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***Musca domestica* Based Machine Vision Sensor: a Continuing Project**

Outline



- Background
- Research objectives
- Methods
- Results
- Applications
- Conclusions
- Acknowledgements

Background



- Ongoing project
 - Undergraduate
 - Graduate
 - Doctorate
 - Post-doctorate
- Fly-based Testing
- Model Development
- Prototype Design, Testing, and Characterization

Fly-based Tests and Model Development

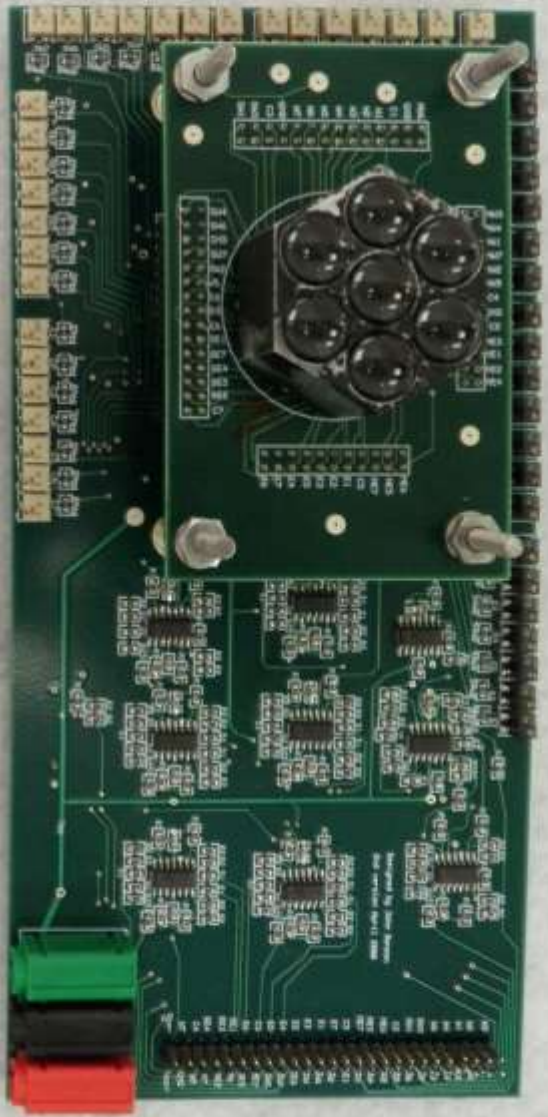


- *Musca domestica* eye tests (“fly-eye”)
- Fundamental mathematical analysis
 - Development of mathematical modeling
 - Basis for prototype development

Prototype Design



- Initial prototype
 - Fiber optics
 - Limitations
- “Second-generation” Design
 - Improvements
 - Still limited in field-of-view (FOV)
- “Third-generation” Design
 - Increases in FOV
 - Additional complexity



Research Objectives



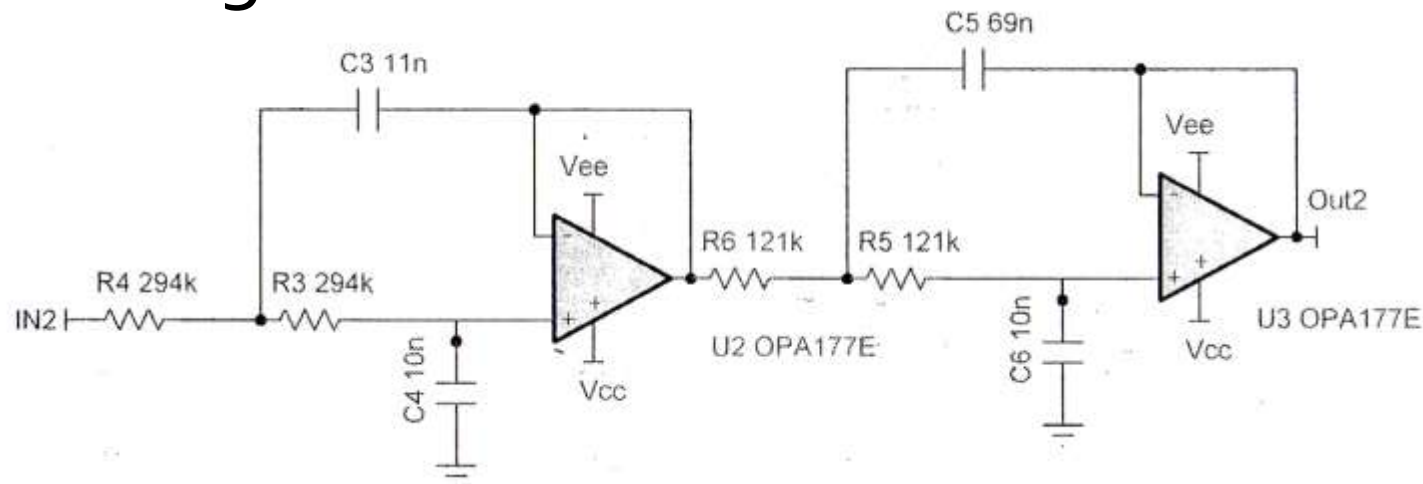
- Ambient light-filtering
 - Filter Design
 - Board layout
 - Testing
- Long-range applications
 - Telescope mount
 - Results



