

# JAMIE R. SNAPE - PRINCIPAL R&D ENGINEER

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Experienced Principal R&D Engineer and Project Lead with demonstrated history of working and leading in the computer software, financial, robotics, scientific, and engineering industries and in academia. Skilled in C++, Java, Python, and other languages, various open-source libraries and cloud (AWS and GCP) and web (LAMP, JavaScript and Python stacks) platforms. Certified in Java programming. Strong engineering professional with Ph.D. in computer science focused on distributed autonomous robotic vehicles and video game artificial intelligence from University of North Carolina at Chapel Hill. US and UK Citizen.

## EXPERIENCE

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### **Computer Vision Team, Kitware, Inc.,** Carrboro, NC, USA

Principal R&D Engineer and Project Lead, 03/21–

Staff R&D Engineer and Project Lead, 05/16–02/21

Senior R&D Engineer, 02/13–04/16

Research and development of frontend and backend software and infrastructure for academic, commercial, government, and defense projects. Worked with Google as part of *Project Tango* on augmented reality apps, build and test infrastructure on experimental mobile devices, web applications using JavaScript, MySQL, PHP, and Sass, C++, Java (JNI), and Unity support libraries, depth interpolation, and vision algorithm evaluation. Worked with Massachusetts Institute of Technology Computer Science and Artificial Intelligence Laboratory and Toyota Research Institute architecting and managing cloud-based build, test, and delivery infrastructure for autonomous vehicle and robotics simulation, worked on Python bindings to C++, visualization, ray tracing, and collision detection, responsible for project management, proposals and statements of work, and basic project financials.

### **Depts. of Electrical and Computer Engineering and Mechanical Engineering and Materials Science, Duke University,** Durham, NC, USA

Adjunct Assistant Professor, 08/17–01/18

Developed and taught graduate course *Distributed Robotic Systems*. Prepared and taught all classes, held office hours, designed and graded assignments and capstone project, and determined final grades. Topics included flocking, foraging, herding, formation, swarming, collision avoidance, path planning, self-driving cars, traffic management, biological-inspired, market-based, and role-based task allocation, aerial-ground robot and human-robot interaction and coordination, and robotic soccer.

### **Dept. of Computer Science, University of North Carolina at Chapel Hill,** Chapel Hill, NC, USA

Co-instructor and Teaching Assistant, 01/11–05/11

Research Assistant, 06/09–07/12

Teaching Assistant, 08/07–05/09

Developed and co-taught graduate course *3D Game Engines*. Prepared and taught majority of classes, held office hours, designed and graded assignments. Topics included animation, artificial intelligence, audio, physics, gameplay, rendering, and video games console architecture. Authored multiple research papers and software in areas of robotics, artificial intelligence, and graphics. Assisted with undergraduate courses *Web Programming* and *Advanced Web Programming* and graduate course *Robotics*. Designed and graded assignments, held office hours, and prepared and taught guest or substitute classes.

### **Millennium Global Investments, Ltd.,** London, UK

Systems Developer, 04/06–07/07

Desktop, mobile, and web application development for currency trading, regulatory compliance, and product marketing using the BlackBerry OS, Bloomberg C# API, CSS, HTML, JavaScript, and SAS Base. System administration of Windows and Linux servers, and VoIP telephones in London, UK and Geneva, Switzerland.

## EDUCATION

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### University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Ph.D. in Computer Science, 08/07–12/12

Research areas: robotics, artificial intelligence, and graphics.

Dissertation: *Smooth and Collision-Free Navigation for Multiple Mobile Robots and Video Game Characters*.

Advisor: Prof. Dinesh Manocha. Committee: R. Alterovitz, J.-M. Frahm, M. C. Lin, D. Manocha, M. Niethammer.

M.S. in Computer Science, 08/07–05/09

Research areas: robotics, artificial intelligence, and graphics.

Advisor: Prof. Ming C. Lin.

### Worcester College, University of Oxford, Oxford, Oxfordshire, UK

M.Sc. in Computer Science, 10/04–10/05

Research areas: algorithms and combinatorics.

Thesis: *Loopless Functional Algorithms*.

Advisor: Prof. Richard S. Bird.

### Collingwood College, University of Durham, Durham, Co. Durham, UK

M.Math. in Mathematics (with honors), 10/00–07/04

Research areas: complex analysis and geometry.

Dissertation: *Applications of Elliptic Functions in Classical and Algebraic Geometry*.

Advisor: Dr. J. Vernon Armitage.

## SKILLS

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**Programming and Scripting Languages:** Bash, C, C++, C#, CSS, Haskell, HTML, Java (Sun-certified Programmer), JavaScript, Objective-C, Python, PHP, Sass, SQL.

**Tools and Technologies:** Amazon Web Services (AWS), Bazel, CMake, Debian, Docker, Git, Google Cloud Platform (GCP), Jenkins, Linux, macOS, MongoDB, MySQL, NoSQL, NGINX, PostgreSQL, Unix, WebDAV, VMware vSphere.

**Academic and Industry Knowledge:** Artificial Intelligence (AI), Augmented Reality (AR), Autonomous Vehicles, Cloud Computing, Collision Avoidance, Collision Detection, Cloud Computing, Computational Geometry, Computer Graphics, Continuous Delivery (CD), Continuous Integration (CI), Databases, Finance, Firewalls, Functional Programming, Game Engines, Geometry, Government Contracting, Graphics, Mobile Devices, Motion Planning, Object-Oriented Programming (OOP), Programming, Project Management, Research and Development (R&D), Robotics, Shell Scripting, Software Development.

