
Education







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|--|-----------------|
| University of Southern California | Los Angeles, CA |
| Ph.D. Candidate in Electrical Engineering | 2015 – 2021 |
| <i>Thesis:</i> Learning Subjective Label Embeddings | |
| <i>Advisor:</i> Dr. Shrikanth Narayanan | |
| Universidad de Chile | Santiago, Chile |
| Electrical Engineering Diploma | 2007 – 2013 |
| <i>Thesis:</i> Early Online Detection of High Volatility Clusters using Particle Filters | |
| <i>Advisor:</i> Dr. Marcos Orchard | |
| <i>Honors:</i> Graduated with highest honors | |
| Universidad de Chile | Santiago, Chile |
| B. Sc. in Electrical Engineering | 2007 – 2013 |
| <i>Honors:</i> Graduated with honors | |
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Publications

In progress



- [I1] **Karel Mundnich** and Shrikanth Narayanan. Learning subjective label embeddings. In preparation for *IEEE Transactions in Affective Computing*.
- [I2] Benjamin Girault, Joanna Yau, Tiantian Feng, **Karel Mundnich**, Amrutha Nadarajan, Brandon M. Booth, Eric Hsieh, and Shrikanth Narayanan. TILES-2019, a longitudinal physiologic and behavioral data set of hospital residents in medical intensive care units. In preparation for *Nature Scientific Data*.
- [I3] Tiantian Feng, **Karel Mundnich**, and Shrikanth Narayanan. Relationship between Smartphone Usage and Work Shift Schedules in Hospital Nurses. In preparation for *IEEE Journal of Biomedical and Health Informatics*.

Journals

- [J1] Vinesh Ravuri, Projna Paromita, **Karel Mundnich**, Amrutha Nadarajan, Brandon M Booth, Shrikanth S Narayanan, and Theodora Chaspari. Investigating group-specific models of hospital workers' well-being: Implications for algorithmic bias. Accepted in *International Journal of Semantic Computing*.
- [J2] Arindam Jati, Amrutha Nadarajan, Raghuveer Peri, **Karel Mundnich**, Tiantian Feng, Benjamin Girault, and Shrikanth Narayanan. Temporal Dynamics of Workplace Acoustic Scenes: Egocentric Analysis and Prediction. *IEEE/ACM Transactions on Audio, Speech and Language Processing*, 29:756–769, 2021. .
- [J3] **Karel Mundnich**, Brandon M. Booth, Michelle L'Hommedieu, Tiantian Feng, Benjamin Girault, Justin L'Hommedieu, Mackenzie Wildman, Sophia Skaaden, Amrutha Nadarajan, Jennifer L. Villatte, Kristina Lerman, Emilio Ferrara, and Shrikanth Narayanan. TILES-2018, a longitudinal behavioral and pyshologic dataset of hospital workers. *Sci Data*, 7(354), 2020. .
- [J4] **Karel Mundnich**, Brandon M. Booth, Benjamin Girault, and Shrikanth Narayanan. Generating Labels for Regression of Subjective Constructs using Triplet Embeddings. *Pattern Recognition Letters*, 128:385–392, 2019. .
- [J5] Brandon M Booth*, **Karel Mundnich***, Tiantian Feng*, Amrutha Nadarajan, Tiago H. Falk, Jennifer L. Villatte, Emilio Ferrara, and Shrikanth Narayanan. Multimodal Human and Environmental Sensing for Longitudinal Behavioral Studies in Naturalistic Settings: Framework for Sensor Selection, Deployment, and Management. *J Med Internet Res*, 21(8):e12832, Aug 2019. .
- [J6] **Karel Mundnich** and Marcos E. Orchard. Early Online Detection of High Volatility Clusters using Particle Filters. *Expert Systems with Applications*, 54:228–240, 2016. .
- [J7] **Karel Mundnich**, Marcos E. Orchard, Jorge F. Silva, and Patricio Parada. Volatility Estimation of Financial Returns using Risk-Sensitive Particle Filters. *Studies in Informatics and Control*, 22(3):297–306, September 2013. .

- [J8] Federico Flores, Roberto Rondanelli, Marcos Díaz, Richard Querel, **Karel Mundnich**, Luis Alberto Herrera, Daniel Pola, and Tomás Carricajo. The Life Cycle of a Radiosonde. *Bulletin of the American Meteorological Society*, 94(2):187–198, 2013. .

