

Pierre Vandenhove

Premier Assistant at UMONS

Avenue Victor Maistriau 15

B-7000 Mons, Belgium

+3265373515

✉ pierre.vandenhove@umons.ac.be

🌐 pierre-vandenhove.github.io/

🐙 [pvdhove](https://github.com/pvdhove)

Last updated on September 30, 2025.

Positions

- Sep 2024– Present **Premier Assistant (Research Associate)**, UMONS – Université de Mons, Belgium
Computer Science Department, Theoretical Computer Science Lab.
- Oct 2023– Sep 2024 **Postdoctoral Researcher**, LaBRI, Université de Bordeaux, France
Work with Nathanaël Fijalkow funded by the ANR project *G4S – Games for Synthesis*.
- Oct 2019– Sept 2023 **PhD candidate**, UMONS, Belgium; Laboratoire Méthodes Formelles (LMF), Université Paris-Saclay, CNRS, ENS Paris-Saclay, France
Funded by the [F.R.S.-FNRS](#) Research Fellow project *FrontieRS: Frontiers of Many-sided Reactive Synthesis*. See “PhD Thesis” section below for more details.

Education

- 2017–2019 **Master’s degree in Mathematics (Specialization in Computer Science)**, UMONS, Belgium, *Summa cum laude*
Exchange year at *Durham University*, UK in 2017–2018. Passed with first-class honors.
Thesis: *Reachability in Stochastic Hybrid Systems*, supervised by T. Brihaye and M. Randour.
- 2014–2017 **Bachelor’s degree in Mathematics**, UMONS, Belgium, *Summa cum laude*
Academic minor in Computer Science.

Publications

In theoretical computer science, authorship is traditionally listed alphabetically. Except for [ZVX+22], all my papers follow this convention.

Links to the articles (including extended versions on arXiv) are available on [my website](#). You can also find my publications on [DBLP](#) and [Google Scholar](#).

Peer-reviewed journal articles

- [BCRV24] **Half-Positional Objectives Recognized by Deterministic Büchi Automata**. Patricia Bouyer, Antonio Casares, Mickael Randour, Pierre Vandenhove. *Logical Methods in Computer Science*, volume 20, issue 3, pages 20:1–20:42, 2024.
- [BORV23] **Arena-Independent Finite-Memory Determinacy in Stochastic Games**. Patricia Bouyer, Youssef Oualhadj, Mickael Randour, Pierre Vandenhove. *Logical Methods in Computer Science*, volume 19, issue 4, pages 18:1–18:51, 2023.
- [BRV23] **Characterizing Omega-Regularity through Finite-Memory Determinacy of Games on Infinite Graphs**. Patricia Bouyer, Mickael Randour, Pierre Vandenhove. *TheoretiCS*, volume 2, pages 1–48, 2023.
- [ZVX+22] **Parallel and Memory-Efficient Distributed Edge Learning in B5G IoT Networks**.

Jianxin Zhao, Pierre Vandenhover, Peng Xu, Hao Tao, Liang Wang, Chi Harold Liu, Jon Crowcroft. *IEEE Journal of Selected Topics in Signal Processing*, volume 17, issue 1, IEEE, pages 222–233, 2022.

[BBRRV22] **Decisiveness of Stochastic Systems and its Application to Hybrid Models.** Patricia Bouyer, Thomas Brihaye, Mickael Randour, Cédric Rivi re, Pierre Vandenhover. *Information and Computation*, volume 289, part B, Elsevier, pages 1–25, 2022.

[BLORV22] **Games Where You Can Play Optimally with Arena-Independent Finite Memory.** Patricia Bouyer, St phane Le Roux, Youssef Oualhadj, Mickael Randour, Pierre Vandenhover. *Logical Methods in Computer Science*, volume 18, issue 1, pages 11:1–11:44, 2022.

■ Peer-reviewed conference proceedings

[BBBFV25] **Decisiveness for countable MDPs and insights for NPLCSs and POMDPs.** Nathalie Bertrand, Patricia Bouyer, Thomas Brihaye, Paulin Fournier, Pierre Vandenhover. *Principles of Formal Quantitative Analysis (Essays Dedicated to Christel Baier on the Occasion of Her 60th Birthday)*, Lecture Notes in Computer Science 15760, Springer, pages 70–98, 2025.

