

# MARTA DÁVILA MATEU

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I aspire to become a computer science researcher in Formal Methods and Programming Languages.

## RESEARCH INTEREST

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My research interests lie in the intersection between Theoretical Computer Science and Software Engineering. More specifically, I am interested program synthesis, automated deduction, automated theorem proving, and automated verification.

## EDUCATION

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### University of Southern California

*M.Sc. in Computer Science*

Programming Languages Research Group.

Los Angeles, CA, USA

*August, 2022-Now*

### Maastricht University

*B.Sc. in Data Science and Engineering - Honours Degree*

Honours & Honours+ Programme (30 additional ECTS).  
Research-Based Learning for Excellence.

Maastricht, the Netherlands

*August, 2016-June, 2019*

### University of Sydney

*B.Sc. in Computer Science*

Exchange Semester.

Sydney, Australia

*August, 2018-December, 2018*

## WORKING EXPERIENCE

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### University of Southern California

*Graduate Research Assistant*

Research supervised by [Dr. Mukund Raghothaman](#) on recursion, program synthesis, and recursive program synthesis.

Los Angeles, CA, USA

*November, 2022 - Currently*

### Guiana Space Centre

*Technical Manager - Software and Systems Engineer*

Developing and improving vital software for rocket's flight and safety, and solving software and system anomalies formerly and during rocket launches.

Kourou, French Guiana

*February, 2021 - April, 2022*

### GTD - Meteosat Satellites

*Data and Software Engineer*

Designing, developing and testing the data processing software of the series of satellites Meteosat, operated by the European Space Agency.

Barcelona, Spain

*June, 2019 - February, 2021*

### Maastricht University

*Undergraduate Research Assistant*

Supervised by [Dr. Rico Möckel](#) at the Laboratory for Cognitive Robotics, [SwarmLab](#).

Maastricht, Netherlands

*September, 2017 - July, 2018*

## RESEARCH PAPERS AND PROJECTS (Selected)

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### Synthesizing Recursive Programs through Dataflow Constraints

University of Southern California

SPLASH SRC (OOPSLA) 2023: accepted 2023-08-25

We present an alternative approach to recover recursive programs. We develop a system of constraints that characterizes patterns of data flow in the unrollings of a recursive program. Combined with a generator of seed nonrecursive circuits and a constraint solver, these constraints naturally form the basis of a general algorithm to synthesize recursive circuits.

Open [paper](#).

### DROSTE - Rrecursive Program Synthesis.

University of Southern California

Submitted to PLDI 2024

We present a general algorithm to synthesize recursive programs from I/O Examples. We first apply an existing non-recursive synthesizer, to find an expression consistent with all I/O Examples. We then look for repeating patterns in this circuit to recover a recursive program. This technique depends on a system of constraints that characterizes well-formed unrollings of a recursive program, with a relaxation on the isomorphism constraints. We then employ a constraint solver to synthesize recursive expression from the nonrecursive expressions.

### Game Theory of Fishing: Sustainable Fishing Policies and its Worldwide Effects.

Maastricht University

December, 2018-June, 2019

Combining game-theory and mathematical modeling to understand the effects of different fishing policies on fish population and fishing communities.

Supervised by [Dr. Kateřina Staňková](#) and [Prof. Frank Thuijsman](#).

Open [research paper](#).

### Intelligent Robotic Game Device for the Assessment of Cognitive and Physical Capabilities in Children.

Maastricht University

September, 2017-July, 2018

Combining natural language processing, computer vision and robotics to create a game device which assists teachers in the assessment of the well-being of children.

Developed at the [SwarmLab](#), supervised by [Dr. Rico Möckel](#).

Open [thesis](#).

## LANGUAGES

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Object-Oriented Languages: Java, C++, Fortran, Python.

Functional Programming: OCaml, Scala, Fortran, Haskell.

Natural Languages: English, Spanish, Catalan, French.

## OTHER ACTIVITIES

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### Professional Sailor

ISAF Youth World Champion 2014.

### Social Media Content Creation

Over 100 000 followers on Instagram: [@martadavma](#).

### Public Speaker

Presented events with over 300 attendees.