Matthew Gardner

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EDUCATION

IOWA STATE UNIVERSITY | Ph.D Computer Science — 2014–Now

- GPA: *3.8*
- Expected graduation: *June 2019*
- Thesis topic: *Motion planning and vision for robot tasks involving Impact Dynamics*

UNIVERSITY OF CALIFORNIA, IRVINE | B.S. Computer Science — 2012–2014

- *GPA:* 3.8

SANTA MONICA COLLEGE | Computer Science — 2009-2012

- *GPA:* 3.4

EXPERIENCE

ISU, ROBOTICS LAB | Research Assistant — Ames, IA | Jan 2015 – Present

Current project involves integrating impact dynamics and impulsive manipulation into robotics tasks. The current task is batting an object of arbitrary shape to a target location. Research problems include:

- Building a high-speed vision system to accurately track objects, making use of Kalman filtering, image processing, GPU computing, and multithreading to ensure speed and robustness.
- Deriving and analyzing a generalized model of impact dynamics for a robotic arm manipulator interacting with 3-D objects.
- Development of an algorithm to plan the motion of an arm manipulator subject to impact dynamics, and capable of executing 150+ times a second.

IOWA STATE UNIVERSITY | Teaching Assistant — Ames, IA | Aug 2014 – Present

One semester as TA of graduate level course *Problem Solving Techniques for Applied Computer Science*.

- Graded assignments/exams and held office hours to help with course material, including advanced topics in data fitting, optimization, curves & surfaces, calculus of variations, coordinate systems, and more.

Four semesters as Head TA of the project course *Software Development Practices*.

- Managed 10+ TA's and 160+ students each semester to ensure sufficient project progress and proper collaboration in a team environment.
- Implemented and administered a new grading system involving the creation of rubrics and grading tools, resulting in significantly more efficient evaluation of team projects.
- Produced weekly reports to enforce best practices in grading of demos, software documentation, and exams.
- Provided technical assistance in all areas to students and their teams (mobile, web, game development, etc.).

WORKIVA | Software Development Intern — Ames, IA | May 2015 – Aug 2015

- Implemented features to improve *Vessel*, a brokered message queue in Golang used to synchronize data in Workiva's cloud services.
- Solely built a benchmark to simulate machines distributed across the U.S. (via Google Cloud Engine) communicating with a cluster of Vessels. The benchmark maintains the state of various machines that exchange data with the Vessels given some configuration. The system measures statistics on Vessel's performance, helping identify bottlenecks and bugs, and resulting in a *20x increase in performance* after optimizations.

SMILEFISH, INC. | Mobile App Developer + Project Manager — Irvine, CA | Mar 2014 – Aug 2014

- Implemented features and bug fixes for the social e-commerce app **eddi.com**, a challenging project in iOS, Android, and Web with fully custom UI and a wide range of features.
- Redesigned the front and backend of an iOS app to improve English speech. Deployed as *American Speechsounds* for iPhone and iPad users.
- Led a team of 5 through concept and design of a language-learning app aimed at Chinese speakers learning English. Produced various design and concept documentation for *TutorGroup*, a global leader in online education. The app is currently in development by a 3rd-party for iOS and Android, and aims to provide access to language learning material for millions of existing TutorGroup users in China.

UC, IRVINE | Undergraduate Research — Irvine, CA | Nov 2013 – Mar 2014

- Designed and built course planning software that models a student's four year program of study as a nonlinear optimization problem in Java, and solves it using Gurobi Optimization. The software includes an intuitive UI for configuring input and storing data, and currently assists the Vice Chair of Undergraduate Education in choosing courses to offer each semester.
- Built a database extension in Node.js that stores timings, metadata, and other analytics data for use in Intel-funded research on evaluating WebRTC performance.

NUMECENT, INC. | Quality Assurance Intern — Irvine, CA | Jun 2013 – Sep 2013

- Created and managed test cases to ensure thorough validation of client-server cloudpaging technology, nearly doubling the number of reported bugs.
- Wrote scripts to automate test cases, and integrated them into daily smoke and regression tests to efficiently identify bugs in development code.

