# RUSHIL KHURANA

**web:** rushil.fyi
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## OVERVIEW

*My goal is to build seamless interactive experiences driven by my work in human-centered AI and sensing approaches, novel interactions, and reimagining consumer devices. I focus on making deployable systems with a sharp eye towards practical use by millions.*

*I primarily build automated systems with commodity sensors for detecting and tracking user activities and behaviors in domains like healthcare, situational impairments, and device interactions. Throughout my Ph.D., I have developed and deployed several systems that have led to over 10 publications, with several more in review, and have won Best Paper Awards in premiere CS and HCI venues such as CHI and Ubicomp (IMWUT). To build and deploy these systems, I draw from a diverse set of skills including computer vision, applied machine learning, signal processing, mobile computing, HCI and interface design.*

## EDUCATION

**Carnegie Mellon University** — Pittsburgh, PA
Ph.D. Candidate, Human-Computer Interaction — Aug 2015–Present
Advisor: Dr. Mayank Goel

**Georgia Institute of Technology** — Atlanta, GA
M.S., Human-Computer Interaction — May 2015
Advisors: Dr. Gregory Abowd, Dr. Rosa Arriaga

**IIIT-Delhi** — Delhi, India
B.Tech, Computer Science & Engineering (Honors), GPA: 8.64/10 — May 2013
Advisor: Dr. Shishir Nagaraja

## RELEVANT SKILLS

### AI & Machine Learning

Tensorflow, Keras, PyTorch, scikit-learn, pandas; Deep Learning- CNNs, RNNs, LSTMs, computer vision, object detection; Classical machine learning- SVMs, Random Forests, Adaboost; signal processing, feature extraction and engineering, sensor fusion.

### Software & Systems

Python, C/C++, Java, Android, HTML/CSS, JavaScript, R, OpenCV, GPUs, Git, MATLAB, Arduino, Processing, Rapid Prototyping of interactive systems- user interfaces, data processing pipelines, and visualizations.

### HCI Skills

Physical prototyping- 3D printing, laser cutting, experience with microcontrollers; User Research & Design- Wireframing, Task Analysis, Personas, Storyboarding, Graphic Design, Comparative Analysis, Interviews, Contextual Inquiry, Survey Design, Heuristic Evaluation, Cognitive Walkthroughs.

## WORK EXPERIENCE

**Carnegie Mellon University** — Pittsburgh, PA
*Graduate Student Researcher* — August 2015–Present
Mentors: Dr. Mayank Goel
Building novel sensing and interaction techniques for smart environments and devices.

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**Microsoft Research** — Cambridge, UK
*Research Intern* — Summer 2019
Mentor: Dr. Steve Hodges
Worked on identifying challenges in scaling up hardware production.

**Disney Research** — Los Angeles, CA
*Research Intern* — Summer 2018
Mentors: Dr. Jack Yang, Dr. Alanson Sample
Explored computer vision, machine learning and RF methods for smart environment applications.

**Technicolor Research** — Los Altos, CA
*Research Intern* — Summer 2016
Mentor: Dr. Kent Lyons
Explored novel around-watch interactions to improve the expressivity of smartwatches.

**Intelos Inc.** — San Francisco, CA
*Research & Development Intern* — Summer 2015
Mentors: Akhil Kuduvalli, Jeff Carnegie
Worked on several product prototypes to reimagine artificial intelligence with an understanding of nature of consciousness.

**Georgia Institute of Technology** — Atlanta, GA
*Graduate Student Researcher* — Jan 2014–May 2015
Mentors: Dr. Gregory Abowd, Dr. Rosa Arriaga & Dr. Daniel Haynes
Worked on several projects in the space of health monitoring, and interaction techniques. Some of the works resulted in publication.

**Yahoo! Inc.** — Sunnyvale, CA
*Research Intern* — Summer 2014
Mentor: Dr. Joanne Locascio
Conducted experiments to quantify the difference in results when co-workers are used as usability test participants.

