

The Research Group

## Artificial Intelligence Lab

has the honor to invite you to the public defense of the PhD thesis of

**Steven ADRIAENSEN**

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

On the semi-automated design of reusable heuristics

### Promotor:

Prof. dr. Ann Nowé

The defense will take place on

**Friday September 21 2018 at 16:30 h**

in Auditorium E.0.04 at the campus Humanities, Sciences and Engineering of the Vrije Universiteit Brussel, Pleinlaan 2 - 1050 Elsene, and will be followed by a reception.

### Members of the jury:

Prof. dr. Viviane Jonckers (chairman)  
Prof. dr. Bernard Manderick (secretary)  
Prof. dr. Tias Guns  
Prof. dr. Gabriela Ochoa  
(CHORDS, University of Stirling, UK)  
Prof. dr. Thomas Stützle  
(IRIDIA, Université Libre de Bruxelles)

### Curriculum vitae

Steven Adriaensen obtained his Master's degree in Computer Science with greatest distinction at the VUB in 2013. He subsequently pursued his PhD at the Artificial Intelligence (AI) Lab, where his main focus was on the application of AI techniques to algorithm design.

The results of his doctoral research have been published in the form of six peer-reviewed articles in the proceedings of several international conferences. He also presented his research at these and various other conferences/workshops, and was invited for collaborations with researchers at the University of Stirling and York. His research was funded by an FWO Aspirant grant.

### Abstract of the PhD research

These days, many scientific and engineering disciplines rely on standardization and automated tools. Somewhat ironically, the design of the algorithms underlying these tools is often a highly manual, ad hoc, experience- and intuition-driven process, commonly regarded as an "art" rather than a "science".

The research performed in the scope of this dissertation is geared towards improving the way we design algorithms. In particular, we investigate the possibility of letting computers, rather than humans, design algorithms.

The idea of automating algorithm design is definitely not "new". Attempts to do so can be traced back to the origins of computer science, and, ever since, this problem, in one form or another, has been considered in many different research communities. Therefore, we first present an overview of this vast and highly fragmented field, relating the different approaches, discussing their respective strengths and weaknesses, towards enabling a more unified approach to automated algorithm design.

One approach, which we explored in more depth, designs algorithms with the help of automated tools known as "algorithm configurators", a practice to which we refer to as Programming by Configuration (PbC). We demonstrate PbC, using it to design a non-exact algorithm (a.k.a. a "heuristic") for solving hard combinatorial optimization problems, which we show to be competitive with the state-of-the-art. Finally, we present a critical reflection on PbC, discuss its limitations, and our own work towards addressing these.