[BFG+25] **Revelations: A Decidable Class of POMDPs with Omega-Regular Objectives.** Marius Belly, Nathana l Fijalkow, Hugo Gimbert, Florian Horn, Guillermo A. P rez, Pierre Vandenhover. *39th Annual AAAI Conference on Artificial Intelligence (AAAI 2025)*, 2025. *Outstanding Paper Award (awarded to 3 papers out of 3000+ accepted papers)*.

[BIPTV24] **The Power of Counting Steps in Quantitative Games.** Sougata Bose, Rasmus Ibsen-Jensen, David Purser, Patrick Totzke, Pierre Vandenhover. *35th International Conference on Concurrency Theory (CONCUR 2024)*, LIPIcs 311, Schloss Dagstuhl, pages 13:1–13:18, 2024. *Best Paper Award nomination*.

[BFRV23] **How to Play Optimally for Regular Objectives?** Patricia Bouyer, Nathana l Fijalkow, Mickael Randour, Pierre Vandenhover. *50th EATCS International Colloquium on Automata, Languages and Programming (ICALP 2023)*, LIPIcs 261, Schloss Dagstuhl, pages 118:1–118:18, 2023.

[BCRV22] **Half-Positional Objectives Recognized by Deterministic B chi Automata.** Patricia Bouyer, Antonio Casares, Mickael Randour, Pierre Vandenhover. *33rd International Conference on Concurrency Theory (CONCUR 2022)*, LIPIcs 243, Schloss Dagstuhl, pages 20:1–20:18, 2022.

[BRV22a] **Characterizing Omega-Regularity through Finite-Memory Determinacy of Games on Infinite Graphs.** Patricia Bouyer, Mickael Randour, Pierre Vandenhover. *39th International Symposium on Theoretical Aspects of Computer Science (STACS 2022)*, LIPIcs 219, Schloss Dagstuhl, pages 16:1–16:16, 2022.

[BORV21] **Arena-Independent Finite-Memory Determinacy in Stochastic Games.** Patricia Bouyer, Youssef Oualhadj, Mickael Randour, Pierre Vandenhover. *32nd International Conference on Concurrency Theory (CONCUR 2021)*, LIPIcs 203, Schloss Dagstuhl, pages 26:1–26:18, 2021.

[BBRRV20] **Decisiveness of Stochastic Systems and its Application to Hybrid Models.** Patricia Bouyer, Thomas Brihaye, Mickael Randour, C dric Rivi re, Pierre Vandenhover. *11th International Symposium on Games, Automata, Logics, and Formal Verification (GandALF 2020)*, EPTCS 326, pages 149–165, 2020.

[BLORV20] **Games Where You Can Play Optimally with Arena-Independent Finite Memory.** Patricia Bouyer, St phane Le Roux, Youssef Oualhadj, Mickael Randour, Pierre Vandenhover. *31st International Conference on Concurrency Theory (CONCUR 2020)*, LIPIcs 171, Schloss Dagstuhl, pages 24:1–24:22, 2020. *Best Paper Award nomination*.

Invited papers in international conferences

[BCRV23] **Half-Positional Objectives Recognized by Deterministic Büchi Automata (Extended Abstract)**. Patricia Bouyer, Antonio Casares, Mickael Randour, Pierre Vandenhover. *32nd International Joint Conference on Artificial Intelligence (IJCAI 2023), Sister Conferences Best Papers*, pages 6420–6425, 2023.

[BRV22b] **The True Colors of Memory: A Tour of Chromatic-Memory Strategies in Zero-Sum Games on Graphs**. Patricia Bouyer, Mickael Randour, Pierre Vandenhover. *Keynote lecture at the 42nd IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2022)*, LIPIcs 250, Schloss Dagstuhl, pages 3:1–3:18, 2022.

Preprints

[BFMMV25] **LTL_f Learning Meets Boolean Set Cover**. Gabriel Bathie, Nathanaël Fijalkow, Théo Matricon, Baptiste Mouillon, Pierre Vandenhover. 23 pages, 2025.

