Michael Maynord
Iribe Center, University of Maryland
8125 Paint Branch Dr.
College Park, MD 20742
maynord@umd.edu

RESEARCH SUMMARY
Research scientist working on feedback-modulated mid-level perception and structured visual representations that link perceptual input with embodied action and symbolic/LLM-mediated reasoning. My work examines how context and goals shape perceptual inference, and how structured abstractions support generalizable understanding across static, dynamic, and real-world applied domains. I also maintain complementary work in medical imaging under practical constraints. I focus on fundamental research, interdisciplinary collaboration, and publishable scientific contributions.

RESEARCH THEMES
• Feedback-modulated mid-level perception and structured visual representations.
• Bridging continuous sensory dynamics with symbolic and LLM-mediated reasoning.
• Perception–action coupling for egocentric and embodied agents.
• Domain-general representation learning, evidenced across natural and applied imaging settings.

EDUCATION

University of Maryland, College Park — College Park, MD
Ph.D., Computer Science — Summer 2024

University of Wisconsin, Madison — Madison, WI
B.S., double major in Computer Science and Mathematics, Comprehensive Honors, Phi Beta Kappa — Spring 2012

RESEARCH EXPERIENCE

Research Scientist (NSF AccelNet Fellow) — **Fall 2024 – Present**
University of Maryland, College Park, MD
- Continuing post-PhD research on feedback-modulated mid-level perception and structured visual representations in embodied and cross-domain settings.
  - Investigate how contextual and top-down feedback shapes mid-level visual representations that support perceptual inference and action.
  - Develop structured perceptual abstractions that bridge continuous sensory input with symbolic/LLM-mediated reasoning in egocentric and embodied settings.
  - Apply representation-learning methods to real-world domains, including 7T MRI lesion segmentation and lung CADe, as evidence of cross-domain generality.

Lab of Professor Yiannis Aloimonos and Cornelia Fermüller — **Fall 2015 to Summer 2024**
University of Maryland, College Park, MD
- Research on: the role of top-down feedback in biasing towards consistency across levels of abstraction; weakly supervised action segmentation; zero-shot action recognition; deep learning methods; use of symbolic methods in interpreting vision; medical image analysis.

Lab of Dr. Aria Pezeshk — **July 2020 – October 2021**
Food and Drug Administration
- As an intern, developed and implemented methods for weakly supervised training of lung nodule detectors.

Lab of Dr. David Aha — **Summer 2013 to Summer 2016**
Naval Research Laboratory, Washington, D.C.

- **Summer 2013:** Drafted a conceptualization of “Goal Reasoning” - the notion that an agent can be made more robust and more capable by structuring that agent's processes around dynamically changing goals.
- **Summer 2014:** Developed a method for rapid plan recognition based on projecting plans into Euclidean space and hierarchical clustering.
- **Summer 2015 - Summer 2016:** Implemented a prototype of the Image Surveillance Assistant architecture – a configurable perception pipeline spanning multiple levels of representation.

Lab of Professor Don Perlis **Fall 2012 – Spring 2015**
University of Maryland, College Park, MD
- **Spring 2013, Fall 2013, and Spring 2014:** Funded as a GRA.
- Involved in multiple efforts to realize Goal Reasoning.
- Involved in work on robotics and drones.

Lab of Professor Xiaojin (Jerry) Zhu **Fall 2011 – Spring 2012**
Undergraduate Research Assistant
University of Wisconsin, Madison, WI
- Collaborated on the design and creation, based on machine learning, of an “image-to-text” application to aid those with language developmental disorders.

Lab of Professor Jignesh Patel **Summer 2010 – Spring 2012**
Undergraduate Research Assistant
University of Wisconsin, Madison, WI
- Principle developer of Themis, an application for combating laptop theft employed by the University of Wisconsin Police Department.

TEACHING and MENTORING

Teaching Assistant
University of Maryland, College Park, MD
- Critiqued and provided input on the creation of projects, tests, and quizzes.
- Interacted with students on and off-line to guide understanding and answer questions.
  - Held office hours
  - Interacted via Piazza and email
- **Taught discussion sections for CMSC 131** **Fall 2012, Spring 2013, Spring 2015**
  - Lectured in discussion on material complementary to that covered by the course instructor
  - Walked through concept and code demonstrations
  - Managed in-section coding exercises and quizzes
- **CMSC 421, 131, 132** **Fall 2014, Spring 2016, Spring 2019 (respectively)**
  - Held grading responsibilities
- **CMSC 216** **Fall 2018, Fall 2019, Spring 2021, Spring 2023**
  - Held grading responsibilities
  - Office hours, student communication, misc.

