Universität Stuttgart
Institut für Flugmechanik und Flugregelung

Animated animals in simulated outdoor environments

Master Thesis

Background:

Video recording and motion capture (estimates of their pose and shape) of animals is required for various applications like animal monitoring for conservation using robots, camera tracks and sensor networks. To do that for endangered animals in their natural habitat is a challenging problem. Moreover, simple real world video recordings lack ground truth values of the animal's pose or shape. A possible solution to this problem is to generate synthetic data in simulations. Moreover, for robotics applications, additional data need to be generated, like sensor measurements, robot positions and velocities, etc.

Problem definition:

The following aspects need to be considered in this project. These include the simulation environment, the animation, and the placement/movement of the synthetic animals in the environment. The simulation environment will be provided and will be based on IsaacSim and Blender, with a codebase that has been developed internally at the institute. The goal is to generate multiple plausible animal motion sequences for a given environment in simulation and a desired number of animals.

Task:

- Design simulation environments or research freely available ones.
- Survey animated models that can be applied [1].
- Research state-of-the-art in animal herd movement modelling and develop a placement strategy.
- Generate and assess quality of the data by applying SOA methods [2]

Requirements:

- Basic working knowledge of ROS
- Experience with Python desired

If interested, please contact:

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[1] 4DComplete: Non-Rigid Motion Estimation Beyond the Observable Surface, ICCV2021
[2] KeyTr: Keypoint Transporter for 3D Reconstruction of Deformable Objects in Videos, CVPR 2022