

Nathaniel D. Bird, Ph.D.

CONTACT INFORMATION

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EDUCATION

University of Minnesota, Minneapolis, Minnesota

Ph.D., Computer Science (October 2009)

- Dissertation Title: “Calibration and Component Placement in Structured Light Systems for 3D Reconstruction Tasks”
- Advisor: Nikolaos Papanikolopoulos
- Minor: Psychology
- GPA: 4.0/4.0

M.S., Computer Science (May 2006)

- Thesis Title: “Detection of Loitering Individuals in Public Transportation Areas”
- Advisor: Nikolaos Papanikolopoulos
- Awards: Matthew J. Huber Award for Excellence in Transportation Research and Education, 2005 ITS Student of the Year
- GPA: 4.0/4.0

Ohio Northern University, Ada, Ohio

B.S., Computer Engineering *with High Distinction* (May 2003)

- Minors: Applied Mathematics, Physics
- Honor Societies: Tau Beta Pi, Phi Kappa Phi, Sigma Pi Sigma, Phi Eta Sigma
- GPA: 3.97/4.0

RESEARCH INTERESTS

Activity recognition (human and robotic), computer vision, robotics, structured light systems, medical imaging.

EXPERIENCE

Image Sensing Systems, Inc., St. Paul, Minnesota

Senior Algorithm Development Engineer

October 2013–Present

- Developing vision-based vehicle tracking algorithms and supporting technologies for next-generation intersection monitoring and control devices.

Birdseye Technology LLC, Minneapolis, Minnesota

Proprietor, Chief Software Engineer, Manager

September 2012–Present

- **Birdseye College Price Comparison** (<http://www.birdseyecollege.com>), a website that helps students by providing them with a 4-year total cost estimate (including tuition, room, board, and books) for each individual college or university they are considering. This tool improves the transparency of college pricing by providing students and their parents with a feel for how much individual colleges will cost them prior to investing time, money, and energy in college visits and application fees.

Ohio Northern University, Ada, Ohio

Assistant Professor of Computer Science

November 2009–August 2012

- Courses taught:

- Introduction to Programming 2 (Java). Spring '11/'12.
- Data Structures and Algorithms 2. Spring '11/'12, Spring '10/'11, Spring '09/'10.
- Operating Systems. Spring '11/'12, Spring '10/'11, Spring '09/'10.
- Computer Security. Fall '11/'12.
- Programming Languages. Fall '11/'12, Fall '10/'11.
- Data Structures and Algorithms 1. Fall '11/'12, Winter '10/'11, Winter '09/'10.
- Computer Vision. Spring '10/'11, Spring '09/'10.
- Introduction to Programming 2 (C++). Winter '10/'11, Winter '09/'10.
- Microprocessors. Fall '10/'11.
- Course introduced:
 - Computer Vision.
- Committees served:
 - University Council. '10/'11–'11/'12.
 - College Disability Accommodations Appeals Committee. '11/'12.
 - Computer Science Curriculum Committee. '09/'10–'11/'12.
- Student academic advising:
 - Computer Science juniors and seniors. '10/'11–'11/'12.
- Student group advising:
 - ACM student chapter advisor. '10/'11.
 - ACM Programming Competition coach. '10/'11.
- Senior Capstone advising:
 - 2011/2012: Autonomous golf cart (path planning); multi-modal robot.
 - 2010/2011: Autonomous golf cart (electromechanical); networked interactive water fountain displays.

University of Minnesota, Minneapolis, Minnesota

Visiting Researcher

June–August 2011

- Worked in a team developing a vision system to monitor children for developmental handicaps in a natural school environment, using data captured from multiple overlapping depth+image sensors.
- Continued developing algorithms to detect traitorous behaviors in robotic members of multi-robot teams, focusing on behaviors that vary based on a robot's sensor input.

Visiting Researcher

June–August 2010

- Developed algorithms to visually analyze behaviors and detect traitors within multi-robot teams, focusing on behaviors that do not change based on a robot's sensor input.

Graduate Research Assistant

September 2003–November 2009

- Developed supporting technology for a full-body patient tracking system for medical applications.
- Developed a large vision-based human activities monitoring system for the Department of Homeland Security, comprising of over 100 cameras and many detected behaviors.
- Developed vision algorithms to detect distracting behavior in motorists.
- Developed a vision system to monitor for suspicious behavior at bus stops.

Technology Day Camp Co-Coordinator

Summer 2008, Summer 2009

- A week-long day camp to get middle school students from underrepresented backgrounds interested in computer science. Expanded to three weeks in 2009.
- Duties included: planning, developing curriculum, organizing volunteers, and leading the camp.
- For more information on the camp, see <http://techcamp.cs.umn.edu>.

Teaching Assistant

Fall 2006–Spring 2008

- Computer Vision: Spring 2007/2008.
- Introduction to Programming: Summer 2007.
- Artificial Intelligence 1: Fall 2006/2007, Spring 2006/2007.

PROFESSIONAL
SOCIETIES

Member, [Institute of Electrical and Electronics Engineers \(IEEE\)](#)

- Secretary, Lima, Ohio, USA Section, January 2011–August 2012.
- Associate Editor, International Conference on Intelligent Robots and Systems (IROS) 2011.
- Session Chair, International Conference on Robotics and Automation (ICRA) 2011.

Member, [Association for Computing Machinery \(ACM\)](#)

- Advisor, Ohio Northern University Student Chapter, 2010/2011.

