SARAH MASUD PREUM

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Google Scholar || LinkedIn

RESEARCH INTERESTS

Human-centered Artificial Intelligence, Natural Language Processing, Machine Learning, Mobile Health, Health Informatics, Cyber-Physical Systems

EMPLOYMENT

- **Assistant Professor**   July 2021-Present
  Department of Computer Science
  Dartmouth College

- **Adjunct Assistant Professor**   August 2022-Present
  Department of Biomedical Data Science,
  Geisel School of Medicine, Dartmouth College

- **Affiliated Faculty**   July 2021-Present
  Center for Technology and Behavioral Health
  Geisel School of Medicine
  Dartmouth College

- **Post-Doctoral Fellow**   July 2020-June 2021
  School of Computer Science
  Carnegie Mellon University, Pittsburgh, PA

- **Artificial Intelligence Research Intern**   May 2018-August 2018
  Bosch Research and Technology Center, Pittsburgh, PA

- **Lecturer**   March 2013-July 2013
  Department of Computer Science and Engineering
  Bangladesh University of Engineering and Technology

EDUCATION

- University of Virginia, Charlottesville, VA   August 2020
  Ph.D. in Computer Science
  Advisor: Professor John Stankovic
  Thesis: *Information Extraction and Fusion for Improving Health Safety*
  Awards: Commonwealth fellowship,
  NSF Smart and connected health student award

- University of Virginia, Charlottesville, VA   May 2015
  M.Sc. in Computer Science, CGPA: 3.97/4.00
  Thesis: *Personalized model for temporal human behavior prediction*

Awards: Big data fellowship, Adobe Research Scholarship

- Bangladesh University of Engineering & Technology, Bangladesh   Feb 2013
  B.Sc. in Computer Science & Engineering, CGPA: 3.95/4.00
  [Double Major Equivalent in Computer Science & Computer Engineering]
  Class Rank: **Summa Cum Laude** (2nd in a class of **141** students)
  Thesis: *Maximum visibility queries in spatial databases*
  Awards: Best undergraduate thesis, Google student grant

GRANTS

- PI, *Characterize Self-Reported Treatment Information Needs Regarding Maintenance Medications for Opioid Use Disorder on Social Medi*a, Center for Technology and Behavioral Health (CTBH) Pilot, $17,100
- PI, Burke Award, Dartmouth College
- PI, Google Cloud Platform research credits**,** $5000 for conducting research

SELECTED HONORS AND AWARDS

- Nomination for best paper, "CitySpec: An Intelligent Assistant System for Requirement Specification in Smart Cities", IEEE International Conference on Smart Computing (SMARTCOMP).
- **Google Cloud Platform research credits,** $5000 for conducting research
- **EECS Rising Stars, 2020,** for academic excellence, interest in a faculty career in the EECS discipline, and commitment to advancing equity and inclusion
- **NSF student award** to attend and present research at 2017 Smart and Connected Health (SCH) PI meeting **[1 of 10 graduate students from the USA]**
- **Commonwealth Fellowship**, Department of Computer Science, UVA, 2013-2014
- **Adobe Research Scholarship** as a Grace Hopper Scholar, 2014
- **Big Data Fellowship** by **Data Science Institute**, UVA, 2014
- **Computing Research Association (CRA) grants** for CRA-W grad cohort in 2014, 2016
- **Best Undergraduate Thesis Award**, Department of Computer Science & Engineering, Bangladesh University of Engineering & Technology (BUET), 2013
- **First place**, National Software Project Contest, Bangladesh, 2011 *[Team leader]*
- **Finalist** (Top 5 out of 121 teams), **Microsoft Imagine Cup,** Bangladesh, 2011 *[Team leader]*
- **University Merit Scholarship** for each semester of B.Sc. studies for academic excellence at BUET, 2009-2012
- **Dean's Award** for each year of B.Sc. studies for academic excellence at BUET, 2009-2012
- **Conference Travel Grants:**
    - **AAAI** student travel grant to present paper at AAAI 2020
    - **NSF** student travel grant to present paper at PerCom 2017
    - **SIGIR** conference grant to present paper at CIKM 2015
    - **Google student grant** to present paper at ICDE 2013

PUBLICATIONS

PEER-REVIEWED CONFERENCE and JOURNAL PUBLICATIONS

1. Joseph Gatto, Madhusudan Basak, **Sarah M. Preum**. *Scope of Pre-trained Language Models for Detecting Conflicting Health Information*. International AAAI Conference on Web and Social Media (ICWSM), 2023.