## AWARDS & HONORS

**Best Paper Award, ACM CHI** (2020)
**Presidential Fellowship, Carnegie Mellon University** (2016)
**Top 3, Student Design Competition**, ACM CHI 2015 (3 out of 65)
**Nominee (Top 3), Best Undergrad Thesis** (2013)
**IIIT-Delhi Honors** (2009–2013)

## PUBLICATIONS

### Peer Reviewed

**(3+ publications in review)**

[10] **Rushil Khurana** & Steve Hodges. 2020. Beyond the Prototype: Understanding the Challenge of Scaling Hardware Device Production. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (CHI '20). ACM. **Best Paper Award (Top 1%)**.

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[9] **Rushil Khurana** & Mayank Goel. 2020. Eyes on the Road: Detecting Phone Usage by Drivers Using On-Device Cameras. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (CHI '20). ACM. [Acceptance Rate: 24.3%]

[8] Abdelkareem Bedri, Diana Li, **Rushil Khurana**, Kunal Bhuwalka, & Mayank Goel. 2020. FitByte: Automatic Diet Monitoring in Unconstrained Situations Using Multimodal Sensing on Eyeglasses. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (CHI '20). ACM. [Acceptance Rate: 24.3%]

[7] **Rushil Khurana,** Mayank Goel & Kent Lyons. 2019. Detachable Smartwatch: More than a Wearable. In *Proceedings of Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 2019.* (Ubicomp '19). ACM.

[6] **Rushil Khurana,** Karan Ahuja, Zac Yu, Chris Harrison & Mayank Goel. 2018. GymCam: Real-Time Multi-Location Exercise Recognition and Analytics. In *Proceedings of Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 2018.* (Ubicomp '19). ACM.

[5] **Rushil Khurana,** Nikola Banovic & Kent Lyons. 2018. In Only 3 Minutes: Perceived Exertion Limits Of Smartwatch Use. In *Proceedings of the 2018 International Symposium on Wearable Computers.* ACM.

[4] **Rushil Khurana,** Duncan McIsaac, Elliot Lockerman, & Jennifer Mankoff. 2018. Nonvisual Interaction Techniques at the Keyboard Surface. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (CHI '18). ACM. [Acceptance Rate: 26%]

[3] Joanne Locascio, **Rushil Khurana**, Yan He, & Jofish Kaye. 2016. Utilizing Employees as Usability Participants: Exploring When and When Not to Leverage Your Coworkers. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (CHI '16). ACM. [Acceptance Rate: 22%]

[2] **Rushil Khurana,** Elena Marinelli, Tulika Saraf, & Shan Li. 2014. NeckGraffe: a postural awareness system. In *CHI '14 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '14). ACM. **Top 3 (out of 70), Student Design Competition**

[1] **Rushil Khurana,** & Shishir Nagaraja. 2013. Simple defences against vibration-based keystroke fingerprinting attacks. In *Security Protocols XXI.*

## Book Chapters & Invited Articles

[2] **Rushil Khurana**. The Past, the Present, and the Future of Fitness Tracking. In *XRDS: Crossroads*. ACM. 2019

[1] Mark S. Baldwin, **Rushil Khurana**, Duncan McIsaac, Yuqian Sun, Tracy Tran, Xiaoyi Zhang, James Fogarty, Gillian R. Hayes, & Jennifer Mankoff. Tangible Interfaces. In Web Accessibility. Springer. 2019.

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## POSTERS & DEMOS

[3] **Rushil Khurana** & Abdelkareem Bedri. CopyCat: Crowd-Enabled Electrical Muscle Stimulation (EMS) For Skill Transference. In *UIST '16 SIC Demos*.

[2] **Rushil Khurana** & Paul Lazarus. SeeThrough: An Indoor Navigation Assistant For Visually Impaired Individuals. In *UIST '14 SIC Demos*.

[1] Kuldeep Yadav, Vibhas Kumar, Shrey Jairath, **Rushil Khurana,** Vinayak Naik & Amarjeet Singh. 2012. Poster: cloud-enabled content search and sharing system for mobile phones (MobiShare). In *MobiSys'12*.