[COV24] **A positional Π_3^0 -complete objective**. Antonio Casares, Pierre Ohlmann, Pierre Vandenhover. 7 pages, 2024.

Book chapter

Positionality and Memory. Antonio Casares, Pierre Ohlmann, Pierre Vandenhover. Chapter 4 of book **Games on Graphs: From Logic and Automata to Algorithms**, coordinated by Nathanaël Fijalkow. To appear in *Cambridge University Press*, 2025.

PhD Thesis

Title **Strategy Complexity of Zero-Sum Games on Graphs**
268 pages, 2023.

Supervisors [Mickael Randour](#) (UMONS) and [Patricia Bouyer](#) (LMF)

Jury Christel Baier (Reviewer – Technische Universität Dresden), Patricia Bouyer (Cosupervisor), Véronique Bruyère (President – UMONS), Thomas Colcombet (Reviewer – CNRS, Institut de Recherche en Informatique Fondamentale), Laurent Doyen (Examiner – CNRS, Laboratoire Méthodes Formelles), Benjamin Monmege (Examiner – Aix-Marseille Université, Laboratoire d'Informatique & Systèmes), Mickael Randour (Cosupervisor)

Graduation April 26, 2023

Grants & Honors

- 2025 *Outstanding Paper Award* at AAAI'25 (awarded to 3 papers out of 3000+ accepted papers).
- 2024 Selected to participate in the 11th Heidelberg Laureate Forum.
- 2024 Nominated for the *Best Paper Award* of CONCUR 2024.
- 2024 *Postdoctoral Researcher* funding from F.R.S.-FNRS (three years, to work with Emmanuel Filiot at Université libre de Bruxelles) — *declined in favor of the Premier Assistant position at UMONS*.
- 2022 Prix Doctorants STIC 2022 – *accessit*, Labex DigiCosme.
- 2020 Nominated for the *Best Paper Award* of CONCUR 2020.

- 2019 *Research Fellow* funding from F.R.S.-FNRS (four years, to work with Mickael Randour at UMONS and Patricia Bouyer at Université Paris-Saclay).
- 2019 Award of the Mathematics Department of UMONS for my bachelor's and master's studies.

Talks

Corresponding slides are available on [my website](#).

2025

- Revelations: A Decidable Class of POMDPs with Omega-Regular Objectives, *INFORTECH Day 2025*, 23/05, Mons, Belgium.
- Revelations: A Decidable Class of POMDPs with Omega-Regular Objectives, *AAAI 2025: The 39th Annual AAAI Conference on Artificial Intelligence*, 02/03, Philadelphia, Pennsylvania, USA.

2024

- Revelations: A Decidable Class of POMDPs with Omega-Regular Objectives, *Journées du GT Vêrif*, 20/11, Lille, France.
- Revelations: A Decidable Class of POMDPs with Omega-Regular Objectives, *UMONS Formal Methods Reading Group*, 07/10, Mons, Belgium.
- Decidability of Omega-Regular Objectives for POMDPs with Revelations, *Dagstuhl Seminar 24231: Stochastic Games*, 04/06, Dagstuhl, Germany.
- The Decisiveness Property for Decidable Classes of Stochastic Systems, *Liverpool Verification Seminar*, 29/02, Liverpool, UK.

