Michael Ball

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Education

Academic Qualifications

University of California, Berkeley　　　　　　　　　　　　　　　　**Berkeley, CA**
MS Computer Science, Advisor: Dr. Daniel Garcia　　　　　　　　　　　　*2016*
Thesis: Lambda: An Autograder for Snap!

University of California, Berkeley　　　　　　　　　　　　　　　　**Berkeley, CA**
BA Computer Science　　　　　　　　　　　　　　　　　　　　　　*2015*

Notable Projects

Masters Project: *Lambda: Autograding For Snap!*

Lambda is an autograding platform for Snap!, a blocks-based programming language. As an undergraduate, I contributed to designing the system, architecting code, and creating autograder tests for student projects. During my Master's Project, I created a server-side component for the autograder to support using LTI (Learning Tools Interoperability), an open educational standard, which allowed embedding the autograder into UC Berkeley's LMS. The autograder was used to trial a series of in-lab exercises, in comparison to the oral lab check-off questions students were answering. http://www2.eecs.berkeley.edu/Pubs/TechRpts/2018/EECS-2018-2.pdf

Side Project: *Alonzo, A Staff Chatbot*

"Alonzo" is the name of a chatbot that course staff use to automate grading processes, saving time and reducing errors. The bot has been an integral part of enabling CS10 to facilitate in-class oral lab check-offs by allowing Lab Assistants to easily enter check off data. The bot was originally started as a fun side project, but has since had multiple generations of TAs contribute to and maintain its code. https://www.github.com/cs10/Alonzo

Experience

Gradescope, by Turnitin   **Berkeley, CA**
Software Engineer   *July 2016–current*

Gradescope is an online platform for grading written work (like exams) that allows instructors to provide detailed feedback while reducing grading time. We were a small team of less than 15 before being acquired by Turnitin in October 2018.

- Led the development of web accessibility. Addressed technical concerns relating to compliance with WCAG 2.0 and 2.1. Set up tooling for automated front-end tests for accessibility, and trained engineers on web accessibility. Presented my web accessibility work to the Turnitin Engineering organization.

- Led the development of growth engineering. Created modern data pipelines (hosted on Amazon Web Services) to address user onboarding and to better understand product usage.

- Collaborated with the design team on new features. Provided customer support and training on the Gradescope platform.

UC Berkeley EECS   **Berkeley, CA**
Researcher and Engineer   *2016-2018*

Contributed to the Beauty and Joy of Computing edX course, including supporting the development of the Snap! programming language, and provided support to high school computer science teachers. (Part-time; Funded via Hopper-Dean Foundation Grant) (See "Projects" section below.)

Projects

Snap*!*
Snap*!* is a blocks-based visual language designed to make teaching computer science easy, while exposing hard concepts like lambdas, recursion, and web APIs. I contribute to the core IDE, and I collaboratively designed, built and maintain the Snap*!* cloud-based project infrastructure, which currently supports more than 2 million projects and over 250,000 users.
https://snap.berkeley.edu

The Beauty and Joy of Computing
BJC is a university-level non-majors or a high school level AP Computer Science Principles course designed to broaden participation in computing. In addition to programming, the course emphasizes the context and implications of computing. I provide infrastructure maintenance, technical consulting and curriculum review. I contributed curriculum heavily to early versions of the course which are still used at UC Berkeley.
https://bjc.berkeley.edu

Downshift

Downshift is an open source React Component maintained by PayPal. I contribute accessibility enhancements and reviews.

https://github.com/paypal/downshift

Teaching

University of California, Berkeley

- **Summer 2015** Co-Instructor, CS10: The Beauty and Joy of Computing
  Instructor of Record for 60 students and 6 staff members. I oversaw all aspects of the course and gave lectures.

- **Spring 2015** Head-TA, CS10: The Beauty and Joy of Computing

- **Fall 2014** Head-TA, CS10: The Beauty and Joy of Computing

- **Spring 2014** Head-TA, CS10: The Beauty and Joy of Computing
  I lead teams of 10-15 TAs and 8-12 graders each semester, overseeing staff training, running meetings and gave guest lectures.

