

## Gilgueng HWANG



### LIMMS, University of Tokyo

4-6-1 Komaba Meguro-ku

153-8505 TOKYO, JAPAN

Tel : +81.3.58.41.67.30

hwang@if.t.u-tokyo.ac.jp

www.micro-nanorobotics.com

h-index : 26

Nationality : South Korean

### Current Positions

---



## Chargé de Recherche CNRS

since  
2010

**Chargé de recherche CNRS (CRCN)**, LPN (2010-2016), C2N (2016-2019),

LIMMS (2019 – now) IRL 2820 CNRS The University of Tokyo

Research topics : Micro/nanorobotics researcher in the Paris-Saclay University and French National Centre for Scientific Research (CNRS) since 2010/10 and recently initiated biomedical micro/nanorobotics activities in the CNRS's international laboratory (LIMMS) at The University of Tokyo for French-Japanese international collaborations on this field. Effectively contributes as an individual PI as well as in multidisciplinary collaborative projects. Winner of 5 world champions out of 7 years of participations to IEEE/NIST International Mobile Microrobotics Challenges. Native in Korean, fluent in English, Japanese and French.

### DISTINCTIONS

---

- 2017 **World double champions** ("Autonomous Mobility & Accuracy Challenge" and "Best in Show Award") in the IEEE/RAS Mobile Microrobotics Challenge 2017, Singapore
- 2014 **World champion** in the event of mobility contest at the IEEE/RAS Mobile Microrobotics Challenge 2014, HongKong
- 2013 **World champion** in the microassembly event of mobile microrobotics challenge 2013, Karlsruhe, Germany
- 2011 **World double champion** as French team (name: MagPieR) in the event of mobility contest at the NIST Mobile Microrobotics Challenge 2011, Shanghai, China
- 2010 **World champion** as French team (name: MagPieR) in the 2mm dash contest at the NIST Mobile Microrobotics Challenge 2010, Anchorage, Alaska, USA

## DIPLOMES

---

- 2018 **Habilitation à Diriger des Recherches**, Université Paris-Sud  
« On-Chip Micro/nanorobotic Swimmers Toward Biological Applications » .  
Composition of jury :
- |                     |   |             |
|---------------------|---|-------------|
| G. Manina           | Institute Pasteur, Paris, France                                | : President |
| P. Fischer          | Max Planck Institute, Stuttgart, Germany                        | : Reporter  |
| A. Barakat          | LadHyX, CNRS, Ecole Polytechnique, Palaiseau, France            | : Reporter  |
| C. Villard          | IPGG, CNRS, Université Paris Sciences et Lettres, Paris, France | : Reporter  |
| S. Le Gac           | University of Twente, Netherlands                               | : Examiner  |
| I. Sagnes           | C2N, CNRS, Université Paris-Saclay, Palaiseau, France           | : Examiner  |
| A.M. Haghiri-Gosnet | C2N, CNRS, Université Paris-Saclay, Palaiseau, France           | : Examiner  |
- 2008 **Ph.D**, Electrical Engineering, The University of Tokyo  
« Development and Application of Piezoresistive 3-D InGaAs/GaAs Helical Nanobelt Force Sensor »  
H. Hashimoto, The University of Tokyo, Tokyo, Japan (Supervisor)  
B. J. Nelson, ETHZ, Zurich, Switzerland (Co-supervisor)
- 2005 **M.Sc.**, Electrical Engineering, The University of Tokyo  
« A Human-Robot Cooperative Tele-Micromanipulation System with Single-Master Multi-Slave Devices »
- 2002 **B.Sc.**, Electrical Engineering, Yonsei University

## COLLECTIVE RESPONSIBILITIES

---

- 2022- Elected member of the LIMMS Scientific Council
- 2020-22 Participation to two Ph.D thesis committees (1 as reporter) : Sorbonne Université and University Paris-Saclay
- 2016-19 Responsible of Group BIOSYS (Smart Nano-Bio-Systems), C2N, University Paris-Saclay
- 2019 Secretary of 2019 IEEE/SICE International Symposium on System Integration (SII 2019), Paris, France
- 2013-17 Organizing committee member of annual Hamlyn medical robotics symposiums : workshop on « Microrobotics » Imperial College London, U.K.
- 2014- Participation to editorial member : Senior Editor (IEEE Ubiquitous Robots), Associate Editors (IEEE/SICE SII, IEEE ICRA, IEEE/RSJ IROS), Guest Editor (special issue on Biomanufacturing in Science Journal "Cyborg and Bionic System". Journal Reviewer (IEEE Robotics and Automation Letters, Wiley Advanced Materials Technologies, Wiley Advanced Materials, Microelectronic Engineering, Springer Microfluidics and Nanofluidics, Journal of Micro-Nano Mechatronics, IEEE Transactions on Industrial Electronics, IEEE Transactions on Robotics, AIP Review of Scientific Instruments.

