Kobiljon Toshnazarov

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Education

PhD in Energy Engineering — **Sep. 2020 – Aug. 2024**
Korea Institute of Energy Technology (KENTECH) — Naju-si, South Korea
Major: Energy AI

MS in Electrical and Computer Engineering — **Sep. 2018 – Aug. 2020**
Inha University — Incheon, South Korea
Major: Computer Science and Engineering

BS in Computer Science — **Sep. 2014 – Aug. 2018**
Inha University in Tashkent (IUT) — Tashkent, Uzbekistan
Major: Computer Science and Engineering

Research Thesis

PhD Dissertation: Study on Stress Sensing with Off-the-shelf Smartwatches in the Wild
MS Thesis: Mobile and Wearable Data Collection Platform with Intelligent Abnormal Behavior Detection

Research Interests

HCI, mHealth, Wearable Sensing, Multimodal Learning, Data Collection Platforms

Selected Publications

- **K. Toshnazarov**, M. Salman, Y. Jung, U. Lee, Y. Noh. EasyTrack: A Scalable and General Purpose Platform for Reliable Data Collection in mHealth Research. *Under Review in IEEE IoT Journal* **IF 10.238**, 2024
- **K. Toshnazarov**, V. Mishra, B. H. Kim, U. Lee, L. A. Caceres Najarro, Y. Noh SOSW: Stress Sensing with Off-the-shelf Smartwatches in the Wild. *Expected publication in IEEE IoT Journal* **IF 10.238**, 2024
- S. Akbarova, M. Im, S. Kim, **K. Toshnazarov**, K. M. Chung, J. Chun, Y. Noh, Y. A. Kim. Improving Depression Severity Prediction from Passive Sensing: Symptom-Profiling Approach. *Published in MDPI Sensors* **IF 3.847**, 2023
- L. A. Caceres Najarro, Y. Lee, **K. Toshnazarov**, Y. Jang, H. Kim, Y. Noh. WMGPT: Towards 24/7 Online Prime Counseling with ChatGPT. In *UbiComp/ISWC'23 Adjunct.* Cancun, Quintana Roo Mexico. October 8-12, 2023.
- Y. Han, **K. Toshnazarov**, B. H. Kim, Y. Noh, U. Lee. WatchPPG: An Open-Source Toolkit for PPG-based Stress Detection using Off-the-shelf Smartwatches. In *UbiComp/ISWC '23 Adjunct.* Cancun, Quintana Roo Mexico. October 8-12, 2023.
- **K. Toshnazarov**, T. H. Lee, Y. Noh. WildStress: exploring rich situational contexts for stress detection in the wild In *IEEE International Conference on Big Data and Smart Computing (BigComp)*. Jeju, South Korea. February 13-16, 2023.
- Y. Han, H. Lee, **K. Toshnazarov**, Y. Noh, U. Lee. StressBal: Personalized Just-in-time Stress Intervention with Wearable and Phone Sensing In *UbiComp/ISWC '22 Adjunct.* Cambridge, United Kingdom, September 11-15, 2022.
- K. Lee, H. Cho, **K. Toshnazarov**, N. Narziev, S. Y. Rhim, K. Han, Y. Noh, and H. Hong Toward future-centric personal informatics: Expecting stressful events and preparing personalized interventions in stress management. In *Conference on Human Factors in Computing Systems (**CHI'20**)*. Honolulu HI USA. April 25-30, 2020.
- N. Narziev, H. Goh, **K. Toshnazarov**, S. A. Lee, K. M. Chung, and Y. Noh. STDD: Short-term depression detection with passive sensing. Published in *MDPI Sensors* Journal, 2020.
- **K. Toshnazarov**, H. Baazizi, N. Narziev, Y. Noh, U. Lee. EasyTrack-Orchestrating Large-scale Mobile User Experimental Studies. In *17th Annual International Conference on Mobile Systems, Applications, and Services (**MobiSys'19**)*. Seoul, South Korea. June 17 - 21, 2019.

Technical Transfers

- Co-inventor of "이종 다차원 데이터 인터랙티브 가시화 기반 데이터 관리 프로그램" (Heterogeneous Multidimensional Data Interactive Visualization-based Data Management Program). Technical transfer to *Industry-University Cooperation Foundation of Hanyang University*, 2024.
- Co-inventor of "멀티모달 데이터 수집 시스템" (Multimodal Data Collection System). Technical transfer to *miniSoft*, 2024.

Experience

Research Assistant (full-time) at IMC Lab **Sep. 2018 – Present**
Intelligent Mobile Computing Lab, IMC Lab (imc.kentech.ac.kr) Naju, South Korea

- Conducted mobile and wearable sensing research works, including field experiments and data analysis, and made *10+ publications* in various journals and conferences as the first and co-author.
- Designed, developed, and maintained cloud-based mHealth data collection platform for mobile and wearable sensing, which annually brought *+$100,000 funding* to the laboratory.
- Acted as the laboratory manager, with such responsibilities as recruitment and mentoring of new members; also distributing tasks and monitoring progress of lab members.

Teaching Assistant (part-time) at KENTECH **Sep. 2020 – Present**
Korea Institute of Energy Technology, KENTECH (kentech.ac.kr) Naju, South Korea

- Taught EE5104 Data Science graduate course. Spring 2022. http://tiny.cc/iaffwz.
- Taught EL1005 Data Structure undergraduate course. Spring 2023. http://tiny.cc/68ffwz.