Mentor **Summer 2016**
Naval Research Laboratory, Washington, D.C.
- Coached two undergraduate interns who were assigned to me as mentees.
- Explained details and concepts pertaining to a project on regularizing object detections produced by a Convolutional Neural Network.
- Collaborated on conceptualization and implementation of this project with interns and a visiting professor.
- Provided guidance on performing academic research, including reviewing literature, systematically approaching a research challenge, evaluating results, and writing up results.

FELLOWSHIPS, GRANTS, and AWARDS

University of Maryland, College Park, MD

- **2016 Qualcomm Innovation Fellowship**, split between myself and my colleague Anupam Guha. 8 out of 129 proposals from 18 of the top CS schools were selected. https://www.qualcomm.com/invention/research/university-relations/innovation-fellowship/winners **$100,000, Fall 2016 – Spring 2017**
- **John Gannon Fellowship** **$300, Spring 2015**
- **Dean's Fellowship** **$10,000 Fall 2012 – Spring 2014**

University of Wisconsin, Madison, WI

- Graduated with **Comprehensive Honors** (completed honors in the liberal arts and honors in the CS major tracks - http://honors.ls.wisc.edu/)
- Inducted into **Phi Beta Kappa**
- Funded by two NSF Research Experiences for Undergraduates (REU) Grants
  - Project on which I was funded by **REU Grant: IIS-0929988** **Summer 2010 – Spring 2012**
  - Project on which I was funded by **REU Grant: IIS-0711887** **Fall 2011 – Spring 2012**
- Awarded **Fulbright-Hays Scholarships** for study in Russia
  - Study in St. Petersburg **$4000, Summer 2011**
  - Study in Moscow **$3500, Summer 2009**
- UWPD **Chief's Award** for being principle developer of Themis, an anti-theft application for laptops, as part of a collaboration between UW and the UW Police Department.
- One of a team of three who won third place and the **Wisconsin Idea award** in the NEST (Nest for Emerging Software Technologies) software competition. https://contest.cs.wisc.edu/past/BB-2010.pdf **Fall 2010**

PUBLICATIONS and PRESENTATIONS

Papers:

1. Farhangi, M. M., **Maynord, M.**, Fermüller, C., Aloimonos, Y., Sahiner, B., & Petrick, N. Exploring Synthetic Datasets for Computer-Aided Detection: A Case Study Using Phantom Scan Data for Enhanced Lung Nodule False Positive Reduction. Journal of Medical Imaging, 2024.
2. Farhangi, M. M., **Maynord, M.**, Sahiner, B., & Petrick, N. Training CADe Algorithms With Synthetic Datasets: Augmenting Clinical Data for Improved Lung Nodule Detection. SPIE Medical Imaging: Computer-Aided Diagnosis, 2024.
3. Dessalene, E., **Maynord, M.**, Fermüller, C., & Aloimonos, Y. Context in Human Action Through Motion Complementarity. WACV, 2024.
4. **Maynord, M.**, Dessalene, E. T., Fermüller, C., & Aloimonos, Y. Mid-Vision Feedback. ICLR, 2023.
5. Dessalene, E., **Maynord, M.**, Devaraj, C., Fermüller, C., & Aloimonos, Y. Therbligs in Action: Video Understanding Through Motion Primitives. CVPR, 2023.
6. **Maynord, M.**, Farhangi, M. M., Fermüller, C., Aloimonos, Y., Levine, G., Petrick, N., & Pezeshk, A. Semi-Supervised Training Using Cooperative Labeling of Weakly Annotated Data for Nodule Detection in Chest CT. Medical Physics, 2023.
7. Fermüller, C., & **Maynord, M.** Learning for Action-Based Scene Understanding. Advanced Methods and Deep Learning in Computer Vision, Academic Press, 2022.
8. Dessalene, E., Devaraj, C., **Maynord, M.**, Fermüller, C., & Aloimonos, Y. Forecasting Action Through Contact Representations From First Person Video. IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2021.
9. Ye, C., Devaraj, C., **Maynord, M.**, Fermüller, C., & Aloimonos, Y. Evenly Cascaded Convolutional Networks. IEEE Big Data, 2018.

