

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 ElectroporationLaboratory 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	<i>London, UK</i>
2010	Institute of Biological Engineering Annual Meeting	<i>Cambridge, MA</i>
2010	Outlaw Biology? Public Participation in the Age of Big Bio (Speaker)	<i>UCLA, CA</i>
2009, 2010	iGEM Jamboree	<i>MIT, MA</i>

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	<i>Boston, MA</i>
Dr. Shuguang Zhang	MIT Center for Bits and Atoms	<i>Cambridge, MA</i>
Stephen Heisig	IBM Research	<i>Yorktown Heights, NY</i>