Veljko Pejovic

Assistant Professor of Computer Science

CONTACT INFORMATION

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INTERESTS

Ubiquitous computing, resource-efficient computing, IoT security, HCI

EDUCATION

University of California Santa Barbara (UCSB), CA, USA
Ph.D., Computer Science Department (September 2012)
- Dissertation title: *Adaptive and Resource-Efficient Rural Area Wireless Networks.*
- Advisor: Dr. Elizabeth M. Belding.

School of Electrical Engineering, Belgrade, Serbia
B.S., Computer Science and Engineering, June, 2006
- Diploma Thesis: *Location Determination in 802.11 Wireless Network.*
- GPA: 9.29/10.00

RESEARCH EXPERIENCE

University of Ljubljana, Slovenia
Assistant Professor **January, 2015 –**

- **Approximate mobile computing.** To enable further proliferation of mobile computing, nowadays heavily constrained by the available resources (primarily energy), I take an unconventional stance that the result of a computation need not be perfectly accurate. Instead, I advocate for judicious use of the available resources so that the quality of the computed is result is *good enough* for the user to accept. In my work I focus on battery-powered mobile devices and use approximation techniques to reduce the computation accuracy in a controlled manner. Observing that a user's accuracy needs vary with the context of use, I dynamically adapt the quality of computation in order to satisfy the above needs with the least amount of resources. Deep learning and mobile multimedia, some of the most computationally expensive domains in mobile computing, represent the key target areas of my work. In these fields I have developed solutions to dynamically adapt the learning models and multimedia playback quality according to the sensed context, and have achieved significant energy savings with negligible perceived quality loss.
- **IoT security.** In my research I harness heterogeneous data coming from IoT sensing to derive models of user behaviour in a given environment. I extract patterns that are characteristic for individual users and propose a continuous authentication mechanism that prevents an adversary from taking over an authenticated session in an IoT environment. I develop my solutions in close collaboration with the European Commission's Joint Research Centre, striving to create a wider impact on European security policies.

University of Birmingham, UK
Research Fellow **September, 2012 - November 2014**
Research project:

- UBhave: ubiquitous and social computing for positive behaviour change
  I investigated opportunities and challenges related to using mobile phones for behaviour change interventions. This involved measuring multiple aspects of human behaviour through smartphones, devising relationships between the observed context and human behavior, and integration with data gathered through online social networks. My work included both theoretical investigation of machine learning models that can be employed for successful behaviour modelling, as well as of designing and building real-world mobile systems. In addition, I designed experiments, deployed mobile applications, gathered and analysed the data. Besides scientific publications, the work has resulted in three open-source programming projects for Android.

University of California Santa Barbara, Santa Barbara, CA, USA
Research Assistant **January, 2008 - August 2012**
Research projects:

- Resource-efficient wireless networks in rural developing regions

  In my PhD dissertation I investigated the Internet usage and problems of connectivity in rural Africa. I analysed network traces from Macha, Zambia and conducted on-site interviews with the local population in rural Zambia and South Africa. Based on the analysis findings, I proposed resource-efficient communication solutions for rural areas. These include three physical/MAC layer protocols for networks operating in the license-free white space wireless spectrum, network data and voice traffic localisation infrastructure for remote villages, and an augmented architecture for improved user experience of OSN users located the developing world.

University of Cambridge, UK
Visiting Researcher **Summer, 2009**
Research project:

- FluPhone: tracking human behaviour patterns in the case of pandemics
  (supervised by: prof. Jon Crowcroft)

  I collaborated on the design and implemented, to the best of my knowledge, *the first mobile phone application that monitors disease spread and human interactions* (through cell phone Bluetooth contacts and GPS location). I deployed the application on twenty cell phones and tested the application.

University of Edinburgh, UK
Visiting Researcher **Summer, 2008**
Research project:

- Energy and performance monitoring in a rural area network
  (supervised by: Dr. Mahesh Marina)

  A part of *Resource-efficient wireless networks in rural developing regions* explained above.

University College Cork, Ireland
Visiting Researcher **Summer, 2007**
Research project:

- Wireless sensor network performance debugging system
  (supervised by: prof. Cormac Sreenan)

  I developed a low-overhead performance monitoring and debugging system for wireless sensor networks, and implemented the solution in the TOSSIM simulator. The concept was presented at the EWSN'09 conference.

Project Funding Obtained

"Context-Aware On-Device Approximate Computing" (PI)
Funding body: Slovenian national research agency, 300,000€, 2022-2024

"Bringing Resource Efficiency to Smartphones with Approximate Computing" (PI)
Funding body: Slovenian national research agency, 200,000€, 2020-2021

"Mobile computing for efficient information dissemination in emergency situations" (PI)
Funding body: US-Slovenia bilateral project, 3,000€, 2020-2021

"Inferring Net neutrality violations from crowdsourced network measurements" (PI)
Funding body: Agency for communication networks and services of the Republic of Slovenia, 20,000€, 2018

"RICERCANDO – Rapid Interpretation and Cross-Experiment Root-Cause Analysis in Network Data with Orange" (co-PI)
Funding body: European Horizon 2020 programme, 150,000€, 2016-2018

Teaching Experience

University of Ljubljana, Slovenia
Instructor, Faculty of Computer and Information Science **Winter, 2015 – ongoing**

- I revised the syllabus, created new teaching materials, and have (or currently am) teaching bachelor, master, and PhD-level courses on mobile and ubiquitous computing, software-defined radio, embedded systems, and algorithms. My courses are structured around practical projects that involve teamwork and often include a research component. My avg. student survey grade for school year 2020/2021 is **4.81/5.00**

University of California Santa Barbara, CA, USA

Instructor, Computer Science Department **Summer, 2011**

- I taught, structured the syllabus, and designed lecture materials for Introduction to Computer Science course. I presented introductory computer science concepts such as variables and expressions, data and control structures, algorithms, debugging, program design, and documentation to fifty students with little or no programming experience.

