



Catarina Gamboa

Software Engineering Ph.D. Student

📍 Pittsburgh, PA, USA

🏠 Portuguese nationality

✉️ cgamboa@andrew.cmu.edu

@ https://catarinagamboa.github.io/

I am interested in both the Design of **Programming Languages** and **Usable Software Verification**. My current projects aim to enhance software reliability by integrating Software Verification with Human-Computer Interaction techniques, thereby creating tools that are valuable, practical, and usable by developers in their everyday work.

EDUCATION

2021–Now	Dual PhD in Software Engineering CARNEGIE MELLON UNIVERSITY AND UNIVERSITY OF LISBON · Pittsburgh and Lisbon 🏛️ I am enrolled in the Dual PhD CMU-Portugal completing courses and research at both CMU and U. Lisbon. Currently, and I'm currently working on improving the usability of liquid types for reliable software, advised by Alcides Fonseca and Jonathan Aldrich.	
2019–2022	Master Degree in Informatics Engineering - Software Engineering FACULDADE DE CIÊNCIAS DA UNIVERSIDADE DE LISBOA · Lisbon 🏛️ GPA of 18/20. The courses included Software Design (18/20), Compiling Techniques (19/20), Software Reliability (18/20), and Software Verification and Validation (18/20). Final Dissertation on "LiquidJava: Extending Java with Refinements" advised by Alcides Fonseca and Chris Timperley.	
2016–2019	Undergraduate Studies in Informatics Engineering FACULDADE DE CIÊNCIAS DA UNIVERSIDADE DE LISBOA · Lisbon 🏛️ GPA of 17/20. The courses included Algorithms and Data Structures (18/20), Principles of Programming (20/20), Construction of Software Systems (18/20), and Information Systems Analysis and Design (18/20).	

PROFESSIONAL EXPERIENCE


Summer 2024	Software Engineer Research Intern GITAR.CO, BAY AREA, CA, USA I had a summer internship at a startup company, Gitar, focused in the development of a developer tools. I was working in their project for automatic stale feature flag removal in polyglot code, which depended on code analysis and transformation. During the internship, I helped improve the code analysis tools across different programming languages, especially in the creation of def-use chains, and I contributed to the testing framework using fuzzing and applying the tool to open-source projects.
2020–Now	Researcher at LASIGE and S3D UNIVERSITY OF LISBON AND CARNEGIE MELLON UNIVERSITY I started doing research at LASIGE during my master thesis and I am currently a researcher at both LASIGE and the Software and Societal Systems Department (S3D) at CMU.
2023	Teaching Assistant for 17-480/17-780 API Design CARNEGIE MELLON UNIVERSITY I was a T.A. for the course of API Design, working with Joshua Bloch.
2019–2020	Teaching Assistant in the Informatics Department (Monitor) FACULDADE DE CIÊNCIAS DA UNIVERSIDADE DE LISBOA I taught courses on Programming for more than 100 undergraduate students of Information Technology, Mathematics, Physics and others. The courses were Programming I (LTI), Programming II (LTI) and Programming II.
Jul 2019	Summer Internship RUNTIME REVOLUTION I had a summer internship in a company of software development, developing a project using Ruby on Rails and React.

PUBLICATIONS

FULL PAPERS

May 2023


Usability-Oriented Design of Liquid Types for Java

Catarina Gamboa, Paulo Santos, Christopher S. Timperley, and Alcides Fonseca. 
ICSE 2023 - IEEE/ACM 45th International Conference on Software Engineering (ICSE), CORE A*.

SHORT PAPERS, POSTERS AND DEMOS


Oct 2023

Latte: Lightweight Aliasing Tracking for Java

Conrad Zimmerman, Catarina Gamboa, Alcides Fonseca, Jonathan Aldrich 
IWACO'23 and HATRA'23 - International workshop on Aliasing, Capabilities and Ownership, and International Workshop on Human Aspects of Types and Reasoning Assistants


Oct 2022

Poster - LiquidJava: Improving the Usability of Liquid Types for Reliable Software

Catarina Gamboa, Alcides Fonseca, and Jonathan Aldrich 
2022 CyLab Partners Conference, at Carnegie Mellon University, Pittsburgh


Mar 2022

DEMO - Dive into LiquidJava - Extending Java with Liquid Types

Catarina Gamboa, Paulo Santos, Christopher S. Timperley, and Alcides Fonseca. 
Posters and Demonstrations track at <Programming> 2022 - International Conference on the Art, Science and Engineering of Programming


Jan 2022

Understandable and Useful Error Messages for Liquid Types

Alcides Fonseca, Catarina Gamboa, João David, Guilherme Espada, Paulo Canelas 
WITS'22 - Workshop on the Implementation of Type Systems 2022, co-located with POPL'22

Oct 2021

User-driven design and evaluation of Liquid Types in Java

Catarina Gamboa, Paulo Santos, Christopher S. Timperley, and Alcides Fonseca 
HATRA'21 - Human Aspects of Types and Reasoning Assistants Workshop, co-located with SPLASH'21.

Sep 2021

LiquidJava: Adding Lightweight Verification to Java

Catarina Gamboa, Paulo Santos, Christopher S. Timperley, and Alcides Fonseca 
INForum 2021 - Informatics Symposium.

