

# Karel Břinda

## Curriculum Vitae

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### Research topics

- 1) **Bioinformatics** – algorithms & data structures for Next-Generation Sequencing data  
– read mapping, metagenomic classification, text filtration
- 2) **Combinatorics on words**
- 3) **Tactile cartography** (maps for the blind)

### Professional experience

- From 2017 **Postdoctoral Researcher at Harvard University (Boston, USA)**  
Harvard TH Chan School of Public Health, Center for Communicable Disease Dynamics  
Antibiotic resistance detection from data coming from mobile sequencing technologies
- 2005 to 2012 **Computer professional at FNSPE Czech Tech. Univ. (Prague, Czech Rep.)**  
TEREZA, Center for support of visual impaired students at universities  
**Responsibilities:** • Developer of Blind Friendly Maps [7] • Programmer (PHP, SQL, HTML, CSS, JavaScript, Python) • Server administrator (Linux) • Lecturer (*Assistive technology* course at the FNSPE) • Web accessibility consultant (e.g., for Seznam.cz, the largest Czech internet company)
- 2008, June to July **Computer professional at SZS Karlsruhe Institute of Technology (Germany)**  
Center for support of visually impaired students at KIT, summer internship

### Education

- 2013 to 2016 **Ph.D. at LIGM Université Paris-Est (Paris, France)**  
Theoretical Computer Science, supervisors: Gregory Kucherov and Valentina Boeva  
PhD thesis: *Novel computational techniques for mapping and classifying Next-Generation Sequencing data* (resulted in [1–3,6]), defended on 2016/11/28.
- 2011 to 2013 **MSc. at FNSPE Czech Technical University (Prague, Czech Rep.)**  
Specialization: *Mathematical informatics*  
Research topics: *Lossless seeds* [6], *Abelian complexity of inf. words* [4]
- 2008 to 2011 **Bc. at FNSPE Czech Technical University (Prague, Czech Rep.)**  
Specialization: *Mathematical informatics*  
Research topic: *Abelian complexity of infinite words* (resulted in [5])

### Projects

- ProPhyle** Phylogeny-based metagenomic classification using Burrows-Wheeler Transform. <http://github.com/karel-brinda/prophyle>
- Ococo** [1] The first online consensus caller (calling genomic consensus online from an unsorted SAM/BAM stream). <http://github.com/karel-brinda/ococo>
- RNFtools** [2] A standard for naming simulated NGS reads and an associated toolkit (MISHmash: component simulating NGS reads, LAVender: component evaluating NGS read mappers). <http://github.com/karel-brinda/rnftools>
- DyMaS** [1] A Dynamic Mapping Simulator. <http://github.com/karel-brinda/dymas>
- Blind Friendly Maps** [7] The first fully automatically generated tactile maps for the blind with street labels (developer of the map key and of acronym generators). <http://hapticke.mapy.cz>

## Organizational experience

2010 to 2013	<b>Academic Senate of FNSPE Czech Technical University in Prague</b> The student vice-chair
2008 to now	<b>“Technická přestávka”, a student organization</b> Organizer of student camps (winter 2011, summer 2011, winter 2012, summer 2012)
2004 to 2008	<b>“Historik”, a school journal about history</b> Editor-in-chief

## Languages

English:	full proficiency	Czech:	native speaker
French:	limited working proficiency	Slovak:	perfect understanding
German:	limited working proficiency		

## Computer skills

OS:	more than 12 years experience with Unix systems (OpenSuSE, Ubuntu, CentOS, Fedora, OS X)
Development:	Git, GitHub, Travis CI
Progr. languages:	Python, C++, C, BASH, Make, Snakemake, Wolfram Mathematica, Matlab
Progr. for web:	PHP, SQL, HTML, CSS, JavaScript, web accessibility

## Interests

History, guitar, mandolin, outdoor and indoor puzzle-solving contests

## Selected publications

- [1] K. Břinda, V. Boeva, and G. Kucherov. **Dynamic read mapping and online consensus calling for better variant detection**. May 2016. [arXiv:1605.09070]
- [2] K. Břinda, V. Boeva, and G. Kucherov. **RNF: a general framework to evaluate NGS read mappers**. *Bioinformatics* **32**(1), pp. 136–139, 2016. [doi:10.1093/bioinformatics/btv524, arXiv:1504.00556]
- [3] K. Břinda, M. Sykulski, and G. Kucherov. **Spaced seeds improve  $k$ -mer-based metagenomic classification**. *Bioinformatics* **31**(22), pp. 3584–3592, 2015. [doi:10.1093/bioinformatics/btv419, arXiv:1502.06256]
- [4] K. Břinda, E. Pelantová, and O. Turek. **Balances of  $m$ -bonacci words**. *Fundamenta Informaticae* **132**(1), pp. 33–61, 2014. [doi:10.3233/fi-2014-1031, arXiv:1301.3334]
- [5] L. Balková, K. Břinda, and O. Turek. **Abelian complexity of infinite words associated with quadratic Parry numbers**. *Theoretical Computer Science* **412**, pp. 6252–6260, 2011. [doi:10.1016/j.tcs.2011.08.016, arXiv:1101.1490]
- [6] K. Břinda. **Languages of lossless seeds**. Proceedings of the 14th International Conference on Automata and Formal Languages (AFL), pp. 139–150, 2014. [doi:10.4204/eptcs.151.9, arXiv:1403.6414]
- [7] P. Červenka, K. Břinda *et al.* **Blind Friendly Maps: Tactile Maps for the Blind as a Part of the Public Map Portal (Mapy.cz)**. Computers Helping People with Special Needs, 15th International Conference ICCHP, pp. 131–138, 2016. [doi:10.1007/978-3-319-41267-2\_18, arXiv:1603.09520]