Methods (filter design and board layout)



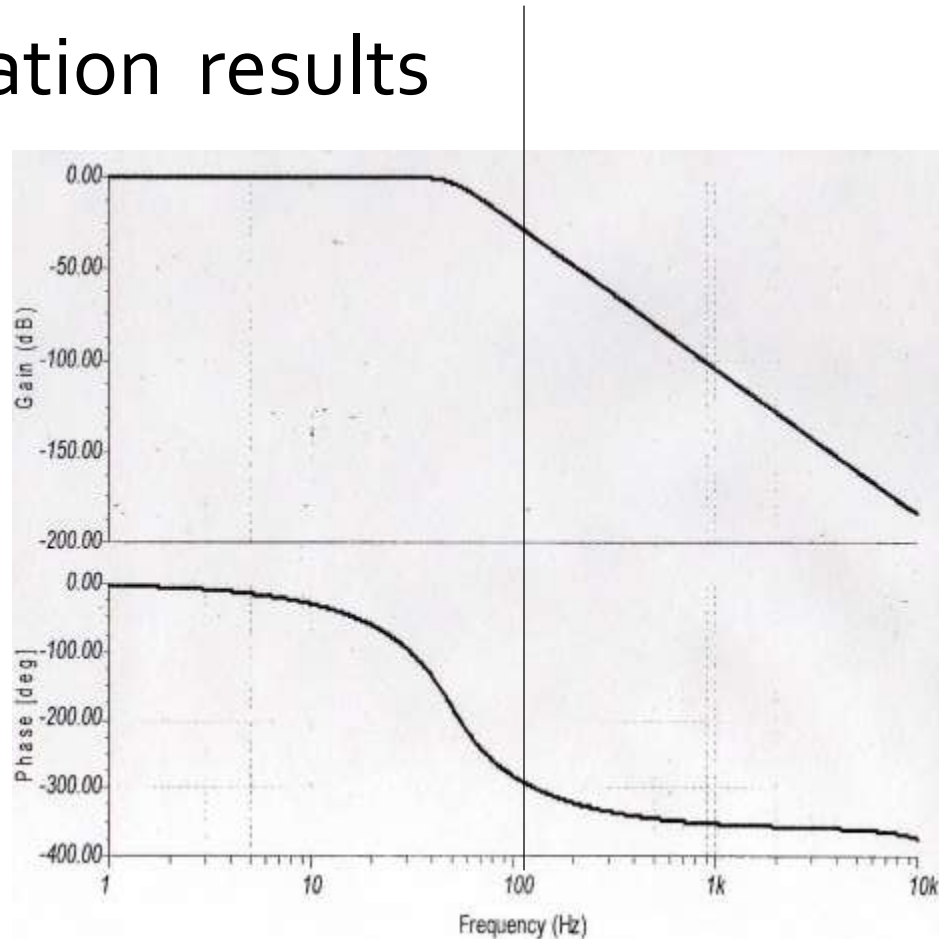
- Simulation in PSpice
- Computerized circuit board design
- Reflow oven construction
- Testing



Methods (filter design and board layout)



- Simulation results



- Ambient noise in the lab
- Trade-offs

Methods (filter design and board layout)



- Reflow oven construction



Methods (long-range application)



- Telescope
- Night tests
- Mounting hardware



Results (filter design and board layout)



- Fully functional
- Adequately removes noise
- Future work

Results (long-range application)



- Limited success
- Optical issues
- Future work



Applications



- Edge-detection
- Hyper sensitive to motion
- Low contrast conditions
- Civil and Military

Conclusions



- Light-filtering:
 - Improves robustness
 - Future adaptations could be active
- Long-range application:
 - Optical limitations
 - Potential for further tests

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