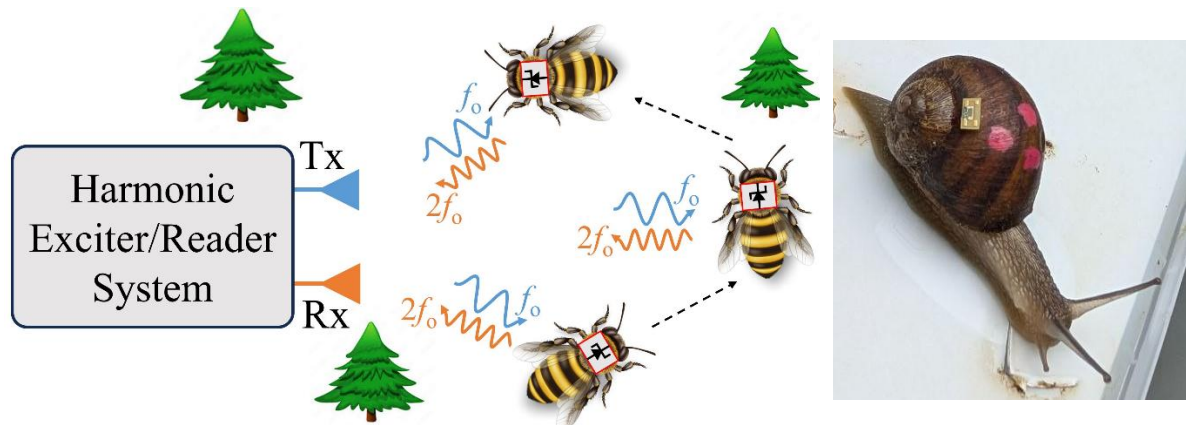


Project title: “Harmonic Tags for Insect tracking and beyond”

Introduction

Harmonic radar systems have been successfully used to detect and track small passive harmonic tags in a variety of applications. One of the common use case is tracking of tags carried by as is schematically illustrated in the figure below. The main operating principle of harmonic radar is that the target of interest is nonlinear so that it produces a return signal at a frequency different of that of the illuminating signal. This allows efficient clutter reflection but introduces a number of unique challenges in the system design.



An insect tracking system using harmonic tags and a snail with an X-band tag attached.

Project description

In this project, we design, test, and experimentally validate harmonic radar tags for use in insect tracking. The tags are fully passive (no battery) and operate at a frequency pair of 9.4/18.8 GHz. Multiple Bachelor and Master projects are available on this topic including

- Tag design and optimization;
- Evaluation of the influence of the insect body on the tag performance;
- Field testing with prospective animals (e.g., bees, snails, etc.);
- Modelling of tag performance under varying condition, etc.

Depending on the type of project, the work can involve one or more of the following: Matlab/Simulink simulations, proof-of-concept implementation on Software Defined Radio (SDR), lab measurements and/or field testing, etc.

Requirements: You are a motivated student looking for a project topic in the field of microwave sensing. You have interest in practically-oriented work, have basic knowledge and interest in microwaves and signal processing, and enjoy working in the lab environment.

If you are interested in this topic, please contact **Dr. A. Lavrenko** at a.lavrenko@utwente.nl.