

Varun Mishra

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Research Interest

My research interest broadly focuses on developing novel sensing and intervention systems for smartphones and wearable devices. Specifically, I work on exploring and advancing the complete “lifecycle” of mental- and behavioral-health sensing and intervention, which includes (a) accurately sensing and detecting a mental or behavioral health condition, like stress and opioid use; (b) after detecting a particular condition, determining the right time to deliver the intervention or support, such that the user is most likely to be receptive to the interventions provided; and (c) choosing the best intervention delivery mechanism and modality to ensure just-in-time delivery and reachability.

Education

Sept '15 – Sept '21	Ph.D. , Computer Science Dartmouth College <i>Thesis</i> : “Towards Effective Delivery of Digital Interventions for Mental and Behavioral Health” <i>Doctoral Committee</i> : David Kotz (<i>Advisor</i>), Andrew Campbell, Temiloluwa Prioleau, and Ching-Hua Chen	Hanover, NH
Aug '11 – Jun '15	B.Tech. , Computer Science and Engineering Shiv Nadar University <i>Minor in Mathematics</i>	Uttar Pradesh, India

Work Experience

Jan '22 – current	Assistant Professor Northeastern University Interdisciplinary Assistant Professor with joint appointment in the Khoury College of Computer Sciences (75%) and the Bouvé College of Health Sciences (25%).	Boston, MA
Oct '21 – Dec '21	Postdoctoral Scholar Dartmouth College I work with Profs. David Kotz and Lisa Marsch on using digital phenotyping to understand clinical trajectories of individuals with Opioid Use Disorder (OUD).	Hanover, NH
Sept '15 – Sept '21	Research Assistant Dartmouth College I developed data-driven technologies using ubiquitous devices to enable effective digital health interventions for mental- and behavioral-health conditions by identifying states of vulnerability and receptivity.	Hanover, NH
Jun '18 – Sept '18	Research Intern IBM Research My work involved development of novel contextual and physiological sensing methodologies to advance mental and behavioral health sensing, specifically for the case of mental stress sensing.	Yorktown Heights, NY

- Jan '15 – Jun '15 **Research Intern**
Siemens Bengaluru, India
 My work focused on analyzing the meta data involved with a new software project development, and predicting the defects and risks the developers could encounter over the course of the software development life-cycle.
- Feb '14 – Nov '14 **Undergraduate Research Assistant**
Shiv Nadar University Uttar Pradesh, India
 I was part of the *HumanSense* project, where my work involved developing novel sensing applications for crowd-sourcing of air temperature, air quality, and atmospheric pressure.
- May '13 – Jun '13 **Research Intern**
Indian Institute of Technology Delhi, India
 I developed a Natural Language Processing application to parse Software Requirement Specification documents and generate UML Class diagrams.

