A Robotic Ecologist for Automated Habitat Monitoring

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Global biodiversity loss creates an urgent need to change the way the built environment interacts with the natural world, and new solutions are required for understanding nature. Earth observation satellites offer the means to map and analyse macroecological trends, but to be truly effective, this must be paired with ground-based data, which is resource and manpower intensive to collect. However, recent advances in robotics now makes it possible to automate tasks in complex outdoor environments. Robotic data collection on the ground offers a way to collect dense data at larger volumes than it is possible for humans to collect, and unlike aerial and space-based sensing, ground vehicles benefit from long operating times and the ability to distinguish microhabitats beneath the tree canopy.

However, before robotic monitoring can become widely used, experienced scientists must test and refine approaches and hardware: This project will deploy a 'robotic ecologist' recently developed at the University of Surrey, and use it to demonstrate ecosystem surveying of habitats using advanced sensors, and pair the observations directly with high-resolution satellite data. The project's student will be responsible for integrating sensors and enhancing the robot to tackle progressively more challenging field sites. Through extensive robotic fieldwork, the student will gain experience in both modern robotics engineering and environmental science and become a leader in the use of mobile robots in service of conservation and sustainability goals.

Training opportunities:

The student will have the opportunity to deploy robotic systems in the field supported by experienced roboticists, gaining simultaneous experience in biological fieldwork and engineering, and become comfortable with the rapid build-test cycle found in modern robotics. The project will take place in a welcoming environment of more than 30 researchers and academics working in robotics and environmental science.

One of the fieldwork sites for the project is the Alice Holt Research Station, which is a closely monitored segment of the publicly owned forest, where a variety of research takes place, giving the student exposure to a broad range of environmental science activities. The student will have the opportunity to conduct field work at

this and other sites during their studentship, and benefit from the project partner's extensive knowledge of forestry.

The student will have the opportunity to take modules from the Centre for Environment and Sustainability and the University of Surrey's renowned MSc in Environmental Engineering, in addition to Doctoral College programmes in academic and transferable skills. They will participate in meetings of University of Surrey interest groups in environmental science which gather diverse expertise spanning sustainability, social sciences and policy, as well as physical sciences and engineering.

Student profile:

This project would be best suited to a student having a background in mechanical, electrical or aerospace engineering, with an interest in robotics and environmental science. The project involves robotics and data analysis, but also entails significant field work so enthusiasm for work outdoors, and a willingness to get muddy will be helpful.

Knowledge of image analysis and geospatial information systems would be an asset.
Experience with Python or C++ would be advantageous but not required, as would any practical experience with mobile robotics.

A candidate with a strong desire to improve the natural world would find the project rewarding.

https://research.reading.ac.uk/scenario/