2023

- Characterizing Omega-Regularity through Strategy Complexity of Zero-Sum Games, *Young Scholar Day of the Belgian Mathematical Society*, 20/12, Brussels, Belgium.
- Strategy Complexity of Zero-Sum Games on Graphs, *Links' Team Seminar*, 24/11, Lille, France.
- Strategy Complexity of Zero-Sum Games on Graphs, *MoVe Seminar*, 09/11, Marseille, France.
- How to Play Optimally for Regular Objectives?, *Highlights 2023 of Logic, Games and Automata*, 25/07, Kassel, Germany.
- How to Play Optimally for Regular Objectives?, *ICALP 2023: 50th EATCS International Colloquium on Automata, Languages and Programming*, 11/07, Paderborn, Germany.
- Strategy Complexity of Zero-Sum Games on Graphs, *Liverpool Verification Seminar*, 03/07, Liverpool, UK.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *STIC doctoral day on the Saclay plateau*, 20/06, Gif-sur-Yvette, France.
- Strategy Complexity of Zero-Sum Games on Graphs, *Seminar of IST Austria*, 09/05, Vienna, Austria.
- Strategy Complexity of Zero-Sum Games on Graphs, *public thesis defense*, 26/04, Mons, Belgium.
- Strategy Complexity of Zero-Sum Games on Graphs, *private thesis defense*, 20/04, Mons, Belgium.
- Strategy Complexity of Zero-Sum Games on Graphs (Thesis seminar), *LMF Seminar*, 14/03, Gif-sur-Yvette, France.
- Memory Requirements of Omega-Regular Objectives: the Regular Case, *LaBRI/MTV Seminar*, 02/03, Bordeaux, France.
- How to Play Optimally for Regular Objectives?, *GT Informel CDS/MCS of the Laboratoire*

Méthodes Formelles, 17/02, Gif-sur-Yvette, France.

2022

- Memory Requirements of Omega-Regular Objectives: the Regular Case, *UMONS Formal Methods Reading Group*, 16/12, Mons, Belgium.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *IRIF Automata Seminar*, 28/10, Paris, France.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *ULB Verif Seminar*, 14/10, Brussels, Belgium.
- Half-Positional Objectives Recognized by Deterministic Büchi Automata, *CONCUR 2022: The 33rd International Conference on Concurrency Theory*, 14/09, Warsaw, Poland.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *LAMAS and SR 2022: Logical Aspects in Multi-Agent Systems and Strategic Reasoning*, 26/08, Rennes, France.
- Half-Positional Objectives Recognized by Deterministic Büchi Automata, *Highlights 2022 of Logic, Games and Automata*, 29/06, Paris, France.
- Existence of memoryless optimal strategies through universal graphs [based on a LICS'22 paper], *UMONS Formal Methods Reading Group*, 02/06, Mons, Belgique.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *Current Trends in Graph and Stochastic Games (GAMENET Workshop)*, 06/04, Maastricht, The Netherlands.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *STACS 2022: 39th International Symposium on Theoretical Aspects of Computer Science*, 17/03, Online.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *LaBRI/LX seminar*, 03/03, Bordeaux, France.

2021

- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *Journées du GT Vérif*, 17/11, ENS Paris-Saclay, Gif-sur-Yvette, France.
- Characterizing Omega-Regularity Through Strategy Complexity of Games on Infinite Graphs [Ongoing Work], *UMONS Formal Methods Reading Group*, 23/09, Mons, Belgique.
- Arena-Independent Finite-Memory Determinacy, *Highlights 2021 of Logic, Games and Automata*, 15/09, Online.
- Arena-Independent Finite-Memory Determinacy in Stochastic Games, *CONCUR 2021: The 32nd International Conference on Concurrency Theory*, 26/08, Online.
- Arena-Independent Finite-Memory Strategies, *GT ALGA - Journées annuelles 2021*, 17/06, Online.
- Arena-Independent Finite-Memory Strategies, *GT Model-Checking and Synthesis, LMF, Université Paris-Saclay*, 23/04, Online.

2020

- Understanding Finite-Memory Determinacy, *LMF Research Days*, 09/12, Online.
- Decisiveness of Stochastic Systems and its Application to Hybrid Models, *11th International Symposium on Games, Automata, Logics, and Formal Verification (GandALF 2020)*, 22/09, Online.
- Games Where You Can Play Optimally with Arena-Independent Finite Memory, *CONCUR 2020: The 31st International Conference on Concurrency Theory*, 02/09, Online.
- Games Where You Can Play Optimally with Arena-Independent Finite Memory, *MOVEP 2020*:

14th Summer School on Modelling and Verification of Parallel Processes, 22/06, Online.

2019

- Reachability in Stochastic Hybrid Systems, *Highlights 2019 of Logic, Games and Automata*, 19/09, Warsaw, Poland.
- Reachability in Stochastic Hybrid Systems, *13th International Conference on Reachability Problems (RP'19)*, 12/09, Brussels, Belgium.
- Reachability in Infinite Markov Chains, *Mardi des Chercheurs 2019*, 05/03, Université de Mons, Mons, Belgium.

