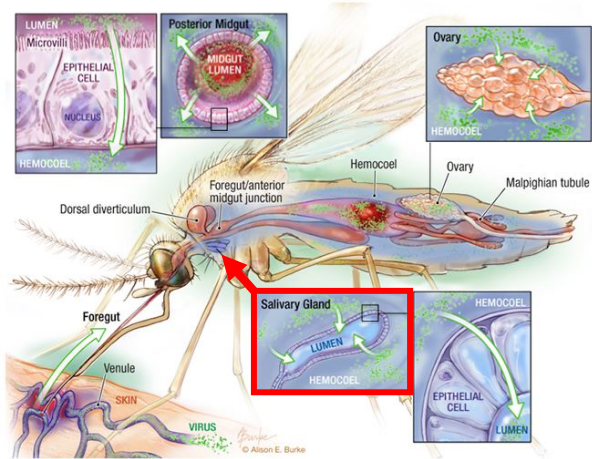


Vision Guided Mosquito Dissection for the Production of Malaria Vaccine

There are over 200 million cases of malaria every year globally that results in more than 400,000 deaths.

The disease is caused by a parasite that incubates inside the salivary glands of mosquitoes.

The extraction of these sporozoites from mosquito salivary glands enables the manufacturing of one promising malaria vaccine.



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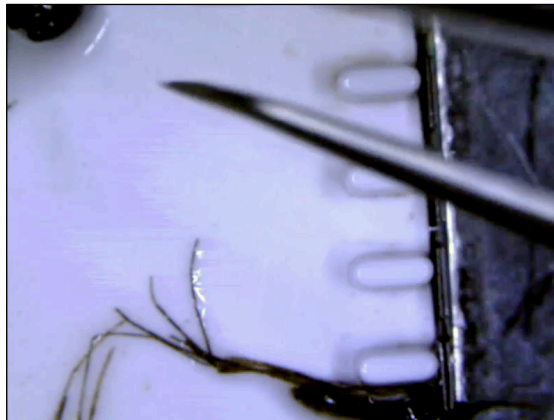


1

Vision Guided Mosquito Dissection for the Production of Malaria Vaccine

The current extraction process is fully manual and requires highly trained technicians to perform delicate manual operations under a microscope.

The process is time consuming and expensive.



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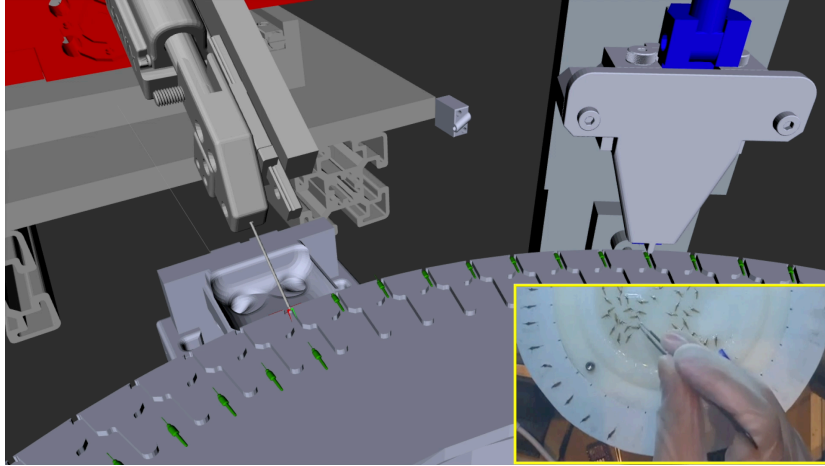
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2

Vision Guided Mosquito Dissection for the Production of Malaria Vaccine

An automated dissection process is being developed at LCSR that uses a robotic microsurgical instrument to manipulate mosquitoes.



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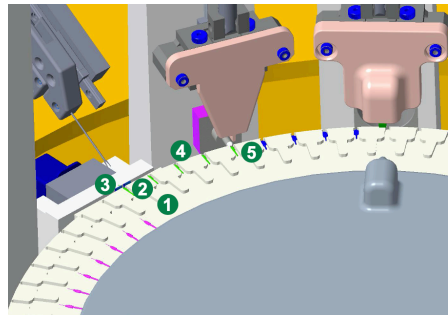
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3

Vision Guided Mosquito Dissection for the Production of Malaria Vaccine

The autonomy of the robotic system hinges on sophisticated computer vision methods to detect mosquitoes and their body parts, and to provide quality control during the process.