Member, [American Society for Engineering Education \(ASEE\)](#)

- Website and Registration Committee, ASEE North Central Section Conference 2012.
- Session Chair, ASEE Annual Conference 2011.

JOURNAL
PUBLICATIONS

N. Bird and N. Papanikolopoulos, “Optimal Image-Based Euclidean Calibration of Structured Light Systems in General Scenes”, *IEEE Trans. Automation Science and Engineering*, vol. 8, no. 4, pp. 815–823, 2011.

K. Cannon, M. A. LaPoint, N. Bird, K. Panciera, H. Veeraraghavan, N. Papanikolopoulos, and M. Gini, “Using Robots to Raise Interest in Technology Among Underrepresented Groups”, *IEEE Robotics and Automation Magazine*, vol. 2, no. 99, pp. 2-11, 2007.

H. Veeraraghavan, N. Bird, S. Atev, N. Papanikolopoulos, and P. Schrater, “Classifiers for Driver Activity Monitoring”, *Transportation Research Part C: Emerging Technologies*, vol. 15, no. 1, pp. 51-67, February 2007.

N. Bird, O. Masoud, N. Papanikolopoulos, and A. Isaacs, “Detection of Loitering Individuals in Public Transportation Areas”, *IEEE Trans. Intelligent Transportation Systems*, vol. 6, no. 2, pp. 167-177, June 2005.

CONFERENCE
PUBLICATIONS

R. Sivalingam, A. Cherian, J. Fasching, N. Walczak, N. Bird, V. Morellas, B. Murphy, K. Cullen, K. Lim, G. Sapiro, and N. Papanikolopoulos, “A Multi-Sensor Visual Tracking System for Behavior Monitoring of At-Risk Children”, *Proc. IEEE Intl. Conf. Robotics and Automation (ICRA 2012)*, May 2012.

N. Walczak, J. Fasching, W. Toczyski, R. Sivalingam, N. Bird, K. Cullen, V. Morellas, B. Murphy, G. Sapiro, and N. Papanikolopoulos, “A Nonintrusive System for Behavioral Analysis of Children Using Multiple RGB+Depth Sensors”, *Proc. Workshop Applications in Computer Vision (WACV 2012)*, January 2012.

N. Bird, "Use of the Arduino Platform for a Junior-Level Undergraduate Microprocessors Course", *Proc. ASEE Annual Conf. (ASEE 2011)*, June 2011.

- Finalist for Best Paper in the Computers in Education division.

J. Estell, N. Bird, F. Hassan, "Mentoring with Index Cards: An Early Introduction to Formative Assessment for New Faculty", *Proc. ASEE Annual Conf. (ASEE 2011)*, June 2011.

N. Bird and N. Papanikolopoulos, "Recognition of Traitors in Distributed Robotic Teams", *Proc. IEEE Intl. Conf. Robotics and Automation (ICRA 2011)*, May 2011.

N. Bird and N. Papanikolopoulos, "Placement Quality in Structured Light Systems", *Proc. IEEE/RSJ Conf. Intelligent Robots and Systems (IROS 2009)*, October 2009.

N. Bird, S. Atev, N. Caramelli, R. Martin, O. Masoud, and N. Papanikolopoulos, "Real-Time, Online Detection of Abandoned Objects in Public Areas", *Proc. IEEE Intl. Conf. Robotics and Automation (ICRA 2006)*, pp. 3775-3780, May 2006.

K. Cannon, M. A. LaPoint, N. Bird, K. Panciera, H. Veeraraghavan, and N. Papanikolopoulos, "No Fear: University of Minnesota Robotics Day Camp Introduces Local Youth to Hands-On Technologies", *Proc. IEEE Intl. Conf. Robotics and Automation (ICRA 2006)*, pp. 363-368, May 2006.

H. Veeraraghavan, S. Atev, N. Bird, P. Schrater, and N. Papanikolopoulos, "Driver Activity Monitoring through Supervised and Unsupervised Learning", *Proc. IEEE Conf. Intelligent Transportation Systems (ITSC 2005)*, pp. 895-900, September 2005.

G. Gasser, N. Bird, O. Masoud, and N. Papanikolopoulos, "Human Activities Monitoring at Bus Stops", *Proc. IEEE Conf. Robotics and Automation (ICRA 2004)*, pp. 90-95, April 2004.

- Finalist for Best Student Paper.

N. Bird, E. Miller, P. Pfeiffer, and S. Vemuru, "Channel Routing with Crosstalk Considerations", *Proc. Int'l Conf. VLSI*, pp. 119-124, 2003.

VIDEO
PROCEEDING

S. Herbert, N. Bird, A. Drenner, and N. Papanikolopoulos, "A Search and Rescue Robot", *Proc. IEEE Conf. Robotics and Automation (ICRA 2009)*, May 2009.

TECHNICAL
REPORTS

H. Veeraraghavan, S. Atev, N. Bird, P. Schrater, N. Papanikolopoulos, "Finding What the Driver Does", CTS 05-03, Intelligent Transportation Systems Institute, University of Minnesota, May 2005.

G. Gasser, N. Bird, and N. Papanikolopoulos, "Recognition of Human Activity in Metro Transit Spaces", CTS 04-02, Intelligent Transportation Systems Institute, University of Minnesota, June 2004.

PEER REVIEW

2011/2012

- 1 paper Pattern recognition Letters, 3 papers ASEE NC 2012, 2 papers ICRA 2012, 5 papers IROS 2011.

2010/2011

- 1 paper Pattern Recognition Letters, 3 papers ICRA 2011, 7 papers ASEE 2011.

REFERENCES

References available upon request.