



# *Biomedical Informatics*

## *Grand Rounds*

Wednesday, March 26, 2025

3:00 pm – 4:00 pm

## **Multi-Scale Motion-Derived Health Sensing**

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### **Remote Access**

**Join Zoom Meeting** <https://stonybrook.zoom.us/j/95617197636?pwd=KytzZ2pVRG9SZGpKZUtpNXJISjNjZz09>

Meeting ID: 956 1719 7636 Passcode: 924293

**Bio:** Shubham Jain is an Assistant Professor in the Department of Computer Science at Stony Brook University where she leads PiCASSo (Pervasive Computing and Smart Sensing) Lab. Her research interests lie in cyber-physical systems, accessibility, and data analytics in smart environments. She is an NSF CAREER awardee and was also recognized as a rising star in networking and communication. She frequently publishes in top-tier venues. Her work on pedestrian safety has been featured in several media outlets, including The Wall Street Journal. She received her PhD in Electrical & Computer Engineering from Rutgers University in 2017.

**Abstract:** In this talk, I will present a series of cutting-edge systems that leverage human motion to enable effective behavior interventions. In the first half of the talk I will introduce LiftRight, a system designed to track human motion continuously and provide feedback regarding form. This system is crucial for injury prevention, particularly in those undergoing rehabilitation. In the second part of the talk I will focus on a series of works wherein we are using human jaw motion to design an unvoiced interaction paradigm. This is designed to overcome the limitations of voice-based technologies particularly for those with speech impairments. I will introduce our innovative ear-worn device that tracks jaw movement using twin IMUs to recognize unvoiced human commands. Next, I will present Unvoiced, which transforms jaw motion signals into audio spectrograms for silent interaction with devices supporting multiple applications. These systems pave the way for a new era of voiceless interactions, enhancing accessibility, privacy, and user convenience in diverse settings.

### **Educational Objectives:**

1. Audience will learn about *LiftRight*, a system that monitors human motion to prevent injuries and assist rehabilitation.
2. Listeners will understand how jaw motion-based innovations can overcome the limitations of voice-based systems for individuals with speech impairments.
3. Participants will discover an ear-worn device using twin IMUs for unvoiced commands and the *Unvoiced* system for silent interaction.
4. Attendees will explore the benefits of voiceless interaction technologies, including improved accessibility, privacy, and convenience.

**Disclosure Statement:** The faculty and planners have no relevant financial relationship with ineligible companies, whose primary business is producing, marketing, selling, reselling, or distributing health care products used by or on patients.

**Continuing Medical Education Credits:** The School of Medicine, State University of New York at Stony Brook, is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. The School of Medicine, State University of New York at Stony Brook designates this live activity for a maximum of **1 AMA PRA Category 1 Credits™**. Physicians should only claim credit commensurate with the extent of their participation in the activity.