- **Fall 2013** TA, CS10: The Beauty and Joy of Computing

- **Spring 2013** TA, CS194-23: The Art & Science of Digital Photography
  A technical photography seminar course with 20-30 students. I gave lectures, graded coursework and contributed to course design.

- **Spring 2013** TA, CS10: The Beauty and Joy of Computing

- **Fall 2012** TA, CS10: The Beauty and Joy of Computing
  I led two seconds of 30 students each semester, contributed exam questions, wrote assignment specifications and led review sessions.

Awards

- Best Lightning Talk Award, 49th ACM Technical Symposium on Computer Science Education, 2018
  Awarded for the lightning talk "IRT In 5 minutes".

- Eugene L. Lawler Prize, UC Berkeley EECS, 2015
  The Lawler Prize honors computer science undergraduates from disadvantaged groups (such as the disabled community and ethnic minorities) or a person who has surmounted unusual difficulties in pursuing a degree with demonstrated academic effort. This prize was established by the UC Berkeley Computer Science Division to honor the memory of colleague, Professor Eugene L. Lawler, who was

an internationally recognized expert in mathematical theories of scheduling and resource allocation.
https://www2.eecs.berkeley.edu/Students/Awards/#11

o EECS Distinguished Graduate Student Instructor Award, 2015
Faculty nominate the top nine percent of UC Berkeley EE or CS GSIs and Group Tutors from the semesters of the previous calendar year. From these, the EECS Student Awards committee selects one top EE and one CS GSI for the departmental award. Because EECS is a large department with about 180 GSIs per semester, it is a great honor to be selected as an Outstanding GSI. https://www2.eecs.berkeley.edu/Students/Awards/#13

Grants and Gifts

o Hopper-Dean Foundation ($200,000). 2016. Researcher. (Daniel Garcia, PI.)
For the support of diversity initiatives in CS to support high schools nationwide. The High School Initiative focuses on high school computer science teachers, led by Professor Dan Garcia. In response to NSF Program Manager Jan Cuny's charge to change the face of computing by engaging and preparing 10,000 teachers to teach computer science courses, Professor Garcia and colleagues have developed our non-major computer science class CS10: The Beauty and Joy of Computing (BJC) into a course that is fully aligned with high school Academic Placement (AP) specification. The plan is to accomplish this objective via an edX Small Private Online Course (SPOC) experience, with the high school teacher in control. The course recently received national exposure when it had more women than men in an intro CS course for the first time since records were digitized.

o Google CS Engagement Award ($5,000). 2015. Michael Ball.
This gift from Google was used to support CS10 and The Beauty and Joy of Computing. The funds have been used to develop Snap! enhancements and help fund the Snap! Cloud infrastructure.

o NSF STEM-C BJC4NYC: Bringing the Beauty and Joy of Computing to the Largest School System in the US ($7,874,876). 2014. Consultant.
For the development of curricular materials, based on the Beauty and Joy of Computing, for teaching CS Principles at the high school level using the Snap! programming language. Development of the Snap! language, including the cloud back-end, and BJC curriculum software. I During the project, 100 high school teachers in New York City were trained to teach BJC, and early participants become teacher-trainers who worked with later participants. The teachers involved become part of a Community of Practice that continues to provide support for the teacher cohorts. I worked with EDC curriculum developers to review and suggest changes, developed BJCx (with auto-grading features) for teachers as a small private online course (SPOC), and (3) supported BJC teachers online.

o edX ($50,000). 2014. Staff.
For the development of BJCx, a Computer Science Principles edX MOOC to be offered (1) as a synchronous Small Private Online Course (SPOC) for high schools, (2) a synchronous open-to-all MOOC for others, and (3) an asynchronous self-study course. The development concluded in

creating four sub-MOOCs, which together was the sum of the BJC offering. I supported Snap! cloud integration, developed autograding (remote grading of Python and Snap! assignments and lab activities in a remove server) and an automated lab content builder, and supported BJC students and teachers in an online forum.

