

The Application of AI and Sensor Technologies in Animal Monitoring and Management: Advancements, Challenges, and Future Directions

C. Aparna

Department of Information Technology, Rathinam Technical Campus, Coimbatore, Tamil Nadu, India

Dr. R. Nedunchezian

Department of Computer Science & Engineering, Coimbatore Institute of Technology, Coimbatore, Tamil Nadu, India

Abstract

AI and sensor technologies are transforming the way we monitor and manage animals, from domestic pets to wildlife. Wearable and environmental sensors collect data on animal physiology, location, and behaviour, while AI and machine learning analyse this information to provide valuable insights. Key applications include automated behaviour classification, health monitoring, disease diagnosis, and emotion assessment. Advanced tools like deep learning models, computer vision, and digital twins are used for tasks such as individual identification, pose estimation, and creating virtual replicas of animals to predict health issues.

However, the widespread adoption of these technologies faces several challenges. These include technical limitations like short battery life and poor connectivity, along with high initial costs and a lack of technical expertise. There are also significant data management issues related to storage, processing, and security, as well as ethical concerns about animal privacy and welfare. Despite these hurdles, future advancements are promising. Non-invasive sensors, like cameras and drones, are becoming more sophisticated, and AI algorithms are improving, with a growing trend toward transfer learning to reduce the need for large datasets. The integration of multiple data sources, including the use of digital twins, is expected to provide a more holistic understanding of animal health and behaviour. These technologies have significant potential to extend beyond livestock, revolutionizing wildlife conservation by helping to track elusive species and manage disease spread.

Keywords

AI, animals, behaviour, environment, health, sensors, technology.