Publications

Refereed Conference, Journal and Workshop Papers

- P1. **Varun Mishra**⁺, Florian Künzler⁺, Jan-Niklas Kramer, Elgar Fleisch, Tobias Kowatsch, and David Kotz. Jun. 2021, “Detecting Receptivity for mHealth Interventions in the Natural Environment,” *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. (IMWUT)*, vol. 5, no. 2, pp. 1–24, DOI: [10.1145/3463492](https://doi.org/10.1145/3463492). (+co-primary authors).
- P2. Kevin Koch⁺, **Varun Mishra**⁺, Shu Liu, Thomas Berger, Elgar Fleisch, David Kotz, and Felix Wortmann. Mar. 2021, “When Do Drivers Interact with In-vehicle Well-being Interventions? An Exploratory Analysis of a Longitudinal Study on Public Roads,” *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. (IMWUT)*, vol. 5, no. 1, DOI: [10.1145/3448116](https://doi.org/10.1145/3448116). (+co-primary authors).
- P3. Simon Föll, Martin Maritsch, Federica Spinola, **Varun Mishra**, Filipe Barata, Tobias Kowatsch, Elgar Fleisch, and Felix Wortmann. 2021, “Flirt: A feature generation toolkit for wearable data,” *Computer Methods and Programs in Biomedicine*, p. 106 461, DOI: <https://doi.org/10.1016/j.cmpb.2021.106461>.
- P4. Joseph Ollier, Simon Neff, Christine Dworschak, Arber Sejdiqi, Prabhakaran Santhanam, Roman Keller, Grace Xiao, Alina Asisof, Dominik Rügger, Caterina Bérubé, Lena Hilfiker Tomas, Joël Neff, Jiali Yao, Aishah Alattas, Veronica Varela-Mato, Amanda Pitkethly, M Dolores Vara, Rocío Herrero, Rosa M Baños, Carolina Parada, Rajashree Sundaram Agatheswaran, Victor Villalobos, Olivia Clare Keller, Wai Sze Chan, **Varun Mishra**, Nicholas Jacobson, Catherine Stanger, Xinming He, Viktor von Wyl, Steffi Weidt, Severin Haug, Michael Schaub, Birgit Kleim, Jürgen Barth, Claudia Witt, Urte Scholz, Elgar Fleisch, Florian von Wangenheim, Lorainne Tudor Car, Falk Müller-Riemenschneider, Sandra Hauser-Ulrich, Alejandra Núñez Asomoza, Alicia Salamanca-Sanabria, Jacqueline Louise Mair, and Tobias Kowatsch. 2021, “Elena+ care for covid-19, a pandemic lifestyle care intervention: Intervention design and study protocol,” *Frontiers in Public Health*, vol. 9, p. 1543, ISSN: 2296-2565. DOI: [10.3389/fpubh.2021.625640](https://doi.org/10.3389/fpubh.2021.625640).
- P5. **Varun Mishra**, Sougata Sen, Grace Chen, Tian Hao, Jeffrey Rogers, Ching-Hua Chen, and David Kotz. Dec. 2020, “Evaluating the Reproducibility of Physiological Stress Detection Models,” *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. (IMWUT)*, vol. 4, no. 4, DOI: [10.1145/3432220](https://doi.org/10.1145/3432220).
- P6. Shkurta Gashi, Elena Di Lascio, Bianca Stancu, Vedant Das Swain, **Varun Mishra**, Martin Gjoreski, and Silvia Santini. Jun. 2020, “Detection of artifacts in ambulatory electrodermal activity data,” *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. (IMWUT)*, vol. 4, no. 2, DOI: [10.1145/3397316](https://doi.org/10.1145/3397316).