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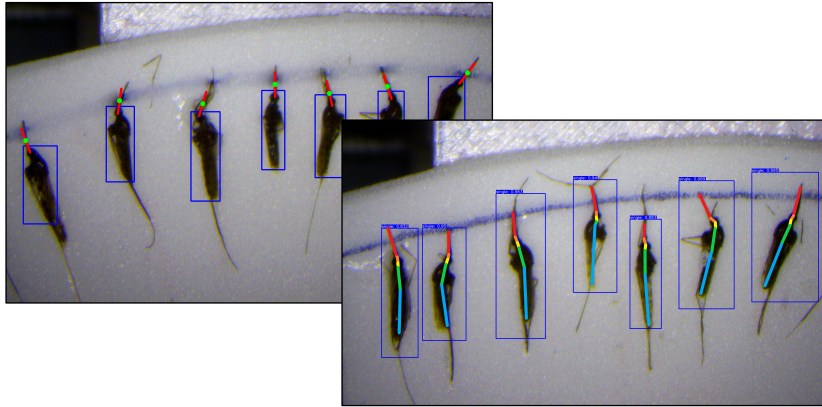
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4

Vision Guided Mosquito Dissection for the Production of Malaria Vaccine

The autonomy of the robotic system hinges on sophisticated computer vision methods to detect mosquitoes and their body parts, and to provide quality control during the process.



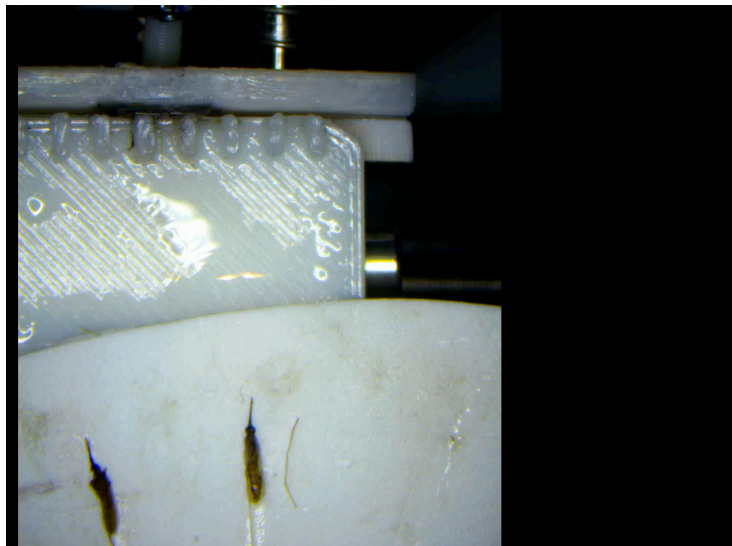
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Vision Guided Mosquito Dissection for the Production of Malaria Vaccine



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6

Vision Guided Mosquito Dissection for the Production of Malaria Vaccine

Problem:

Efficient automated mosquito salivary gland extraction system requires robust high performance computer vision methods for robot control and quality control.

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7

Vision Guided Mosquito Dissection for the Production of Malaria Vaccine

- **What Students Will Do:**
 - Use model-based and machine-learning-based (DL) computer vision methods to facilitate robotic mosquito dissection.
 - **Model based approach:** Conventional image processing methods
 - **Machine learning based approach:** Using Deep Learning
- **Deliverables:**
 - Improve existing methods and develop new methods for:
 - Supervising mosquito decapitation, squeezing of salivary glands, cleaning of dissection apparatus
 - Perform laboratory experiments
 - Maintain documentation of experimental results, methods, source code
 - Contribute to publishing results
- **Size group:** 1-2
- **Skills:** Computer Vision - Deep Learning and Image Processing
- **Mentors:** Balazs Vagvolgyi (balazs@jhu.edu); Parth Vora (pvara4@jhu.edu); Alan Lai (alan_lai@jhu.edu)

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