Earlier Work (Selected):

1. Paisner, M., Cox, M. T., **Maynord, M.**, & Perlis, D. Goal-Driven Autonomy for Cognitive Systems. Proceedings of the 36th Annual Conference of the Cognitive Science Society, 2014.
2. **Maynord, M.**, Cox, M. T., Paisner, M., & Perlis, D. Data-Driven Goal Generation for Integrated Cognitive Systems. AAAI Fall Symposium on Integrated Cognition, 2013.
3. Paisner, M., **Maynord, M.**, Cox, M. T., & Perlis, D. Goal-Driven Autonomy in Dynamic Environments. ACS Workshop on Goal Reasoning, 2013.
4. Cox, M. T., **Maynord, M.**, Paisner, M., Perlis, D., & Oates, T. The Integration of Cognitive and Metacognitive Processes with Data-Driven and Knowledge-Rich Structures. IACAP Annual Meeting, 2013.
5. Perlis, D., Cox, M. T., **Maynord, M.**, McNany, E., Paisner, M., Shivashankar, V., et al. A Broad Vision for Intelligent Behavior: Perpetual Real-World Cognitive Agents. Advances in Cognitive Systems Workshop on Metacognition in Situated Agents, 2013.
6. **Maynord, M.**, Vattam, S., & Aha, D. W. Increasing the Runtime Speed of Case-Based Plan Recognition. FLAIRS Conference, 2015.
7. **Maynord, M.**, Bhattacharya, S., & Aha, D. W. Image Surveillance Assistant. IEEE WACV Workshops, 2016.
8. **Maynord, M.**, Aha, D. W., & Bhattacharya, S. Image Surveillance Assistant Architecture: Status and Planned Extensions. IJCAI Workshop on Deep Learning for Artificial Intelligence (DLAI), 2016.

Preprints and Under Review:

9. Dessalene, E. T., Yuan, D., **Maynord, M.**, Pan, N. S., Fermüller, C., & Aloimonos, Y. From Appearance to Motion: Aligning Visual Representations for Robotic Manipulation.
10. Dessalene, E. T., **Maynord, M.**, Kapu, R., Fermüller, C., & Aloimonos, Y. Evolved LLM Schemas for Mid Vision Feedback.
11. Dessalene, E. T., **Maynord, M.**, Mantripragada, P., & Aloimonos, Y. EmbodiSwap for Zero-Shot Robot Imitation Learning. arXiv preprint arXiv:2510.03706.
12. Dessalene, E., **Maynord, M.**, Fermüller, C., & Aloimonos, Y. (2023). LEAP: LLM-Generation of Egocentric Action Programs. arXiv preprint arXiv:2312.00055.
13. Dessalene, E., **Maynord, M.**, Devaraj, C., Fermüller, C., & Aloimonos, Y. (2020). Egocentric Object Manipulation Graphs. arXiv preprint arXiv:2006.03201.

Manuscripts in Preparation:

- **Maynord, M.**, *et al.* Automated Detection of Multiple Sclerosis Lesions on 7-tesla MRI Using U-net and Transformer-based Segmentation. *Manuscript in preparation.*

Technical Reports:

1. **Maynord, M.** (2024). Feedback for Vision. Ph.D. Dissertation, Department of Computer Science, University of Maryland, College Park.
2. 2013 NRL report: **Maynord, M.** Aha, D.W., Wilson, M., & Cox, M.T. (2013). On goal reasoning (Technical Note AIC-13-143). Washington, DC: Naval Research Laboratory, Navy Center for Applied Research in Artificial Intelligence.
3. UW-Madison report: **Michael Maynord**, Jitrapon Tiachunpun, Xiaojin Zhu, Charles R. Dyer, Kwang-Sung Jun, and Jake Rosin. An Image-To-Speech iPad App. Department of Computer Sciences Technical Report TR1774, University of Wisconsin-Madison. 2012.

Poster Presentations:

1. Maynord M, Liu M, Fermüller C, Zeng Y, Choi S, Harrison DM. Multiple Sclerosis Lesion Segmentation on 7T MRI: A U-Net Tool and Evaluation. Annual Meeting of the American Committee for Treatment and Research in Multiple Sclerosis: San Diego, CA. Poster P008. Feb 2023.
2. Deep Learning for Artificial Intelligence Workshop at IJCAI 2016 (poster), “Image Surveillance Assistant Architecture: Status and Planned Extensions.”
3. ACS-13 workshop on Goal Reasoning: "On the Definition and Desirability of Goal Reasoning"

4. 14th Annual Undergraduate Symposium, University of Wisconsin Madison, April 2012, “An Image-To-Speech iPad App.”

Talks:

1. Presented “Feedback for Vision” - finalist presentation for the 2016 Qualcomm Innovation Fellowship, in collaboration with Anupam Guha.
2. Presented “Image Surveillance Assistant” at the Winter Applications of Computer Vision Workshops, 2016.
3. Presented “Increasing the runtime speed of case-based plan recognition” in the CBR track of FLAIRS-28: http://users.csc.tntech.edu/~weberle/FLAIRS-28/FLAIRS-28%20-%20Program.pdf
4. Presented “Data-driven goal generation for integrated cognitive systems” at the 2013 AAAI Fall Symposium Series: http://www.aaai.org/ocs/index.php/FSS/FSS13/paper/view/7618