Nov 2020

Extending Java with Refinements

Catarina Gamboa, Paulo Santos, Christopher S. Timperley, and Alcides Fonseca 
PSSV'20 - Program Semantics, Specification and Verification: Theory and Applications, Student Paper

INVITED TALKS

Oct 2024

Guest Lecture at Quality Assurance course

CARNEGIE MELLON UNIVERSITY
Chris Timperley invited me to give a guest lecture about static analysis, liquid types and LiquidJava in the course of Quality Assurance. The lecture counted with more than 50 students all enrolled in the Masters in Software Engineering program at CMU.

Dec 2022

Guest Talk at Secure Coding class

CARNEGIE MELLON UNIVERSITY
I was invited by Hanan Hibshi to give a talk about LiquidJava in the course of Secure Coding, 14735, Fall 2022.

Jul 2022

Science Communication and the Media

LASIGE, Faculdade de Ciências da Universidade de Lisboa 
Presentation about the importance of Science Communication to broad audiences using media resources. Short version presented at the 1st LASIGE FORUM and a full-version presented in Talks@LASIGE.

ONGOING PROJECTS

July 2023 -
now

Understanding the usability barriers in Liquid Types

Liquid Types improve software reliability by finding bugs at compile-time as it has been shown in many papers. However, they are yet to be widely used. Therefore, this project aims to investigate what are the usability issues and improvements that can make liquid types more widely used by applying exploratory qualitative techniques (e.g., contextual inquiries, interviews, usability studies).

July 2023 -
now

LiquidJava - Formalization of Liquid Types in Java

After designing LiquidJava with a focus on usability, this project aims to formalize the language and the interesting properties of integrating liquid types in Java. The first step was accomplished by adding a lightweight aliasing tracking technique in Java (Latte) that will be leveraged to reason about strong updates where liquid types are present.

CONFERENCE COMMITTEES

2023	SPLASH'23 - Volunteer Co-Chair (website) CASCAIS, PORTUGAL I was part of the organizing committee, co-chairing the volunteering team, where 50 volunteers helped run the conference that counted with more than 600 attendees.
2023	PLDI'23 - Artifact Evaluation Committee (website)

OUTREACH, LEADERSHIP AND TEAMWORK

May 2023	Student Volunteer at ICSE 2023 MELBOURNE, AUSTRALIA I participated as a student volunteer in the organization of the conference that counted with 1500 participants.
2021-2023	Student Volunteer at POPL 2021, 2022 and 2023 I participated as a student volunteer in three consecutive years helping in the organization of the event in online, hybrid and in-person versions.
2021-2022	Co-organization of events at LASIGE I joined the organization committee for the LASIGE Welcome Day 2021 and 2022, organized team building activities such as paintball and movie nights for all members of the research unit, joined the PhD student commission to help improve the well-being and connection among PhD students.
2019-2022	Board Member of the non-profit cultural organization Associação Alegres Olhares I was an elected board member of the non-profit cultural association Alegres Olhares in the last two elections for the corporate entities. The association organizes and co-organizes cultural projects using creativity to take the traditional projects to our present day.
2010-now	Participation in Music and Theater Groups I play the concert flute in several music groups including the Band of the Phillarminic Society of Olhalvo and the portuguese folk music group Noses com Vozes. I also participated in multiple theater groups such as the Academic Theater of the University of Lisbon (TUT) and the SCS Musical group at CMU.

AWARDS

Apr 2022	Huawei Scholarship I was awarded with one of the 50 scholarships given in the scope of Huawei's program Seeds For The Future 2.0, in collaboration with .PT, to empower students in the STEM areas.
Sep 2021	Award for Best Student Poster I received the award for best poster for the work on "LiquidJava: Adding Lightweight Verification to Java" in the conference INFORUM - Informatics Symposium 2021.
2021	MaxData Award - Informatics Excellence I received the academic excellence award for the best student on the first year of the MSc on Informatics Engineering.
2018-2020	Diploma of Academic Merit I received academic excellence awards for the three years of the Bachelor degree.

OTHER EDUCATION

Apr 2022	Science and the Media - bringing scientists, journalists and society cE3c, Faculdade de Ciencias da Universidade de Lisboa 
	2nd Grade on Concert Flute I had concert flute classes since the age of 6, and in 2014 got the 2nd grade of transverse flute by the Torres Vedras Conservatory.

6th Grade on Classical Dance

I attended classes of classical dance from 2006 to 2015, and achieved the 3rd Level of the "Certificate in Graded Examination in Dance" by Royal Academy of Dance, for the 6th grade of classical dance.

OTHER ACTIVITIES

2022, 2018

Monitor at Verão ULisboa and Ciências Open Day

FACULDADE DE CIÊNCIAS DA UNIVERSIDADE DE LISBOA

I helped in activities to promote Programming and Computer Science for high school students.

Jan 2019

Volunteer in the event Building the Future

MICROSOFT AND IMATCH

I participated as volunteer on the organization of the event Building the Future which joined technology, transformation and leadership to empower people and companies. The event was promoted by Microsoft in collaboration with imatch.

Jul 2017

Summer Course on Heritage and Creativity

INSTITUTO POLITÉCNICO DE LEIRIA

I participation on the International Summer Course about Heritage and Creativity.