Peer-reviewed conferences

- [C1] **Karel Mundnich**, Alexandra Fenster, Aparna Khare, and Shiva Sundnaram. Audiovisual highlight detection in videos. In *ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2021. .
- [C2] Vinesh Ravuri, Projna Paromita, **Karel Mundnich**, Amrutha Nadarajan, Brandon M Booth, Shrikanth S Narayanan, and Theodora Chaspari. Group-specific models of healthcare workers’ well-being using iterative participant clustering. In *2020 Second International Conference on Transdisciplinary AI (TransAI)*, pages 115–118. IEEE, 2020. .
- [C3] George Hadjiantonis, Projna Paromita, **Karel Mundnich**, Amrutha Nadarajan, Brandon M Booth, Shrikanth Narayanan, and Theodora Chaspari. Dynamical systems modeling of day-to-day signal-based patterns of emotional self-regulation and stress spillover in highly-demanding health professions. In *2020 42nd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, pages 284–287. IEEE, 2020. .
- [C4] Jiayi Wang, **Karel Mundnich**, Allison T. Knoll, Pat Levitt, and Shrikanth Narayanan. Bringing in the outliers: A sparse subspace clustering approach to learn a dictionary of mouse ultrasonic vocalizations. In *ICASSP 2020 - 2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 3432–3436, 2020. .
- [C5] Timothy Greer, **Karel Mundnich**, Matthew Sachs, and Shrikanth Narayanan. The role of annotation fusion methods in the study of human-reported emotion experience during music listening. In *ICASSP 2020 - 2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 776–780, 2020. .
- [C6] **Karel Mundnich**, Benjamin Girault, and Shrikanth Narayanan. Bluetooth based indoor localization using triplet embeddings. In *ICASSP 2019 - 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 7570–7574, 2019. .
- [C7] Brandon M. Booth, **Karel Mundnich**, and Shrikanth Narayanan. Fusing Annotations with Majority Vote Triplet Embeddings. In *Proceedings of the 2018 on Audio/Visual Emotion Challenge and Workshop, AVEC’18*, pages 83–89. ACM, 2018. **Winner of the AVEC GES 2018 subchallenge.** .
- [C8] Brandon M Booth, **Karel Mundnich**, and Shrikanth Narayanan. A Novel Method for Human Bias Correction of Continuous-time Annotations. In *2018 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 3091–3095. IEEE, 2018. .
- [C9] **Karel Mundnich**, Md Nasir, Panayiotis Georgiou, and Shrikanth Narayanan. Exploiting Intra-annotator Rating Consistency through Copeland’s Method for Estimation of Ground Truth Labels in Couples’ Therapy. In *Proceedings of Interspeech 2017*, pages 3167–3171, 2017. .

Research Experience

Amazon Lab126

LOS ANGELES, CA

Applied Scientist II Intern

May ’20 – Aug ’20

Design and implementation of a multimodal system for video summarization and highlight detection in unconstrained videos [C1].

Signal Analysis and Interpretation Lab, University of Southern California

LOS ANGELES, CA

Research Assistant

Aug ’15 – present

- TILES project (performer team within IARPA’s MOSAIC program).
 - Design and implementation of a longitudinal data collection of physiological and behavioral data of hospital workers at USC Keck Hospital [J3].
 - * Experimental design and sensor testing/selection [J5].
 - * Design of algorithms for indoor localization [C6].
 - * Data curation and modeling.
- Design and implementation of a longitudinal data collection of physiological and behavioral data of residents at LA County Hospital.

- Annotation fusion: Design of algorithms to generate unique labels for supervised machine learning from diverse annotations of subjective constructs [J4, C5, C7, C8, C9].
- MUPET: Mice Ultrasonic Profile ExTractor
 - Mentored a Master's student to refactor the code available at <https://github.com/mvansegbroeck/mupet>.
 - Mentored an undergraduate student to improve the dictionary learning of the MUPET software using sparse subspace clustering techniques [C4]. This work was possible due to the refactoring mentioned above.

Ingeniería y Geofísica Ltda.

Research Engineer

Signal processing for a low-cost ultrasonic anemometer.

SANTIAGO, CHILE

Oct '13 – Jan '14

Electrical Engineering Dept., Universidad de Chile

Research Assistant

Volatility estimation of financial returns using Particle Filters. Detection of low-likelihood/high-risk events in financial time series [J6, J7].

SANTIAGO, CHILE

Mar '12 – Sep '13

Infosys

Engineering Intern

Development of a modular framework for mitosis detection in histopathological images using MATLAB.

BANGALORE, INDIA

Jan '12 – Mar '12

Electrical Engineering Dept., Universidad de Chile

Research Assistant

Study of Information Theory tools in statistical learning for the self-modeling of robots.

SANTIAGO, CHILE

Aug '11 – Dec '11

Research Assistant

Co-design and implementation of an open hardware/software radiosonde for atmospheric sensing [J8].

Mar '10 – Oct '11

Teaching Experience

Electrical Engineering Dept., Universidad de Chile

Teaching Assistant & Grader

Courses: Principles of Communications, Analog Electronic Circuits, Seminar in Remote Atmospheric Sensing.

SANTIAGO, CHILE

'10 – '12

Skills & Background

Scientific Programming: Python, Julia, MATLAB. Classwork experience with C and Java.

Languages: Spanish (*mother tongue*), English (*IELTS score: 8.0/9.0 Oct '14*).

Relevant Coursework

At USC:

- *Electrical Engineering*: Linear Algebra, Probability, Statistics, Random Processes, Mathematical Pattern Recognition, Machine Learning, Optimization for the Information and Data Sciences, Mathematics of Data
- *Data Sciences and Operations*: Machine Learning and Statistical Inference
- *Mathematics*: Mathematical Foundations of Statistical Learning Theory
- *Industrial Engineering*: Large Scale Optimization and Machine Learning

At Universidad de Chile:

- *Electrical Engineering*: Computational Intelligence, Neural Networks and Information Theory for Learning, Estimation and Detection, Statistical Signal Processing, Optimal Control, Information Theory (audit)
- *Computer Science*: Algorithms and Data Structures, Design and Programming Methodologies, Systems Software Programming

Awards & Distinctions

AVEC Workshop 2018: Winner of the AVEC GES sub-challenge 2018 [[C7](#)].

ACM Multimedia 2018: NSF student travel award.

Outstanding Student Award (2010, 2012): Awarded to the top 6% of students of a given class (from a total of 700 students) with highest academic performance in the School of Engineering at Universidad de Chile.

Reviewer/subreviewer work

- Engineering in Medicine and Biology Conference (EMBC) 2019, 2020
 - Association for the Advancement of Artificial Intelligence (AAAI) 2019, 2020
 - Nature Communications Biology
 - IEEE Transactions in Audio, Speech, and Language (TASL)
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