Back-end Developer (freelance) at Toptal **May 2022 – Present**
Toptal (toptal.com/resume/kobiljon-toshnazarov) Remote

Teaching Assistant (part-time) at Inha University **Sep. 2018 – Aug. 2020**
Inha University (inha.ac.kr) Incheon, South Korea

- Taught undergraduate courses: Application Programming in Java, Capstone Design, Computer Network, and Wireless Communications.
- Course on Youtube: https://youtube.com/playlist?list=PLZIwlOSv75K7jXcVABdIo3wyKp5NwXKlW

Ongoing and Completed Projects

Ongoing Projects

- **Efficacy and Engagement Empowerment Technology for Digital Mental Health Services using Personalization and Automation Technologies (New York University and HY Digital Healthcare Center Project):** Engagement, crucial for users to consistently benefit from digital therapeutics, plays a pivotal role in enhancing mental health. The proactive dropout prevention system, featuring a predictive model, is designed to ensure sustained user engagement. The system encompasses three essential steps: first, the development of a multimodal log data collection system capturing diverse user interactions; second, the creation of a personalized dwell time prediction model based on this data; and third, the implementation of techniques to boost user engagement, validated through dwell time profiling and intervention effectiveness assessment. By focusing on preventing dropout, this system strives to maintain user involvement in digital therapeutic solutions, fostering continuous improvement in mental health.

Completed Projects

- **Stress Detection in the Wild (National Research Foundation of Korea – NRF, and KETEP Project):** Stress is known to stimulate physiological responses such as heart activity changes and sweat, and such events can be detected using wearables such as smartwatches and chest sensors. Moreover, smartphones give access to rich situational contexts and allow stress detection research to move towards uncontrolled environments. Our methods incorporate collection of situational contexts and physiological sensing to accurately predict daily life stress, which is further used for Digital Therapeutics (DTx) such as timely intervention suggestions to prevent health complications by managing stress levels. In the future, alongside the health benefits, this research direction can help individuals optimize their daily stress levels and enhance productivity by "controlling" their stress levels.

- **mHealth data collection platform (National Research Foundation of Korea – NRF Project):** We introduced EasyTrack, a solution that was scalable, accommodating a diverse range of participants and their associated sensors. It offered general-purpose functionality, making it flexible for diverse mHealth applications. It incorporated a Data Quality monitoring mechanism with a user-friendly dashboard and automatic problem-detecting routine that warned the researcher of potential discrepancies in collected data. It provided interoperability with the existing data collection platforms.
- **Short-term Depression Detection (National Research Foundation of Korea – NRF Project):** We developed a smartphone-based methodology to detect symptoms of short-term depression. Depression is a major public health issue, often with a chronic course and poor prognosis. Traditional methods of estimating depression are time-consuming and costly, and may require professional involvement. Passive sensing using mobile and wearable devices can track daily activities and routines, providing digital behavior markers related to depression. Our work provides a systematic data processing pipeline that leverages mobile passive data for the clinical detection and forecasting of depression and depressive moods. We analyze a wide range of digital behavior markers related to depression, including physical movement, social interactions, and daily activities. By integrating these digital behavior markers, we perform comprehensive and accurate assessment of depression, allowing for personalized interventions and long-term symptom management.
- **Node and Link Failure Monitoring (KERI Project)** We designed and developed a software, based on the SNMP protocol, with a dashboard UI for monitoring node and link failures in a network of power apparatus and the grid.

Distinction Awards

- **Research Excellence** for "Stress Detection in the Wild" research in 2023 KENTECH Annual Research Fair.
- **Full scholarship** awarded by KENTECH for the entire PhD degree study, 2020-2024.
- **Global Vision Scholarship** awarded by Inha University for entire MS degree study, 2018-2020.
- **Half Scholarship Award** awarded by Inha University in Tashkent (IUT) for BS degree study, 2014-2015.
- **Dean's List** awarded by IUT for outstanding excellence for BS degree study, 2014-2016.
- **Gold Medal** awarded by IUT for winning in contest of "Development of Academic Scheduling Tool", 2016.
- **Second Place** awarded by IUT in the contest of "Inaugural IUT Software Contest", 2015.
- **Championship Certificate** awarded by IUT to Walkers Team in the "2017 Navruz Football Cup", 2017.
- **Stiped by Ministry of ICT** awarded by Ministry of ICT of Uzbekistan, 2017.
- **Certificate of Recognition** awarded by IUT for outstanding contribution to the development of IUT, 2016.
- **Quarter-Finals Participant** awarded by ACM ICPC International Collegiate Programming Contest 2015-2016.

Skills (Tech Stack)

- **Languages:** Python, C++, JavaScript, SQL, Dart, CSS, HTML, Java.
- **Frameworks:** Django, Flutter, Tailwind CSS, Django REST Framework, gRPC.
- **Libraries/APIs:** Pandas, REST APIs, Django ORM, peewee.
- **Tools:** Google Slides, Git, Slack, Figma, Miro, Photoshop, Notion, Terminal.
- **Paradigms:** Data Science, Unit Testing, Microservices.
- **Platforms:** Databricks, Jupyter Notebook, AWS, GCP, Firebase, Kubernetes, Docker.
- **Storage:** PostgreSQL, MariaDB, Cassandra, MongoDB, AWS S3 object storage.
- **Others:** Machine Learning, Sensors, Passive Sensing, Signal Analysis, Algorithms, Data Structures, Data Visualization, Distributed Computing, Wireless Protocols, Deep Linking.

Language Proficiency

- **English** (Proficient in writing, reading, listening, and speaking).
- **Korean** (Fluent in listening and speaking, intermediate in writing and reading).
- **Russian** (Fluent in writing, reading, listening, and speaking).
- **Uzbek** (Native).

References

- **Professor Youngtae Noh** (MS and PhD Advisor). Associate professor and director of the Intelligent Mobile Computing Lab, KENTECH, South Korea.
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- **Professor Uichin Lee** (PhD Co-Advisor). Associate Professor School of Computing and director of Interactive Computing Lab, KAIST, South Korea.
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