

# Bassem DAHROUG

*PhD, Mechatronics Engineer*

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## Field of Interest

Mechatronics - Mechatronics Design - Robotics - Automatic control - Visual servoing - Programming - Mechanics - Fluid mechanics - (micro)Manufacturing - Materials - Electronics

## Skills and Know-how

Mechatronic design	● ● ● ● ●	Robotic experimentation	● ● ● ● ●
Robotics	● ● ● ● ○	Analysis, synthesis and solving problems	● ● ● ● ○
Automatic control	● ● ● ● ○	Oral and writing communication	● ● ● ● ○
Scientific programming	● ● ● ● ○	Organization, rigor and autonomy	● ● ● ● ○
Mechanics	● ● ● ● ○	Project Collaboration	● ● ● ● ○
Electronics	● ● ● ● ○		

## Education

- 11/2014 – **Doctor of philosophy in Engineering Sciences**, **UBFC**<sup>1</sup>, Besançon, France.  
02/2018 **Dissertation**: Minimally Invasive Surgery in the Middle Ear: a guided micro-robotic system to efficiently remove cholesteatoma.
- 09/2012 – **Masters degree in Mechatronics and Micro-Mechatronics Systems**, joint masters degree  
09/2014 from **ENSMM**<sup>2</sup>, Besançon, France and **EPI**<sup>3</sup>, Gijón, Spain.  
**Master thesis**: Design, modelling and control of a contactless modular conveyor.
- 09/2006 – **Bachelor degree in Mechanical Engineering**, **AAST**<sup>4</sup>, *College of Engineering Studies and Technology, Department of Mechatronics*, Alexandrie, Egypt.  
09/2011 **Graduation project titre**: Mobile robot control for parking manoeuvre.

## Professional and Academic Experiences

- 06/2021 – **PhD, Mechatronics engineer**, **AMAROB Technologies**<sup>5</sup>, Besançon, France.  
11/2022
  - participate in the research and development of the main product of the company which is a micro-robotic systems dedicated to intracorporeal laser surgery;
    - design of a mechatronics device to actuate a blendable micro-robot;
    - manufacturing some parts of the micro-robot;
  - take part in the company activities with its collaborators and client;
    - design and fabricate a medical prototype for detecting the breast cancer;
    - manufacturing using milling and electrical discharge machines.
- 09/2021 – **Temporary teaching**, **ENSMM**, Besançon, France.  
01/2022
  - 20 hours of practical work of JAVA programming for students in the 1<sup>st</sup> year of bachelor.