Research visits

- Visits to Dominik Wojtczak and Patrick Totzke at the University of Liverpool, July 3–7, 2023 and February 26 to March 1, 2024.
- Visit to Nicolas Mazzocchi at IST Austria, Vienna, May 8–12, 2023.
- Visit to Hugo Gimbert at LaBRI, Bordeaux, from February 27 to March 3, 2023.
- Visit to Nathanaël Fijalkow at the University of Warsaw, September 19–23, 2022.
- Visits to Nathanaël Fijalkow at LaBRI, Bordeaux, from February 28 to March 4, 2022 and December 16–20, 2024.

Teaching

- Feb 2025– **Introduction to Machine Learning and Data Science**, *Teacher*, Université de Mons
Present Theory courses and practical sessions (about 60h / year).
- Sept 2024– **Operating Systems**, *Teacher*, Université de Mons
Present Theory courses (about 27h / year, twice).
- Jan 2024– **Machine Learning and Deep Learning**, *Teaching Assistant*, Université de Bordeaux
Jun 2024 Theory courses and exercise sessions (about 18h).
- Jan 2024– **Computer Science**, *Teaching Assistant*, Lycée Montaigne (CPGE)
Jun 2024 Algorithms and programming exercises for first-year students (about 24h).
- Sept 2019– **Formal Methods for System Design**, *Teaching Assistant*, Université de Mons
Aug 2023 Exercise sessions (about 50h / year).

Student supervision

Interns

- Supervision of Matéo Torrents on memory requirements of stochastic games (June to July 2024).
- Cosupervision (with Gabriel Bathie, Nathanaël Fijalkow, and Théo Matricon) of Baptiste Mouillon on LTL learning (March to July 2024).
- Cosupervision (with Nathanaël Fijalkow, Guillaume Lagarde, and Théo Matricon) of Sylvain Brisset on programmatic reinforcement learning (February to April 2024).
- Cosupervision (with Nathanaël Fijalkow and Théo Matricon) of Gianni Padula on incremental reactive synthesis (November 2023 to February 2024).
- Cosupervision (with Mickael Randour) of Jean Abou Samra on automata minimization (June to August 2023).
- Supervision of Maximilien Vanhaverbeke (student intern, UMONS) on succinctness of good-for-games automata (August 2022).

- Supervision of Luca Lani (student intern, UMONS) on strategy complexity of zero-sum games (August 2021).

■ Supervision of master's theses

- Amar Hamouma (2025, UMONS).
- Jordan Demaret (2025, UMONS).
- Matéo Torrents (2024, ENS Paris).

■ Jury member for master's theses

- Antoine Guns (2025, UMONS).
- Valentin Dusollier (2023, UMONS).
- James Main (2021, UMONS).

■ Attended research events

■ 2025

Brussels Summer School of Mathematics, Brussels, Belgium | *INFORTECH Day 2025*, Mons, Belgium | *AAAI 2025: The 39th Annual AAAI Conference on Artificial Intelligence*, Philadelphia, PA, USA.

■ 2024

Journées du GT Vérif, Lille, France | *Dagstuhl Seminar 24231: Stochastic Games*, Dagstuhl, Germany | *Journées du GT DAAL*, Rennes, France.

■ 2023

Belgian Mathematical Society Young Scholar Day, Brussels, Belgium | *Highlights 2023 of Logic, Games and Automata*, Kassel, Germany | *ICALP 2023: 50th EATCS International Colloquium on Automata, Languages and Programming*, Paderborn, Germany | *STIC doctoral day on the Saclay plateau*, Gif-sur-Yvette, France.

■ 2022

CONCUR 2022: The 33rd International Conference on Concurrency Theory, Warsaw, Poland | *LAMAS and SR 2022: Logical Aspects in Multi-Agent Systems and Strategic Reasoning*, Rennes, France | *Highlights 2022 of Logic, Games and Automata*, Paris, France | *Current Trends in Graph and Stochastic Games (GAMENET Workshop)*, Maastricht, The Netherlands | *39th International Symposium on Theoretical Aspects of Computer Science (STACS 2022)*, Online.

