Charles V. Fracchia

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Education

2012 – present **Massachusetts Institute of Technology** *Cambridge, MA*
Molecular Machines (Prof. Joe Jacobson), Centre for Bits and Atoms
Masters in Media Arts and Sciences (Medialab)
Co-Mentored by Prof. George Church, Harvard Medical School
IBM Ph.D. Scholar

2007 – 2011 **Imperial College London** *(2:1 Honours)* *London, UK*
Bachelor of Science in **Biology** with a Year in Industry
- Associateship of the Royal College of Science
- Industry year spent working at Ginkgo Bioworks (*Boston, MA*)

Thesis: "Engineering a potassium efflux pump as a cyborg reporter in synthetic biology"
- Designed and transformed plasmid constructs, produced and characterized novel K^+ sensor
- *Supervisor:* Dr Tom Ellis

Research Experience

2011 – 2012 **Church Lab Wyss Institute Harvard Medical School** *Boston, MA*
- Design and experimentation of novel DNA origami applications
- Optimising the high volume production of Phage backbone DNA used in origami folding

2011 **IBM Research** *Yorktown Heights, NY*
- Tested the in vivo usability of the bio-electronic interface designed during thesis work at Imperial College London
- Designed and implemented new technologies to enhance biological research in a laboratory environment. These include a wireless high impedance pH meter used to measure K^+ concentration in vivo, a wireless dongle for communicating with lab equipment and automatically collecting data from them and a web-based interface to display all the aggregated data in a useful manner

2009 – 2010 **Ginkgo Bioworks** *Boston, MA*
- Designed and implemented an automated DNA assembly pipeline
- Developed a set of protocols for the various robotic platforms
- Created software (Ruby on Rails) protocols to be integrated to the custom Laboratory Information Management System (LIMS) which linked resources management to the experimental protocols used in the laboratory
- Maintained and Integrated different automation platforms together to create a pipeline to increase throughput and decrease the time of iteration when creating engineered bacterial organisms
    - *Platforms:* Beckman Coulter Biomek FX and Qiagen BioRobot 8000

2009 **Imperial College iGEM team** *London, UK*
- Developed an auto-encapsulable E. coli to deliver proteins to the intestine
- Tested the different parts of the three different modules constituting our project
- Led the Human Practices project and built website

2008 **Pasteur Institute** *Brussels, Belgium*
Laboratory of Mycobacterial Immunology
- Assisted a team in the development and testing of a novel DNA-based vaccine against Mycobacterium tuberculosis
- *Techniques used:* Plasmid purification and sequencing, RNA purification Electroporation

Laboratory of Cellular Microbiology
- Assisted the study of a molecular cascade leading to apoptosis
- *Techniques used:* Mammalian cell culture, FACS, SDS-PAGE, Chemoluminescent western blot

2006 **Steria** *Brussels, Belgium*

- Contributed to the Schengen Information System (SIS II): software for the exchange of police information between member countries. I developed a PHP program to report test results from the application's performance and compliant with European Commission regulations
- Worked under confidentiality clause

Patents

2014 **Details Pending**
2013 **Hierarchical Scalable Functional Nanoassembler**

Posters / Presentations

2014 **Airbus (speaker)** *Toulouse, France*
Title: Towards Digital Biology
2013 **Google Glass Research Symposium (poster)** *Zurich, Switzerland*
Title: Continuous, Multiplexed, Non-Invasive Physiological Sensing with Glass
2013 **Institute for BioMedical Engineering, Tarassenko Lab (speaker)** *Oxford, UK*
Title: Play with DNA: Building a Star Trek Replicator and other shenanigans
2013 **Open Hardware Summit (poster)** *Cambridge, MA*
Title: Fabricated machines for rapid prototyping in bio labs
2013 **NASA Ames (speaker)** *Mountain View, CA*
Title: DNA origami mediated bioelectronic interface
2012 **International BioEngineering conference (speaker)** *Indianapolis, IN*
Title: Engineering Programmable Potassium Efflux as a Cyborg Reporter Mechanism in Synthetic Biology
2011 **MIT T=0 Entrepreneurship Event (speaker)** *MIT, MA*
Title: Why biological prototyping sucks and how to fix it.
2011 **IBM Research (poster)** *Yorktown Heights, NY*
Title: Building a new reporter system using synthetic biology for Bio-Electronic communication
2009 **iGEM** *MIT, MA*
Presented the encapsulator project and the genetic circuitry designed.

Awards / Fellowships

2013 **IBM Ph.D. Fellowship** *Yorktown Heights, NY*
2010 **Awesome Foundation Fellowship** *Cambridge, MA*
Awarded for the development of bioengineered inks using fluorescent protein-producing E. *coli*
2009 **iGEM 2009** *MIT, MA*
Finalist team, Winner of the Manufacturing track prize, Best Human Practices prize with Paristech

Computational Skills

Biological software: Pymol, caDNAno, Qiasoft, Biomek FX software, Vector NTI
Programming and Web Design: Python, Node.js, Javascript, MATLAB, R, Visual Basic, HTML, CSS, PHP
Graphics and Fabrication: Photoshop, Illustrator, SolidWorks, Eagle

Languages

Fluent in: **French, Italian, English** and **Spanish**

Meetings / Conferences

2014 **Libre Planet** *Cambridge, MA*
2014 **White House cyber-physical systems working group** *White House, DC*
2014 **FOSDEM** *Brussels, Belgium*
2013 **Genomes Environments and Traits (Workshop)** *Boston, MA*
2012, 2013 **DARPA Living Foundries** *Chicago, IL & San Francisco, CA*
2012 **International BioEngineering conference (Speaker)** *Indianapolis, IN*
2011 **MIT T=0 Entrepreneurship Event (Speaker)** *MIT, MA*
2011 **IBM Research Poster Session (Speaker)** *Yorktown Heights, NY*
2010 **Genopole Synthetic Biology Conference** *Evry, France*

2010	**Centre for Synthetic Biology and Innovation Fall Symposium**	*London, UK*
2010	**Institute of Biological Engineering Annual Meeting**	*Cambridge, MA*
2010	**Outlaw Biology? Public Participation in the Age of Big Bio (Speaker)**	*UCLA, CA*
2009, 2010	**iGEM Jamboree**	*MIT, MA*

Other Projects

BioBright LLC	data collection, analysis and visualization of biomedical research data	biobright.org
BioGlasses	accessible, low-cost human physiological sensors	bioglasses.org
Open Humans	open source collection and dissemination of human physiological data	openhumans.org
DiME	an architecture to enable a modular and extensible "Internet of Things"	

References

Prof. George Church	Wyss Institute, Harvard Medical School	*Boston, MA*
Dr. Shuguang Zhang	MIT Center for Bits and Atoms	*Cambridge, MA*
Stephen Heisig	IBM Research	*Yorktown Heights, NY*