## COLLABORATIVE PROJECTS

---

- 2021-23 **Project IEA EXPANSION** with Seoul National University (SNU)  
Partner : LIMMS (UTokyo), INRoL (SNU)  
Implication : Coordinator
- 2020-21 **Project LIMMS Internal** U-Tokyo (Development of miniaturized soft transformable microswimmer)  
Partner : LIMMS-CNRS (G. Hwang, B. J. Kim, Y. Mita)  
Implication : Coordinator
- 2020-21 **Project LIMMS Internal** U-Tokyo (Living integrated biological reservoir-computing artificial intelligence by neuron-network-on-silicon (LIBRAIN))  
Partner : LIMMS-CNRS (G. Hwang, G. Larrieu, Y. Mita)  
Implication : Coordinator
- 2020-21 **Project PEPS** CNRS-INSIS (PRONAGE : Soft and programmable microswimmers inspired by nature)  
Partner : LIMMS-CNRS (G. Hwang)  
Implication : Coordinator
- 2019-23 **Project ANR PRC DIMELEC** (Microfluidic devices incorporating capture, release and detection modules electrochemical matrix of micro-RNA)  
Partner : C2N-CNRS, PHENIX, LISE, INSERM/IRBA Hospital de Clamart  
Implication : Participant
- 2018-20 **Project Labex Nanosaclay HDE** and **CNRS/INP prematuration DAGNOS** (Instrument couplant excitation magnétique et détection électrochimique)  
Partner : C2N-CNRS, PHENIX  
Implication : Participant
- 2016-21 **Project ANR/RHU BIOART-LUNG 2020**  
Partner : C2N-CNRS, LEMM-CEA, Airbus group, Xenios, MLH, Smartcanula, INSERM U999, INSERM U1176, LITEN-CEA, INSERM-U1197, AP-HP KB  
Implication : Project manager of C2N
- 2015-18 **Project Labex Nanosaclay RAPID\_3D** (Module d'écriture rapide pour nanolithographie 3D)  
Partner : LPN-CNRS, LPQM-ENS Cachan and B2A-CNRS.  
Implication : Coordinator
- 2011-15 **ANR P2N NANOROBUST** (In-SEM Multi-physics characterization and robotics manipulation)  
Partner : LPN-CNRS, Femto-ST, IRISA, ISIR.  
Implication : Participant
- 2011-15 **ANR Blanc JCJC NOMAD** (Mobile Nano-robots for biologic and diagnosis applications)  
Partner : LPN-CNRS  
Implication: Coordinator

## RESEARCH SUPERVISION

---

- 2020-21 **Post-doc** of J. Lachaux (50%), Development of microfluidic oxygenator, co-supervision in BIOSYS team
- 2018-20 **Post-doc** of V. Lotito (50%), Design optimization of transplantable microfluidic oxygenator, co-supervision
- 2013-15 **Post-doc** of S. Alvo (50%) Multiphysics Characterizations and Modelings for Cavity Nanooptomechanics and Nanoswimmers, co-supervision with Photonics department C2N
- 2018-20 **Ph.D** of J. Lachaux (50%) Development of microfluidic oxygenator, co-supervision with BIOSYS team
- 2016-19 **Ph.D** of A. Paris (100%) Non-contact micromanipulation of active matter by mobile microrobotic vortex
- 2013-16 **Ph.D** of A. Barbot (100%) Implémentation d'actionneurs et capteurs sur des robots micrométriques évoluant dans un fluide
- 2011-14 **Ph.D** of H. Salmon (90%) Development and Applications of Microswimmers with Functional Tools
- 2010-13 **Ph.D** of T. Xu (30%) Closed-loop Control of Micro/nanoswimmers, co-supervision with S. Régnier

## TEACHING

---

### The University of Tokyo

2020-22 Master course « U-Tokyo D2T special courses »

### Ecole Polytechnique

2018 Master course « Biomechanical Engineering »

### University of Paris-Saclay

2017-18 Master course « biodesign and bioengineering »

2015-20 Master course : « NanoSciences Saclay »

## PUBLICATIONS

---

Patents: 4

Book Chapters: 5

Peer-reviewed International Journal Papers: 38

Peer-reviewed International Conference Papers: 53

Invited Talks: 32

National Conference Papers: 13

Research and Thesis Supervisions: 3 postdoc, 5 Ph.D, 17 M.S., 5 B.S.

Summary 38 International Journals with peer review (18 as first author, 9 as last author, 1 Nano Letters, 2 Nature Scientific Reports, 1 Lab on a chip, 1 Applied Physics Letters, 2 International Journal of Robotics Research, 1 IEEE Transactions on Robotics, 1 IEEE Transactions on Control System Technology, 1 IEEE Robotics and Automation Magazine, 1 IEEE/ASME Transactions on Mechatronics, 5 Review of Scientific Instruments, 5 Sensors and Actuators :A Physical, 1 IEEE Journal of Microelectromechanical Systems, 1 IEEE Transactions on Semiconductor Manufacturing), 4 Patents, 5 Book Chapters, 53 International Conference Proceedings with peer review (IEEE ICRA, IEEE/RSJ IROS, RSS, IEEE MEMS, Transducers and others)