- P7. **Varun Mishra**, Gunnar Pope, Sarah Lord, Stephanie Lewia, Byron Lowens, Kelly Caine, Sougata Sen, Ryan Halter, and David Kotz. Apr. 2020, “Continuous detection of physiological stress with commodity hardware,” *ACM Trans. Comput. Healthcare (HEALTH)*, vol. 1, no. 2, DOI: [10.1145/3361562](https://doi.org/10.1145/3361562).
- P8. Jan-Niklas Kramer, Florian Künzler, **Varun Mishra**, Shawna N. Smith, David Kotz, Urte Scholz, Elgar Fleisch, and Tobias Kowatsch. Mar. 2020, “Which Components of a Smartphone Walking App Help Users to Reach Personalized Step Goals? Results From an Optimization Trial,” *Annals of Behavioral Medicine*, pp. 1–11, DOI: [10.1093/abm/kaaa002](https://doi.org/10.1093/abm/kaaa002).
- P9. Lisa A. Marsch, Aimee Campbell, Cynthia Campbell, Ching-Hua Chen, Emre Ertin, Udi Ghitzza, Chantal Lambert-Harris, Saeed Hassanpour, August F. Holtyn, Yih-Ing Hser, Petra Jacobs, Jeffrey D. Klausner, Shea Lemley, David Kotz, Andrea Meier, Bethany McLeman, Jennifer McNeely, **Varun Mishra**, Larissa Mooney, Edward Nunes, Chrysovalantis Stafylis, Catherine Stanger, Elizabeth Saunders, Geetha Subramaniam, and Sean Young. Mar. 2020, “The application of digital health to the assessment and treatment of substance use disorders: The past, current, and future role of the national drug abuse treatment clinical trials network,” *Journal of Substance Abuse Treatment*, vol. 112, pp. 4–11, DOI: [10.1016/j.jsat.2020.02.005](https://doi.org/10.1016/j.jsat.2020.02.005).
- P10. Florian Künzler⁺, **Varun Mishra**⁺, Jan-Niklas Kramer, David Kotz, Elgar Fleisch, and Tobias Kowatsch. Dec. 2019, “Exploring the state-of-receptivity for mhealth interventions,” *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. (IMWUT)*, vol. 3, no. 4, DOI: [10.1145/3369805](https://doi.org/10.1145/3369805). (+ co-primary authors).
- P11. George Boateng, Vivian Genaro Motti, **Varun Mishra**, John A. Batsis, Josiah Hester, and David Kotz. Oct. 2019, “Experience: Design, development and evaluation of a wearable device for mHealth applications,” in *Proceedings of the International Conference on Mobile Computing and Networking (MobiCom '19)*. DOI: [10.1145/3300061.3345432](https://doi.org/10.1145/3300061.3345432).
- P12. Grace Chen, **Varun Mishra**, and Ching-Hua Chen. Sep. 2019, “Temporal factors of listening to music on stress reduction,” in *Proceedings of the ACM International Joint Conference on Pervasive and Ubiquitous Computing Adjunct (UbiComp '19)*, London, United Kingdom: ACM, pp. 907–914. DOI: [10.1145/3341162.3346272](https://doi.org/10.1145/3341162.3346272).
- P13. Jan-Niklas Kramer, Florian Künzler, **Varun Mishra**, Bastien Presset, David Kotz, Shawna Smith, Urte Scholz, and Tobias Kowatsch. Jan. 2019, “Investigating Intervention Components and Exploring States of Receptivity for a Smartphone App to Promote Physical Activity: Protocol of a Microrandomized Trial,” *JMIR Research Protocols*, vol. 8, no. 1, e11540, ISSN: 1929-0748. DOI: [10.2196/11540](https://doi.org/10.2196/11540).
- P14. **Varun Mishra**, Tian Hao, Si Sun, Kimberly Walter, Marion Ball, Ching-Hua Chen, and Xinxin Zhu. Oct. 2018, “Investigating the role of context in perceived stress detection in the wild,” in *Proceedings of the ACM International Joint Conference on Pervasive and Ubiquitous Computing Adjunct (UbiComp '18)*, ACM. DOI: [10.1145/3267305.3267537](https://doi.org/10.1145/3267305.3267537).
- P15. **Varun Mishra**, Gunnar Pope, Sarah Lord, Stephanie Lewia, Byron Lowens, Kelly Caine, Sougata Sen, Ryan Halter, and David Kotz. Oct. 2018, “The case for a commodity hardware solution for stress detection,” in *Proceedings of the ACM International Joint Conference on Pervasive and Ubiquitous Computing Adjunct (UbiComp '18)*, ACM. DOI: [10.1145/3267305.3267538](https://doi.org/10.1145/3267305.3267538).
- P16. Gunnar C Pope, **Varun Mishra**, Stephanie Lewia, Byron Lowens, David Kotz, Sarah Lord, and Ryan Halter. Mar. 2018, “An Ultra-Low Resource Wearable EDA Sensor Using Wavelet Compression,” in *Proceedings of the IEEE Conference on Body Sensor Networks (BSN '18)*, pp. 193–196. DOI: [10.1109/BSN.2018.8329691](https://doi.org/10.1109/BSN.2018.8329691).
- P17. Gabriella M. Harari, Sandrine R. Müller, **Varun Mishra**, Rui Wang, Andrew T. Campbell, Peter J. Rentfrow, and Samuel D. Gosling. Jul. 2017, “An Evaluation of Students’ Interest in and Compliance With Self-Tracking Methods,” *Social Psychological and Personality Science*, vol. 8, no. 5, pp. 479–492, ISSN: 1948-5506. DOI: [10.1177/1948550617712033](https://doi.org/10.1177/1948550617712033).