FBI | Intern with Cyber Division — Westwood, CA | Sep 2008 – Feb 2010

- Used various data analytics tools to organize and visualize case data for a team of Special Agents fighting cyber crime.
- Assisted with parsing data sets (of anywhere between 100 to 100k data points) into formats where various methods of data analysis could then be performed.
- Networked and built a moderate-sized lab used as a "hacking environment" in more than 3 investigations during my time, including reverse engineering of a malicious operating system exposed in the U.S.

PUBLICATIONS

[1] Matthew Gardner and Yan-Bin Jia. Estimating the linear and angular velocities of a free-flying object. In ***ICRA, IEEE/RSJ*** (Submitted), Brisbane, Australia, 2018. <http://robotics.cs.iastate.edu/papers/ICRA18b.pdf>.

[2] Yan-Bin Jia, Matthew Gardner, and Xiaoqian Mu. Batting an in-flight object to the target. Submitted to *International Journal of Robotics Research*, 2017. <http://robotics.cs.iastate.edu/papers/IJRR17.pdf> <VIDEO:https://youtu.be/dGBevZ54E3s>.

[3] Matthew Gardner and Yan-Bin Jia. Batting flying objects to the target in 2d. In ***IROS, IEEE/RSJ***, pages 3225–3232, Daejeon, Korea, 2016. <http://robotics.cs.iastate.edu/papers/IROS16.pdf>.

TECHNICAL PRESENTATIONS

"Batting Flying Objects to the Target in 2D," IEEE International Conference on Intelligent Robots and Systems, Daejeon, Korea, Oct 2016.

AWARDS

Robert Stewart Early Research Recognition Award — Ames, IA | 2016
Recognition of early success in Robotics research.

Hack ISU Hackathon (1st/48) — Ames, IA | 2016
Built FallWatch, an iOS+iWatch app that uses sensor data to learn when the user falls, and send out a distress signal.

Graduate Research Contest (2nd/20+) — Ames, IA | 2016
Presented research on robotic batting of objects to a target in 2D.

Ingenuity Showcase (1st/100+) — Irvine, CA | 2014
Showcased a course project called River, an iOS app where users can collaboratively stream music.

MedAppJam (6th/19) — Irvine, CA | 2012
Built NearMiss, an iOS app for quickly reporting accidents in an effort to preempt future harmful medical accidents.

National Youth Leadership Forum on National Security — Washington, D.C. | 2010
Attended a week long program on building leadership and learning about various systems of National Security.

SKILLS

PROGRAMMING

Proficient: C++ ○ Java ○ Obj-C ○ C# ○ SQL ○ Matlab ○ LaTeX
Familiar: C ○ Swift ○ CSS+HTML ○ PHP ○ Javascript ○ R ○ AutoIT

COURSEWORK

Selected graduate-level coursework: *Computational Geometry, Advanced Machine Learning, Artificial Intelligence, Problem Solving Techniques for Applied CS, Computer Graphics & Geometric Modeling, Computational Perception, Surface Modeling, Database Systems*

PERSONAL PROJECTS

www.mgardner.me — 2015
My personal website developed in HTML5/CSS3 and JavaScript to showcase my work and help build connections.

ISOC Ramadan 2015 — 2015
Built an iOS and Android app for the Islamic Society of Orange County that provides information on events during the month of Ramadan. Users could sign up to volunteer and make donations over Paypal, resulting in $50,000+ of donations to charity during Ramadan 2015.

collab.dj: Collaborative music streaming — 2014-Present
A mobile app (iOS+Android+Web+C#.NET) for users to collaborate in groups to stream music. Rooms are used to house a queue of songs that members prioritize using tokens. Music can be contributed from Spotify, YouTube, and more, and users can either tune in, or listen with others using the app as a jukebox.

LINKS

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