University of Basel, Department of Biomedical Engineering, Hegenheimermattweg 167 c, 4123 Allschwil

Master of Science – Biomedical Engineering, Thesis Proposal

**Deep Learning for Automatization of Video-Analysis for Malaria Vector Behavioral Studies**

Malaria is an infectious disease that is transmitted via different *Anopheles* mosquito vectors, each with their own unique behavior. To develop and deploy effective vector control products, it is essential to understand the behavior of each mosquito species. In particular, studying mosquito movement in space and time in their local environment and the vector control tool they interact with can help improve such vector control strategies. The mosquitoes may be targeted and killed by small insecticidal net barriers positioned above a conventional net, as they tend to approach a net more frequently from above.

The aim of this master thesis is to develop deep learning models to support malaria vector behavioral studies based on video analysis. In particular, these models will focus on aiding in the automatization of common tasks performed during these experiments, such as mosquito detection, sexing, species identification, and behavioral pattern classification. For this purpose, the student will need to improve an existing pipeline to process the 2D images that constitute the videos (taken with normal and infrared cameras). Next, based on previous work, they should develop a working solution for each task using deep learning. Ground truth labels per image will be provided by the Swiss TPH. Finally, should all objectives be completed before the end of the thesis, additional work related to the Swiss TPH's malaria control projects will be conducted.

**Nature of the Thesis**
Experimental: 30%, Programming: 60%, Documentation: 10%

**Specific Requirements**
- Experience in deep learning
- Good programming skills (Python)

**Supervisors**
Prof. Dr. Philippe Cattin, *University of Basel, Center for medical Image Analysis and Navigation (CIAN)*
Alicia Durrer*, University of Basel, Center for medical Image Analysis and Navigation (CIAN)*

**Scientific Collaborators**
Prof. Dr. Frédéric Tripet, *Vector Biology Unit, Swiss Tropical and Public Health Institute (Swiss TPH), Basel*

**Contact**
alicia.durrer@unibas.ch

University of Basel
Department of Biomedical Engineering
Hegenheimermattweg 167b/c
4123 Allschwil, Switzerland

Prof. Dr. Philippe Claude Cattin
Center of Image Analysis and Navigation
T +41 61 207 54 00
philippe.cattin@unibas.ch