■ 2021

Journées du GT Vérif, ENS Paris-Saclay, Gif-sur-Yvette, France | *Highlights 2021 of Logic, Games and Automata*, Online | *CONCUR 2021: The 32nd International Conference on Concurrency Theory*, Online | *Reinforcement Learning - From Theory to Practice Summer School*, Alan Turing Institute | *GT ALGA - Journées annuelles 2021*, Online.

■ 2020

Spotlight on Games, Online | *GandALF 2020: 11th International Symposium on Games, Automata, Logics, and Formal Verification*, Online | *Highlights 2020 of Logic, Games and Automata*, Online | *CONCUR 2020: The 31st International Conference on Concurrency Theory*, Online | *MOVEP 2020: 14th Summer School on Modelling and Verification of Parallel Processes*, Online.

2019

Highlights 2019 of Logic, Games and Automata, Warsaw, Poland | *13th International Conference on Reachability Problems (RP'19)*, Brussels, Belgium | *Theory and Algorithms in Graph and Stochastic Games*, Mons, Belgium | *Mardi des Chercheurs*, Mons, Belgium.

2018

FoPSS Logic and Learning School, Oxford, UK | *MOVEP 2018: 13th Summer School on Modelling and Verification of Parallel Processes*, Cachan, France | *International Conference on Functional Programming (ICFP'18)*, St. Louis, Missouri, United States.

2017

Computers in Scientific Discoveries 8, Mons, Belgium.

Internships

- Aug– **Student intern**, OCaml Labs, University of Cambridge, UK
- Nov 2018 Implementation of the Mask R-CNN architecture for image segmentation and classification using OCaml's numerical library Owl. Contributions to the *computation graph* module.
- Jul 2017 **Research intern**, Algorithms Lab, UMONS, Belgium
Received a grant for a research internship in graph theory about coloration problems.

Outreach and popular science

2025

- Strategy Complexity: How Much Does It Take to Win?, *Brussels Summer School of Mathematics*, 26/08, Brussels, Belgium.
- Erreur détectée : Comment les ordinateurs réparent toutes nos erreurs (ou presque !), popular science talk for secondary school students, *Journées Math-Sciences*, 27–28/03, UMONS.

2022

- Jeux pour l'informatique et complexité des stratégies, popular science talk for university students, *Séminaire Jeunes de l'UMONS*, 21/04, UMONS.
- À vous de jouer !, popular science talk for secondary school students, *Journées Math-Sciences*, 24/03, UMONS.

2019

Member of the organizing committee of *Pint of Science* in Mons, 20–22/05.

Miscellaneous

- Reviewing Subreviewer for Logical Methods in Computer Science (x3), Dynamic Games and Applications, GandALF'20, LICS'21, CONCUR'21 (x2), FORMATS'21, SETTA'21, ATVA'22, CSL'23, FoSSaCS'23, CONCUR'23 (x2), MFCS'23, EUMAS'23, VMCAI'24, STACS'24, LATIN'24, FoSSaCS'24, LICS'24, ICALP'24 (x2), FSTTCS'24, LICS'25 (x2), CONCUR'25, MathSciNet (x4).
- Program committees Program committee member for AAAI'26.

- Academic responsibilities
 - Member of the Council of the Faculty of Science at UMONS (2020–2023, and 2024 onwards).
 - Co-organizer of the *MTV seminar* at LaBRI (academic year 2023–2024).
 - Member of the organizing committee of Highlights 2024 of Logic, Games and Automata at LaBRI, Université de Bordeaux; responsible for the Highlights Extended Stay Support Scheme.
- Programming contests
 - UMONS representative for the BeOI (*Belgian Olympiad in Informatics*) for secondary schools (since 2025). Organizer of a two-day training session in March 2025.
 - Coach of the ICPC teams at UMONS, and *BAPC Preliminaries* organizer at UMONS in 2019, 2020, 2021, 2022, and 2024.
 - Participation in ICPC (programming contests) as a student from 2016 to 2018. Our team CPUMONS won a bronze medal (rank 12/114) during NWERC 2016, 3rd place during BAPC 2016 and BAPC 2018, 5th place during BAPC 2017.