## ACADEMIC SERVICE

**Program Committee, Associate Chair (AC),** ACM CHI 2020 Late Breaking Work
**Program Committee,** ACM ICMI 2020
**PhD Faculty Representative,** 2019-20, Carnegie Mellon University, HCII
**Session Chair**, ACM CHI 2018, Technology to Support Deaf and Hard of Hearing People
**Mentor, Broadening Participation Workshop,** ACM Ubicomp 2018

### Reviewing (90+)

**ACM CHI** `17, `19, `20, '21
**ACM Ubicomp/ISWC** `18, `19, `20, '21
**ACM UIST** `19, `20
**ACM MobileHCI** `19, `20
**ACM ICMI** `19, `20
**ACM DIS** `20

## TEACHING EXPERIENCE

| | |
|---|---|
| **Teaching Assistant**, Carnegie Mellon University<br>*Programming Usable Interfaces* (Graduate) | Pittsburgh, PA<br>Fall 2019 |
| **Teaching Assistant**, Carnegie Mellon University<br>*User Centered Research and Evaluation* (Graduate) | Pittsburgh, PA<br>Fall 2016 |
| **Teaching Assistant**, IIIT-Delhi<br>*Data Structures and Algorithms* (Undergraduate) | Delhi, India<br>Spring 2012 |
| **Teaching Assistant**, IIIT-Delhi<br>*Introduction to Python* (Undergraduate) | Delhi, India<br>Fall 2011 |

## MENTORING

| | |
|---|---|
| **Katelyn Morrison,** Undergraduate at University of Pittsburgh | Fall 2020 |
| **Sejal Bhalla,** Undergraduate at IIIT-Delhi | Fall 2020 |
| **Ashley Wang,** Undergraduate at Carnegie Mellon University | Summer 2020 |
| **Vikas Udupa,** Masters Student at Carnegie Mellon University | Summer 2020 |
| **Corentin Dugue,** Masters Student at Carnegie Mellon University | Fall 2019 |
| **Joseph Standerfer**, Masters Student at Carnegie Mellon University | Fall 2019 |
| **Zac Yu**, Undergraduate at University of Pittsburgh | Fall 2017–Summer 2019 |
| **Elena Deng**, Undergraduate at Carnegie Mellon University | Spring 2019 |
| **Sriram Kollipara**, Masters Student at Carnegie Mellon University | Summer 2017 |
| **Dian Q. Le**, Masters Student at Carnegie Mellon University | Spring 2017 |
| **Aarohi Palkar**, Undergraduate at Carnegie Mellon University | Spring 2017 |

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**Elliot Lockerman**, Masters Student at Carnegie Mellon University — Spring 2016
**Duncan McIsaac**, Undergraduate at Carnegie Mellon University — Fall 2015–Fall 2016

