

# Hammad F. Khan

Weldon School of Biomedical Engineering,

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## RESEARCH INTEREST

Neuroengineering, neuroscience, calcium imaging, electrophysiology, bio-integrated devices.

## EDUCATION

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<b>PhD in Biomedical Engineering, Purdue University</b>	Expected May 2025
<b>BS in Electrical Engineering, Montana State University</b>	Graduated May 2020

## RESEARCH EXPERIENCE

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<b>Graduate Research Assistant, Purdue University</b> Research Advisor: Dr. Krishna Jayant During my PhD, I aim to unraveling dendritic computations by developing scalable bioelectronic interfaces and computations. Together, I aim to link single synapse to neural computations.	August 2020 – Present
<b>Undergraduate Research Assistant, Montana State University</b> Research Advisor: Dr. Anja Kunze During my undergraduate training, I focused on developing scalable and biocompatible cell assays to investigate cytosolic calcium signal during neurite maturation in vitro.	June 2018 – June 2020

## PUBLICATIONS

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- 1) C. L. Beck, **H. F. Khan**, A Kunze, Biomechanical modulation of calcium event rates in soft matter neuro patterns. *Proceedings of the 25<sup>th</sup> International Conference on Miniaturized Systems for Chemistry and Life Science*
- 2) **H. F. Khan**, C. L. Beck, A. Kunze, Multi-curvature micropatterns unveil distinct calcium and mitochondrial dynamics in neuronal networks. *Lab on a Chip 2021*.
- 3) Anja Kunze, Connor L. Beck, **Hammad F. Khan**, Multi-curvature soft matter patterns and methods for lab-on-chip pharmaceutical testing and neurobiology studies. *US Patent #63/143.701, 2021*.

- 4) **H. Khan**, C. Beck, A. Kunze, Soft-gel Microchannels to Study Curvature Effects in Neuronal Calcium Signaling. *In: Proceedings of the BMES, Philadelphia, Pennsylvania, USA, 2019.*
- 5) Jeneane Jaber, **Hammad Khan**, Anja Kunze, Quantifying Magnetic Nanoparticle Movement Under Micromagnetic Field Patterns. *In: Proceedings of the BMES, Philadelphia, Pennsylvania, USA, 2019*

## RESEARCH GRANTS

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|--|-----------------------------|
| NSF Graduate Research Fellowship (GRFP)<br>Project title: <i>Large-scale mapping of somato-dendritic dynamics during memory formation and replay</i> | July 2022 – July 2027       |
| NIH T32DC016853<br>Project title: <i>Mapping intracellular rate code in CA1 neurons under auditory spatial cues</i>                                  | July 2021 – July 2023       |
| NIH P20GM103474<br>Project title: <i>Using Agarose Hydrogel to Mimic Organize Neural Network Response and Mechanical Stimulus In Vitro</i>           | January 2019 – January 2020 |

## PRESENTATIONS

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- CSHL Neuronal Circuits Conference, *Cold Spring Harbor, NY* March 2022  
**Hammad F. Khan**, Sayan Dutta, Saumitra Yadav, Xiaoling Chen, Tamara L. Kinzer-Ursem, Jean-Christophe Rochet, Krishna Jayant  
*Examining the coupling between beta oscillations and functional cortical ensembles in an alpha-synuclein mouse model of dementia*
- CSHL Neuronal Circuits Conference, *Cold Spring Harbor, NY* March 2022  
Daniel L. Gonzales, **Hammad F. Khan**, Scott R. Pluta, Krishna Jayant  
*Transparent, flexible electrodes for mapping sensory-driven activity from the cortical surface in awake animals*
- Annual NCUR Conference (Invited Talk), *Montana State University, MT* March 2020  
**Hammad Khan**, Connor Beck, Anja Kunze.  
*Agarose Microchannels to Study Curvature Effects in Neuronal Calcium Signaling.*
- Annual BMES Conference (Invited Talk), *Philadelphia, PA* Oct. 2019  
**Hammad Khan**, Connor Beck, Anja Kunze.  
*Soft-gel Microchannels to Study Curvature Effects in Neuronal Calcium Signaling.*

- Annual BMES Conference (Poster), *Philadelphia, PA* Oct. 2019  
 Jeneane Jaber, **Hammad Khan**, Anja Kunze.  
*Quantifying Magnetic Nanoparticle Movement Under Micromagnetic Field Patterns.*
  
- NSF NNCI Convocation (Invited Talk), *Cornell University, NY* Aug. 2019  
**Hammad Khan**, Connor Beck, Anja Kunze.  
*Agarose microchannels to study curvature effects in neuronal calcium signaling.*
  
- NIH INBRE Convocation (Poster), *Montana State University, MT* Aug. 2019  
**Hammad Khan**, Connor Beck, Anja Kunze.  
*Agarose microchannels to study curvature effects in neuronal calcium signaling.*
  
- Undergraduate Scholars Research Celebration (Poster), *Montana State University, MT* May 2019  
**Hammad Khan**, Anja Kunze.  
*Fine-tuning Agarose Concentrations towards Soft-gel based Neuro-microfluidics.*
  
- IEEE Neuroengineering Conference (Poster), *San Francisco, CA* March 2019  
 Derek Judge, **Hammad Khan**, Anja Kunze.  
*Neural network growth under heterogeneous magnetic gradient patterns.*

## AWARDS

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Stephan Ash Fellowship	August 2020
Undergraduate Scholar Program Travel Award	March, Oct. 2019
Extended abstract for annual (BMES) conference	July 2019
National Institute of Health INBRE Fellowship	May 2019
IM Flash Scholarship	March 2019
Warren Edward and Phyllis Sullivan Howe Scholarship	2016 – 2019
Frank L. Eckard Scholarship Endowment	2018 – 2019

## LEADERSHIP EXPERIENCE

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### *Purdue BME GSA*

- Treasurer July 2021 – Present
- First Year representative August 2020-July 2021

### *Sophomore Surge Program*

- Mentor Aug. 2017 – June 2020

Mentored incoming students on academic resources, registrations, and classes. Researched high impact practices for seminar classroom.

*Biomedical Engineering Journal Club*

- Member

May 2018 – May 2019

Presented on a diverse set of biomedical and neuroengineering topics. Reviewed and discussed new developments within respective fields.

*Residence Hall Association (RHA)*

- Senator

Aug. 2016 – May 2017

Participated in advocating for community needs within our residence halls. Coordinated with other student organizations for monetary budgets and activities.

*Montana State University, University Comm.*

Sept. 2018 – Dec. 2019

- Peer Facilitator; US 101

Helped facilitate discussions in a freshman seminar classroom.

*Montana State University, Department of Mathematics*

Sept. 2017 – Dec. 2017

- Co-instructor; M121

Lectured three times a week in introductory algebra for non-traditional students.

Graded quizzes and compiled homework packets.