**Spoken Languages:** English (native), French (limited working proficiency), Finnish (elementary proficiency).

## SOFTWARE

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J. v.d. Berg, S. J. Guy, —, M. C. Lin, and D. Manocha, *RVO2-3D Library*, released 05/11. Software library for autonomous multiagent collision avoidance in three dimensions.

J. v.d. Berg, S. J. Guy, —, M. C. Lin, and D. Manocha, *RVO2 Library*, released 08/10. Software library for autonomous multiagent collision avoidance in two dimensions. Licensed by THQ, Inc., Electronic Arts, Inc., and other major game publishers.

—, J. v.d. Berg, S. J. Guy, and D. Manocha, *HRVO Library*, released 10/09. Software library for autonomous multi-robot collision avoidance in two dimensions.

## REFEREED PUBLICATIONS

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—, S. J. Guy, J. v.d. Berg, and D. Manocha, “Smooth coordination and navigation for multiple differential-drive robots,” in O. Khatib, V. Kumar, and G. Sukhatme, eds., *Experimental Robotics: Proc. 12th Int. Symp. Experimental Robotics*, ser. Springer Tracts in Advanced Robotics, vol. 79, pp. 601–613, 2014. DOI: 10/q34.

- and D. Manocha, “Goal velocity obstacles for spatial navigation of multiple virtual agents,” extended abstract in *Proc. 12th Int. Conf. Autonomous Agents and Multiagent Systems*, pp. 1191–1192, 2013.
- and D. Manocha, “Goal velocity obstacles for spatial navigation of multiple autonomous robots or virtual agents,” in *Proc. AAMAS Workshop Autonomous Robots and Multirobot Systems*, 2013.
- S. Curtis, —, and D. Manocha, “Way portals: efficient multi-agent navigation with line-segment goals,” in *Proc. ACM SIGGRAPH Symp. Interactive 3D Graphics and Games*, pp. 15–22, 2012. DOI: 10/htq.
- , J. v.d. Berg, S. J. Guy, and D. Manocha, “The hybrid reciprocal velocity obstacle,” *IEEE Trans. Robot.*, vol. 27, no. 4, pp. 696–706, 2011. DOI: 10/b3pfs2.
- J. v.d. Berg, —, S. J. Guy, and D. Manocha, “Reciprocal collision avoidance with acceleration-velocity obstacles,” in *Proc. IEEE Int. Conf. Robotics and Automation*, pp. 3475–3482, 2011. DOI: 10/bjppqxq.
- , J. v.d. Berg, S. J. Guy, and D. Manocha, “Smooth and collision-free navigation for multiple robots under differential-drive constraints,” in *Proc. IEEE/RSJ Int. Conf. Intelligent Robots and Systems*, pp. 4584–4589, 2010. DOI: 10/ds9xb5.
- and D. Manocha, “Navigating multiple simple-airplanes in 3D workspace,” in *Proc. IEEE Int. Conf. Robotics and Automation*, pp. 3974–3980, 2010. DOI: 10/bdssrs.
- , J. v.d. Berg, S. J. Guy, S. Curtis *et al.*, “Independent navigation of multiple robots and virtual agents,” extended abstract in *Proc. 9th Int. Conf. Autonomous Agents and Multiagent Systems*, pp. 1645–1646, 2010.
- , J. v.d. Berg, S. J. Guy, and D. Manocha, “Independent navigation of multiple mobile robots with hybrid reciprocal velocity obstacles,” in *Proc. IEEE/RSJ Int. Conf. Intelligent Robots and Systems*, pp. 5917–5922, 2009. DOI: 10/drvhjc.

## PRESENTATIONS AND OTHER PUBLICATIONS

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- , *Smooth and Collision-Free Navigation for Multiple Mobile Robots and Video Game Characters*, Ph.D. dissertation, Dept. Comput. Sci., Univ. N. Carolina Chapel Hill, 2012. DOI: 10/fmxd.
- , “Velocity obstacle algorithms and locomotion integration,” live interview with AIGameDev.com, 2012.
- , “Reciprocal collision avoidance and navigation for video games,” presented at Game Developers Conf., 2012.
- , S. J. Guy, D. Vembar, A. Lake *et al.*, “Reciprocal collision avoidance and navigation for video games,” Intel Software Network, 2012.
- , *Loopless Functional Algorithms*, M.Sc. thesis, Comput. Lab., Univ. Oxford, 2005.
- , *Applications of Elliptic Functions in Classical and Algebraic Geometry*, M.Math. dissertation, Dept. Math. Sci., Univ. Durham, 2004.

## PROFESSIONAL ACTIVITIES AND ORGANIZATIONS

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Member of IEEE and the IEEE Robotics and Automation Society.

Invited reviewer for the journals *Comput. Animat. Virtual Worlds*, *IEEE Trans. Robot.*, *Intell. Serv. Robot.*, *Int. J. Geo-Inf.*, *Int. J. High Perform. Comput. Appl.*, *Int. J. Robot. Res.*, *Inventions*, *Robotica*, and *Sensors* and the conferences *IEEE Int. Conf. Robotics and Automation*, *IEEE/RSJ Int. Conf. Intelligent Robots and Systems*, and *Int. Conf. Motion in Games*.

Invited judge for the Game Developers Choice Awards.