## SELECTED PRESS

**Yahoo! (Japanese),** "The in-camera on the smartphone determines the structure inside the car. Technology that does not let you use your smartphone while driving", 05/2020
**Gizmodo (Japanese),** "The in-camera on the smartphone determines the structure inside the car. Technology that does not let you use your smartphone while driving", 05/2020
**Hackaday,** "Using Smartphone Cameras To Make Sure Drivers Are Looking At The Road" 05/2020
**Livedoor News (Japanese),** "The in-camera on the smartphone determines the structure inside the car. Technology that does not let you use your smartphone while driving", 05/2020
**Nicovideo News (Japanese),** "The in-camera on the smartphone determines the structure inside the car. Technology that does not let you use your smartphone while driving", 05/2020
**Mobility21 CMU,** "Using Smartphone Cameras To Make Sure Drivers Are Lookingg At The Road", 05/2020
**Wevolver,** "FitByte Uses Sensors on Eyeglasses To Automatically Monitor Diet", 05/2020
**Futurity,** "Fitbyte attaches to glasses to track your diet", 05/2020
**Hackster.io,** "FitByte Monitors Diets Using Sensors Mounted on Glasses", 05/2020
**Carnegie Mellon News,** "FitByte Uses Sensors on Eyeglasses To Automatically Monitor Diet", 05/2020
**New Atlas,** "FitByte glasses designed to keep an eye on your diet", 05/2020
**Mirage News,** "FitByte Uses Sensors on Eyeglasses To Automatically Monitor Diet", 05/2020
**cnBeta (Chinese),** "Carnegie Mellon University showcases FitByte diet record smart glasses", 05/2020
**Agenparl (Italian),** "FitByte Uses Sensors on Eyeglasses To Automatically Monitor Diet", 05/2020
**What Next (Polish),** "These glasses will help you keep a diet", 05/2020
**MyScience,** "FitByte Uses Sensors on Eyeglasses To Automatically Monitor Diet", 05/2020
**Inceptive Mind,** "FitByte mounts on eyeglasses uses sensors to monitor your diet", 05/2020
**TechXplore,** "FitByte uses sensors on eyeglasses to automatically monitor diet", 05/2020
**ZDNet**, "A novel solution to curb phone use by drivers", 04/2020
**Gingdu**, "A novel solution to curb phone use by drivers", 04/2020
**Aedaily,** "A novel solution to curb phone use by drivers", 04/2020
**ZDNet**, "Uh-oh: This camera watches while you work out", 09/2019
**Hackaday**, "GymCam Knows Exactly What You've Been Doing In The Gym", 09/2019
**Science Daily**, "GymCam tracks exercises that wearable monitors can't", 09/2019
**Medgadget**, "GymCam Automatically Classifies, Counts Exercise Reps", 09/2019
**ACM TechNews**, "GymCam Tracks Exercises That Wearable Monitors Cannot", 09/2019
**New Atlas**, "Computer vision system tracks workouts when wearables can't", 09/2019
**Carnegie Mellon News**, "GymCam Tracks Exercises That Wearable Monitors Can't", 09/2019
**Digitimes**, "I want to analyze the effectiveness of gym exercise and use computer vision technology to do it" 09/2019
**Lab Roots**, "GymCam Can Track Exercise Effectively Than Wearable Sensors", 09/2019
**Med India**, "Camera Tracks Exercises More Efficiently Than Smartwatches", 09/2019
**I-Programmer**, "GymCam Tracks Your Workout", 09/2019
**What Next (Polish)**, "The GymCam system outperforms smartwatches during exercise", 09/2019
**CravingTechs**, "GymCam tracks exercises that wearable monitors can't", 09/2019

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**Les Affaires (French)**, "10 things to know Thursday", 09/2019
**Market Research Finance**, "GymCam Counts Your Reps And Sets Just Like A Personal Trainer", 09/2019
**Edgy**, "Researchers Introduce a New Way to Monitor Gym Exercises", 09/2019
**cnBeta (Chinese)**, "Scientists develop a new computer vision system to track user movements", 09/2019
**Science Daily,** "Screen reader plus keyboard helps blind, low-vision users browse modern webpages", 04/2018
**Futurity,** "Keyboard tech speeds browsing for blind internet users", 04/2018
**UPI,** "Device helps blind, low-vision users better browse web pages", 04/2018
**Gadgets New Tech (Spanish)**, "El lector de pantalla más el teclado ayuda a los usuarios ciegos y con baja visión a navegar por las páginas web modernas", 04/2018
**Rehacare Magazine,** "Screen reader plus keyboard helps blind, low-vision users browse modern webpages", 04/2018
**News Medical,** "New tool helps blind, low-vision users navigate modern webpages more easily", 04/2018
**University of Washington News**, "Screen reader plus keyboard helps blind, low-vision users browse modern webpages", 04/2018
**New Scientist,** "Crowdsourced software could stop SMS spam", 02/2011
**Mid-Day (India)**, "Now 'kill' that unwanted SMS", 03/2011
**NDTV (India)**, "Now, a software to filter SMS spam", 03/2011

## REFERENCES

[1] Dr. Mayank Goel, Assistant Professor, Carnegie Mellon University
[2] Dr. Steve Hodges, Senior Principal Researcher, Microsoft Research
[3] Dr. Scott Hudson, Professor, Carnegie Mellon University
[4] Dr. Kent Lyons, Staff Research Scientist, Toyota Research Institute
[5] Dr. Gregory Abowd, Regents' Professor, Georgia Institute of Technology
[6] Dr. Rosa Arriaga, Senior Research Scientist, Georgia Institute of Technology