- P18. **Varun Mishra**, Byron Lowens, Sarah Lord, Kelly Caine, and David Kotz. 2017, “Investigating Contextual Cues As Indicators for EMA Delivery,” in *Proceedings of the 2017 ACM International Joint Conference on Pervasive and Ubiquitous Computing*, Maui, Hawaii: ACM, pp. 935–940. DOI: [10.1145/3123024.3124571](https://doi.org/10.1145/3123024.3124571).
- P19. Rahul Majethia, **Varun Mishra**, Akshit Singhal, Lakshmi Manasa K, Kunchay Sahiti, and Vijay Nandwani. 2016, “PeopleSave: Recommending effective drugs through web crowdsourcing,” in *2016 8th International Conference on Communication Systems and Networks (COMSNETS)*, IEEE, pp. 1–6. DOI: [10.1109/COMSNETS.2016.7440000](https://doi.org/10.1109/COMSNETS.2016.7440000).
- P20. Rahul Majethia, **Varun Mishra**, Prasad Pathak, Divya Lohani, Debopam Acharya, and Seema Sehrawat. 2015, “Contextual sensitivity of the ambient temperature sensor in Smartphones,” in *2015 7th International Conference on Communication Systems and Networks (COMSNETS)*, IEEE, pp. 1–8. DOI: [10.1109/COMSNETS.2015.7098674](https://doi.org/10.1109/COMSNETS.2015.7098674).

Refereed Posters and Doctoral Symposiums

- R1. **Varun Mishra**. 2019, “From sensing to intervention for mental and behavioral health,” in *Doctoral Colloquium at UbiComp 2019*, London, United Kingdom: ACM, pp. 388–392. DOI: [10.1145/3341162.3349304](https://doi.org/10.1145/3341162.3349304).
- R2. Sougata Sen, **Varun Mishra**, and David Kotz. 2019, “Using vibrations from a smartring as an out-of-band channel for sharing secret keys,” in *Proceedings of the ACM International Joint Conference on Pervasive and Ubiquitous Computing Adjunct (UbiComp’19)*, London, United Kingdom: ACM, pp. 198–201. DOI: [10.1145/3341162.3343818](https://doi.org/10.1145/3341162.3343818).
- R3. Sundara Rajan, Meghna Joshi, **Varun Mishra**, Ishita Dasgupta, Anurag Joshi, and Rahul Majethia. 2015, “Humorse: Smartphone Based Unified Home Automation for the Disabled and Elderly,” in *Adjunct Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing*, Osaka, Japan: ACM, pp. 5–8. DOI: [10.1145/2800835.2800840](https://doi.org/10.1145/2800835.2800840).

Technical Reports and Unrefereed Works

- T1. **Varun Mishra**. Aug. 2018, “Poster: Investigating the Role of Context in Perceived Stress Detection in the Wild,” IBM Intern Poster Session.
- T2. **Varun Mishra**, Byron Lowens, Sarah Lord, Kelly Caine, and David Kotz. Apr. 2018, “Investigating Contextual Cues as Indicators for EMA Delivery,” Dartmouth Computer Science, Tech. Rep. TR2018-842. [Online]. Available: https://digitalcommons.dartmouth.edu/cs_tr/352/.
- T3. **Varun Mishra**, Rui Wang, and Andrew Campbell. Apr. 2016, “Poster: Sensing Stress Levels,” Computer Science Research Symposium (CSRS), Dartmouth College.