Service

Professional Service

- SIGCSE Technical Symposium Publicity Co-Chair, 2020

- SIGCSE Technical Symposium Computer Science Principles Providers and Teachers Forum Co-Organizers, 2018-2019
  This forum was launched because there had been no formal face-to-face community for providers and teachers of CSP to discuss best practices, feedback, or share teaching experiences at SIGCSE.

- SIGCSE Technical Symposium Photography Chair, 2018

- SIGCSE Technical Symposium Reviewer, 2016-2018

UC Berkeley Service

- UC Berkeley EECS Graduate Student Instructor Survey Presentation for Faculty, 2016

- UC Berkeley EECS Undergraduate Study Committee, Student Member, 2014-2016

Publications

Conference Workshops, Presentations and Posters

- **Ball, Michael**; Romagosa, Bernat; Moenig, Jens; Harvey Brian. Snap! A Look at 5 Years, 250,000 Users and 2 Million Projects. Poster. Proceedings of the 50th ACM Technical Symposium on Computer Science Education.

- **Ball, Michael** Teaching Accessibility Using Software. What to Teach about Accessibility SIGCSE 2019 Pre-Symposium Event.

- **Ball, Michael**. IRT in 5 Minutes: Easy Ways to Better Understand an Assessment. Lightning Talk. Proceedings of the 49th ACM Technical Symposium on Computer Science Education. http://doi.acm.org/10.1145/3159450.3162211

- Galanos, Ria; **Ball, Michael**; Dougherty, John; Hummel, Joe; Malan, David. Technology We Can't Live Without!, Revisited. Panel. Proceedings of the 49th ACM Technical Symposium on Computer Science Education. http://doi.acm.org/10.1145/3159450.3159629

- Milliken, Alexandra; **Ball, Michael**; Mock, Lauren. AP CS Principles and The Beauty and Joy of Computing Curriculum: Workshop. Proceedings of the 49th ACM Technical Symposium on Computer Science Education. http://doi.acm.org/10.1145/3159450.3162375

- Garcia, Daniel; Harvey, Brian; Mönig, Jens; **Ball, Michael**; Romagosa, Bernat; Low, Robert; Mock, Lauren. The Beauty and Joy of Computing. Workshop. Scratch Conference 2017, Bordeaux, France, 2017-07-21.

- **Ball, Michael**; Garcia, Daniel; Mock, Lauren. Writing Autograders for Snap*!* and Integrating them Into Your Course. Short Talk, Scratch Conference 2017, Bordeaux, France, 2017-07-20.

- Garcia, Daniel; Harvey, Brian; Mönig, Jens; **Ball, Michael**; Mock, Lauren; Low, Robert; Romagosa, Bernat. The Beauty and Joy of Computing and the Snap*!* Programming Language. Poster. Scratch Conference 2017, Bordeaux, France, 2017-07-20.

- **Ball, Michael**; Garcia, Daniel; Mock, Lauren. Early Analysis of "In-Lab" Autograding for Snap*!*. Poster. Scratch Conference 2017, Bordeaux, France, 2017-07-20.

- Mock, Lauren; **Ball, Michael**; Garcia, Daniel; Harvey, Brian. Lessons Learned Delivering a Customizable Course with Autograders to 200 Teachers. Ignite Talk. Scratch Conference 2017, Bordeaux, France, 2017-07-20.

- Garcia, Daniel; Romagosa, Bernat; **Ball, Michael**; Mönig, Jens; Harvey, Brian. Programming the Internet (of things) with Snap*!*. Short Demo. Scratch Conference 2017, Bordeaux, France, 2017-07-19.

- **Ball, Michael**. Writing Autograders for Snap*!* and Integrating Them Into Your Course. Demo. Proceedings of the 48th ACM SIGCSE Technical Symposium on Computer Science Education. http://doi.acm.org/10.1145/3017680.3022385

- **Ball, Michael**. Implementing "In-Lab" Autograding for Snap*!*. Poster. Proceedings of the 48th ACM SIGCSE Technical Symposium on Computer Science Education. http://doi.acm.org/10.1145/3017680.3022443

- Garcia, Daniel and **Ball, Michael**. Bringing the Beauty and Joy of Computing to the World via edX: An Experience Report. Panel. Scratch Conference 2016, Cambridge, MA, 2016-08-05.