Teaching Assistant, Computer Science Department **Fall, 2006 - Spring, 2008**

- I held discussion sections, devised course materials and graded for the following courses: Network Security, Introduction to Computer Networks, Parallel Programming, Foundations of Computer Science, and Introduction to Computer Programming.

Selected Publications

My citation count is 2374, h-index is 21 (source Google Scholar `https://scholar.google.co.uk/citations?user=hpPGsJQAAAAJ`). I have published over 50 peer-reviewed articles (20 as the first author) in journals (20), conferences/workshops (27), and as book chapters (3).

E. Hasanbegovic and **V. Pejovic**, *Uncovering Personal and Context-Dependent Display Preferences in Mobile Newsreader App* ACM UMAP, June 2021

V. Pejovic, T. Matkovic, and M. Ciglaric *Wireless Ranging for Contactless Cognitive Load Inference in Ubiquitous Computing*, International Journal of Human-Computer Interaction (2021)

A. Krasovec, D. Pellarini, D. Geneiatakis, G. Baldini, and **V. Pejovic**, *Not Quite Yourself Today: Behaviour-Based Continuous Authentication in IoT Environments*, ACM IMWUT (2020)

V. Pejovic, M. Gjoreski, C. Anderson, K. David, and M. Lustrek, *Towards Cognitive Load Inference for Attention Management in Ubiquitous Systems*, IEEE Pervasive Computing (2020)

V. Pejovic and A. Skarlatidou, *Understanding Interaction Design Challenges in Mobile Extreme Citizen Science*, International Journal of Human-Computer Interaction (2020)

A. Mehrotra, **V. Pejovic**, and M. Musolesi, *FutureWare: Designing a Middleware for Anticipatory Mobile Computing*, IEEE Transactions on Software Engineering (2019).

C. Anderson, I. Hubener, A. Seipp, S. Ohly, K. David, and **V. Pejovic**, *A Survey of Attention Management Systems in Ubiquitous Computing Environments* Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), June 2018.

L. Morrison, C. Hargood, **V. Pejovic**, A. Geraghty, S. Lloyd, N. Goodman, D. Michaelides, A. Weston, M. Musolesi, M. Weal and L. Yardley, *The effect of timing and frequency of push notifications on usage of a smartphone-based stress management intervention: an exploratory trial* PLoS ONE, Vol 12, (2017)

A. Mehrotra, **V. Pejovic**, J. Vermeulen, R. Hendley and M. Musolesi, *My Phone and Me: Understanding User's Receptivity to Mobile Notifications*, ACM CHI'16, San Jose, CA, USA, May 2016.

A. Lima, M. De Domenico, **V. Pejovic** and M. Musolesi, *Disease Containment Strategies based on Mobility and Information Dissemination*, Nature Scientific Reports, 10650; doi: 10.1038/srep10650 (2015). (based on the **Winner of the Data for Development Challenge Best Overall Prize**)

V. Pejovic and M. Musolesi, *Anticipatory Mobile Computing: A Survey of the State of the Art and Research Challenges*, ACM Computing Surveys (CSUR) 47.3 (2015)

A. Mehrotra, M. Musolesi, R. Hendley and **V. Pejovic**, *Designing Content-driven Intelli-*

gent Notification Mechanisms for Mobile Applications, UbiComp'15, Osaka, Japan, September 2015.

V. Pejovic and M. Musolesi, *InterruptMe: Designing Intelligent Prompting Mechanisms for Pervasive Applications*, UbiComp'14, Seattle, WA, USA, September 2014. **Best paper nominee**

V. Pejovic and E. M. Belding, *WhiteRate: Context-Aware Approach to Wireless Transmission Adaptation*, IEEE Transactions on Mobile Computing, Vol 13 (2014)

N. Lathia, **V. Pejovic**, K. Rachuri, C. Mascolo, M. Musolesi and P. J. Rentfrow, *Smartphones for Large-scale Behaviour Change Interventions*, IEEE Pervasive Computing 12(3), July 2013.

V. Pejovic, D. L. Johnson, M. Zheleva, E. M. Belding, L. Parks and G. van Stam, *The Bandwidth Divide: Obstacles to Efficient Broadband Adoption in Rural Sub-Saharan Africa*, The International Journal of Communication, Vol 6 (2012).

D. L. Johnson, **V. Pejovic**, E. M. Belding and G. van Stam, *Traffic Characterization and Internet Usage in Rural Africa*, WWW'11, Hyderabad, India, March 2011.

M. P. Wittie, **V. Pejovic**, L. Deek, K. C. Almeroth and B. Y. Zhao *Exploiting Locality of Interest in Online Social Networks*, ACM CoNEXT'10, Philadelphia, PA, December 2010.

Selected Professional Services

Vice-Dean for International Affairs, Faculty of Computer and Information Science, University of Ljubljana, Slovenia, 2016-2018.

Associate Editor: Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (ACM IMWUT)

General chair: ACM SIGCHI Chapter Bled – Human-Computer Interaction in Information Society Conference, Cyberspace, October 2020

Co-chair and workshop organiser: ACM UbiTtention Smart & Ambient Notification and Attention Management, Cyberspace, September 2020

Conference TPC Member: MobiSys, UMAP, MobileHCI, MobileSoft, Pervasive Health, WWW (poster track), NETWORKS, ACM DEV, MobiCASE, ICC, ACM COMPASS

References

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