Invited Talks

November 2020	Evaluating States-of-Receptivity for mHealth Interventions Host: <i>Vivian Motti</i>	George Mason University
April 2020	Evaluating States-of-Receptivity for mHealth Interventions Host: <i>Birgit Kleim</i>	University of Zürich
February 2020	Clinical Trajectories of Individuals with Opioid Use Disorder Host: <i>Tobias Kowatsch</i>	ETH Zürich
February 2020	Detecting Stress from Physiological Signals Host: <i>Tobias Kowatsch</i>	ETH Zürich

Teaching Experience

	Guest Lecturer	
Spring '19	COSC 65/165: Smartphone Programming (2 lectures) <i>Prof. Andrew Campbell</i>	Dartmouth College
Winter '19	COSC 65/165: Smartphone Programming (3 lectures) <i>Prof. Xing-Dong Yang</i>	Dartmouth College
Fall '17	COSC 65/165: Smartphone Programming (8 lectures) <i>Prof. Sergey Bratus</i>	Dartmouth College
	Teaching Assistant	Dartmouth College
Winter '19, W '18, F '17, W '17, W '16 Fall '16 Summer '16 Fall '15	COSC 65: Smartphone Programming COSC 76: Artificial Intelligence COSC 52: Full-Stack Web Development COSC 31: Algorithms	

Grants and Awards

2019 – 2021	NIH/NIDA via Clinical Trials Network (CTN), \$885,355 <i>Harnessing Digital Health Technologies and Analytics to Understand Clinical Trajectories of Individuals with Opioid Use Disorder in Buprenorphine Treatment</i> , with Lisa Marsch (PI) and others. [Read more.]
2018 – 2019	Pilot Grant from NIH/NIDA via Dartmouth Center for Technology and Behavioral Health , \$20,887 <i>Development of an open-source state-of-receptivity MobileCoach module for mHealth field studies</i> , with David Kotz (PI). [Read more.]
2018, 2021	Special Recognition for Outstanding Review , CHI 2018, IMWUT 2021
2020	Alumni Research Award , Dartmouth College
2019	SIGMobile Student Travel Grant , ACM
2017 – 2019	Student Travel Grant , Neukom Institute
2018	Student Travel Grant , Dartmouth Computer Science

Professional Service

	Workshop Organizer
2021	<i>Mental Health Sensing and Intervention</i> – Workshop at UbiComp '21
2020	<i>Mental Health Sensing and Intervention</i> – Workshop at UbiComp '20
2019	<i>Mental Health Sensing and Intervention</i> – Workshop at UbiComp '19
2016	<i>Mental Health and Well-being: Sensing and Intervention</i> – Workshop at UbiComp '16
	Program Committee Member
2022	Healthy Interfaces Workshop (co-located with IUI '22)
2022	WristSense Workshop (co-located with PerCom '22)
2021	Digital Biomarkers Workshop (co-located with MobiSys '21)
2021	WristSense Workshop (co-located with PerCom '21)
2019	MobiCASE

Reviewer

- 2018 – Present PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)
- 2019 – Present ACM Transactions on Computing for Health (HEALTH)
- 2018 – Present ACM Conference on Human Factors in Computing Systems (CHI)
- 2022 International Journal of Behavioral Medicine
- 2021 IEEE Pervasive Computing
- 2021 Nature Scientific Reports
- 2020 IEEE Transactions on Affective Computing
- 2020 IEEE Transactions on Mobile Computing
- 2019 Pervasive and Mobile Computing (PMC)
- 2019 WristSense 2019 (Co-located with IEEE PerCom)
- 2017 – 2018 Journal of Ambient Intelligence and Humanized Computing

Community Service

- 2018 – present **Volunteer**, Nirantar Prayas
A non-profit school for autistic children in Delhi (NCR), India
- 2020 – 2021 **Mentor**, Dartmouth ManyMentors
Dartmouth chapter of ManyMentors, aimed to make STEM opportunities more visible, valuable, and viable for underrepresented K-12 students.
- 2016 – 2017 **Mentor**, Dartmouth's International Graduate Mentorship Program
Organization of current graduate students at Dartmouth who work with incoming international students to help their transition to life in the US.
- 2010 – 2015 **Volunteer**, Playtime Delhi
A non-profit organization for autistic children in Delhi, India