- **Ball, Michael** and Garcia, Daniel. Autograding and Feedback for Snap*!*: A Visual Programming Language. Poster. Proceedings of the 47th ACM Technical Symposium on Computing Science Education. http://doi.acm.org/10.1145/2839509.2850572

- Garcia, Daniel; Barnes, Tiffany; **Ball, Michael**; Biga, Emil; Paley, Josh; Hill, Marnie; Mattix, Nathan; Safa, Parisa; Morris, Sean; Kenner, Shawn. AP CS Principles and The Beauty and Joy of Computing Curriculum. Workshop. Proceedings of the 47th ACM Technical Symposium on Computing Science Education. http://doi.acm.org/10.1145/2839509.2844714

- **Ball, Michael**. Using Instant Chat for Fun and for Profit to Run a Large Class. Abstract Only. Proceedings of the 47th ACM Technical Symposium on Computing Science Education. http://doi.acm.org/10.1145/2839509.2850526

- Garcia, Daniel; Harvey, Brian; Moenig, Jens; **Ball, Michael**. The Beauty and Joy of Computing. Workshop. Scratch 2015, Amsterdam, Netherlands, August 12-16, 2015.

- Garcia, Daniel; Harvey, Brian; Moenig, Jens; **Ball, Michael**. Bringing the Beauty and Joy of Computing to the World via edX. Special Session. Scratch 2015, Amsterdam, Netherlands, August 12-16, 2015.

- Garcia, Daniel; Harvey, Brian; Moenig, Jens; **Ball, Michael**. The Beauty and Joy of Computing and the Snap*!* Programming Language. Poster. Scratch 2015, Amsterdam, Netherlands, August 12-16, 2015.

- **Ball, Michael**; Mock, Lauren; McKinsey, Jonathan; Machardy, Zachary; Garcia, Daniel; Titterton, Nathaniel; Harvey, Brian. Oh, Snap*!* Enabling and Encouraging Success in CS1. Poster. Proceedings of the 46th ACM Technical Symposium on Computer Science Education. http://doi.acm.org/10.1145/2676723.2691947

- Garcia, Daniel; **Ball, Michael**; Parikh, Aatash. L@S 2014 Demo: Best Practices for MOOC Video. Demo+Paper. Proceedings of the First ACM Conference on Learning @ Scale Conference. http://doi.acm.org/10.1145/2556325.2567889

Other Writing

- *AUTOGRADING FOR SNAP!* Hello World Magazine, Issue 3, Autumn 2017
  https://magazines-static.raspberrypi.org/issues/full_pdfs/000/000/004/orignal/HelloWorld03.pdf

Publicity and News

- NPR: *Adding 'Beauty And Joy' To Obama's Push For Computer Science Teaching*. 2016-01-14.
  https://www.npr.org/sections/ed/2016/01/14/462954645/adding-beauty-and-joy-to-obamas-push-for-computer-science-teaching

Research Interests

- **Computer Science Education**
  I am most experienced in high school, CS0 and CS1 courses. I am particularly interested in exploring and improving structural issues in courses, such as sound principles for course policies, teaching with teams and effective use of education technology.

- **Digital Accessibility**
  I have experience building tools for software teams to improve the accessibility of web applications. I'm

interested in improving methods for automatically detecting accessibility defects and recommending corrections. I am also interested in building accessible CS courses, and materials to teach accessibility to students.

Technical Skills

- **Programming Languages:**
  Snap*!*, JavaScript, Ruby, Python, SQL, bash, CSS, HTML
  (Previous experience): Java, C, C++, Apex, MATLAB, scheme

- **Industry Software Skills:**
  git, React, accessibility testing and compliance, Amazon Web Services, Heroku, Terraform (server management)

References

- Teaching Professor Dan Garcia
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  (510) 642-5775

- Senior Lecturer SOE Emeritus Brian Harvey
  bh@cs.berkeley.edu
  (510) 642-8311

- Assistant Teaching Professor Josh Hug
  josh@joshh.ug

- Professor Armando Fox
  fox@berkeley.edu