<sup>1</sup>UBFC: <https://www.ubfc.fr/>

<sup>2</sup>ENSMM: <https://www.ens2m.fr/>

<sup>3</sup>EPI: <http://www.epigijon.uniovi.es/>

<sup>4</sup>AAST: <http://www.aast.edu/en/index.php>

<sup>5</sup>AMAROB: <https://amarob.com/>

- 09/2018 – **Researcher, Post-doctoral**, *Institute FEMTO-ST*<sup>6</sup>, *Department AS2M (Automatique et Systèmes Micro-Mécatroniques)*, Besançon, France.
- participate to the INSERM project "ROBOT" (Robotics and Optical coherence tomography for optical BiOpsy in the digestive Tract) [2017 – 2021] which proposes an innovative approach to detect the cancer cells at the digestive tract;
  - implement a visual servoing scheme based on the 3D imaging (C-scan) obtained from the OCT (Optical Coherence Tomography) for guiding a robot during the intra-operative phase in order to perform a repeatable optical biopsy;
  - design and development of a prototype in order to validate and integrate the distinct technological and methodological approaches proposed by the different projects teams;
  - supervision of two undergraduate trainees;
  - valorization of the dissertation work.
- 09/2019 – **Temporary teaching**, *UFC*<sup>7</sup>, Besançon, France.
- 01/2020
- 28 hours of practical work of robotics for the *ISIFC*<sup>8</sup> students in the 3<sup>rd</sup> year of bachelor;
  - 12 hours of practical work of 3D computer vision for the students in the 2<sup>nd</sup> year of master;
  - 9 hours of practical work of automatic control of continuous system for the students in the 3<sup>rd</sup> year of bachelor.
- 11/2014 – **Research assistant, PhD student**, *Institute FEMTO-ST*, *Department AS2M*, Besançon, France.
- 02/2018
- early research stage of the project "*μRMES*" (Micro-Robot for Middle Ear Surgery)
    - analysis of the clinical need for middle ear surgery to treat the disease known as cholesteatoma;
    - development of an image-guided micro-robotic system to perform this procedure.
  - collaboration with *ARTOG* Center<sup>9</sup>, Bern, Switzerland, by conducting experimental tests to evaluate the proposed controller in a clinical environment;
  - supervision of six undergraduate trainees.
- 09/2015 – **Temporary teaching**, *ENSMM*, Besançon, France.
- 01/2016
- 64 hours of practical work of automatic control and programming for students in the 1<sup>st</sup> year of bachelor.
- 02/2014 – **Master graduation project**, *Institute FEMTO-ST*, *Department AS2M*, Besançon, France.
- 08/2014
- participate to the project "*Smart Block*" [2011 – 2015] which innovates the transportation of fragile objects by designing a modular and reconfigurable conveyor;
    - propose new designs for a modular block which builds an aerodynamic conveyor for transporting photovoltaic cells;
    - model the air jets below an object;
    - propose control law to control the opening of the ports of each block independently so that the object can maintain a fixed position or follow a desired trajectory;
    - numerical and experimental validation of the proposed controller.
- 02/2012 – **Temporary teaching**, *AAST*, *Department of Mechanics*, Alexandria, Egypt.
- 07/2012
- practical work of robotics and CAD (Computer Aided Design);
  - tutor of a university team participating in the 11<sup>th</sup> MATE (Marine Advanced Technology Education Centre) International ROV Competition.
- 02/2012 – **Bachelor graduation project**, *AAST*, *Department of Mechanics*, Alexandria, Egypt.
- 07/2012
- model and control of a mobile robot (car-like vehicle) for performing an automated parking maneuver.

## Scholarship and Awards

2016 International mobility grant for doctoral students, funded by **UBFC**

2015 Best Automation Paper Award<sup>10</sup>, **ICRA'2015** (IEEE International Conference on Robotics and Automation)

<sup>6</sup>FEMTO-ST: <http://www.femto-st.fr/en/>

<sup>7</sup>UFC: <http://www.univ-fcomte.fr/>

<sup>8</sup>ISIFC: <http://isifc.univ-fcomte.fr/pages/en/index.html>

<sup>9</sup>ARTOG: [http://www.artorg.unibe.ch/research/igt/index\\_eng.html](http://www.artorg.unibe.ch/research/igt/index_eng.html)

<sup>10</sup>ICRA'2015: <https://www.ieee-ras.org/about-ras/latest-news/635-icra-2015-award-recipients-announced>

2012 **European Scholarship**, Master **EU4M** (Mechatronics and Micro-Mechatronics Systems <sup>11</sup>) funded by the Erasmus Mundus programme

2008 **Participation in competition Robocon** (Egypt) with AAST team, 4th place in Egypt

## Computer skills

**Computer Aided Design (CAD):** FreeCAD, Solidworks, CATIA, Creo

**Computer Aided Manufacturing (CAM):** G-Code, FreeCAD-Path, Vericut, GO2Cam

**Electronic Design Automation (EAD):** KiCAD, Eagle, Proteus, Quartus

**Mathematics:** Matlab/Simulink, Octave

**Numerical Modeling:** COMSOL Multiphysics

**Programming:** C/C++, ViSP, OpenCV, PCL, VTK, CMake,  
Python, Java, JS, HTML, CSS,  
micro-controller, Ladder,  
TCP/IP, I2C,  
Android

**Simulation:** Blender

**Version Control:** SVN, GIT

**Operating Systems:** Linux, Windows

**Office Tools:** L<sup>A</sup>T<sub>E</sub>X, MS-office, Sozi

## Linguistics



English



French



Arabic



Spanish

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<sup>11</sup>EU4M: <http://www.eu4m.eu/>