal. The visual deterrent is designed to provide effective repulsion without adversely affecting the natural behaviours and routines of penguins, ensuring ecological safety and sustained effectiveness.

Together, these subsystems form a comprehensive and humane strategy to effectively protect penguin habitats from honey badger intrusion while prioritizing ecological sensitivity and long-term reliability.