

Project Title	AntGate: A colony door which selects for ant size
Supervisor	Dr David Labonte
Theme(s)	Biomechanics and Mechanobiology Computational and Theoretical Modelling Neurotechnology and Robotics
Project Type	Lab based
Project Description	<p>Many experiments on animals require identification of different individuals—often a difficult task for the human eye. Traditional methods are laborious, involving marking each individual and closely following them over time, necessitating the development of automated methods.</p> <p>The goal of AntGate is to develop a door that opens only for permitted insects, improving the efficiency and reliability of research, while allowing exploration of questions on individual learning and behaviour.</p> <p>Using computer vision models developed in the lab, the mass of an insect will be extracted from a camera located next to the gate, and the gate will be activated if the insect is of appropriate size. The camera will also be able recognize tags, using existing technology [1] and trigger the gate if the insect is on the permitted list [2].</p> <p>The core challenge of this project will be engineering a tunnel and gate system seamlessly integrated with the camera input that allows only one insect through at a time. The main insect used to develop this gate will be ants, as their large colony sizes increase the need for automated tools.</p> <p>In this project, you will gain experience in machine learning techniques, camera control, and the building and development of practical tools for research. The system will be used to investigate how size and experience impacts ant locomotion, energetics, and behaviour, contributing to important advances in biomechanics and complex systems.</p> <p><u>Recommended Literature</u></p> <p>[1] Crall, J.D., Gravish, N., Mountcastle, A.M. and Combes, S.A., 2015. BEEtag: a lowcost, image-based tracking system for the study of animal behavior and locomotion. PloS one, 10(9), p.e0136487.</p> <p>[2] Robinson, E.J., Feinerman, O. and Franks, N.R., 2012. Experience, corpulence and decision making in ant foraging. Journal of Experimental Biology, 215(15), pp.2653-2659.</p>