2. Joseph Gatto, Matthew Seegmiller, Garrett Johnston, Madhusudan Basak, **Sarah M. Preum**. *HealthE: Recognizing Health Advice & Entities in Online Health Communities*. International AAAI Conference on Web and Social Media (ICWSM), 2023.

3. Joseph Gatto, Matthew Seegmiller, Garrett Johnston, **Sarah M. Preum**. *Identifying Severe Medical Queries from An Online Medical Hotline: A Transfer Learning Based Solution*. Journal of Medical Internet Research (JMIR), 2022.

4. M Arif Rahman, **Sarah M. Preum**, Homa Alemzadeh, Ronald D. Williams, John Stankovic. EMS-BERT: A Pre-Trained Language Representation Model for the Emergency Medical Services (EMS) Domain. IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE) 2023.

5. Joshua Levy, Jack Greenburg, Yunrui Lu, Shuyang Lu, Uhuru Kamau, Robert Hamilton, Jason Pettus, **Sarah M. Preum**, Louis Vaickus. Development of an Interactive Web Dashboard to Facilitate the Reexamination of Pathology Reports for Instances of Underbilling of CPT Codes. in Journal of Pathology Informatics.

6. Brooke M. Bell, Donna Spruijt-Metz, Ridwan Alam, Abu Mondol, Meiyi Ma, Ifat Emi, **Sarah M. Preum**, John A. Stankovic, John Lach, Kayla Haye. *Utilizing wearable sensors and ecological momentary assessment to automatically detect in-home contextualized eating events*. 43rd Annual Meeting of the Society of Behavioral Medicine, 2022.

7. Arya Kadakia, **Sarah Masud Preum**, Andrew R. Bohm, Karen L. Fortuna. Investigating the Fidelity of Digital Peer Support: A Preliminary Approach Using Natural Language Processing to Scale High-Fidelity Digital Peer Support. Workshop on Best Practices for Scaling-Up Digital Innovations in Healthcare - Scale-IT-up 2023, 16th International Joint Conference on Biomedical Engineering Systems and Technologies.

8. Zirong Chen, , Isaac Li, Haoxiang Zhang, **Sarah Preum**, John A. Stankovic, and Meiyi Ma. "CitySpec: An Intelligent Assistant System for Requirement Specification in Smart Cities." International Conference on Smart Computing (SMARTCOMP), 2022.

9. **Sarah M. Preum**, Sirajum Munir, Meiyi Ma, Mohammad Yasar, David J. Stone, Ronald D. Williams, Homa Alemzadeh,and John Stankovic. *A Review of Cognitive Assistants for Healthcare: Trends, Prospects, and Future Directions.* **ACM Computing Surveys, 2021** [**impact factor: 6.131**]

10. Nur Yildirim,1 John Zimmerman, **Sarah M. Preum**. *Technical Feasibility, Financial Viability, and Clinician Acceptance: On the many challenges to AI in Clinical Practice*. Human partnership with Medical Artificial Intelligence, AAAI Fall 2021 Symposium

11. John Stankovic, Meiyi Ma, **Sarah M. Preum,** and Homa Alemzadeh. *Challenges and Directions for Ambient Intelligence: A Cyber Physical Systems Perspective*. The Third IEEE International Conference on Cognitive Machine Intelligence (IEEE CogMI), 2021.

12. Brooke M. Bell, Ridwan Alam, Abu Mondol, Meiyi Ma, Ifat Emi, **Sarah M. Preum**, Kayla Haye, John A. Stankovic, John Lach, Donna Spruijt-Metz. *Validity and Feasibility of the Monitoring and Modeling*

Family Eating Dynamics (M2FED) System to Automatically Detect In-Field Family Eating Behavior. Journal of Medical Internet Research (JMIR), 2021

13. Brooke M. Bell, Donna Spruijt-Metz, Ridwan Alam, Abu Mondol, Meiyi Ma, Ifat Emi, **Sarah M. Preum**, John A. Stankovic, John Lach, Kayla Haye. *Investigating the Dynamics of In-Home Family Eating Behavior: A Relational Event Modeling Approach.* Special issue in the Network Science journal, 2021.

14. **Sarah M. Preum**, Homa Alemzadeh, and John Stankovic. *EMSContExt: EMS Protocol-driven Concept Extraction for Cognitive Assistance in Emergency Response.* The Thirty-Second Annual Conference on Innovative Applications of Artificial Intelligence (AAAI /IAAI), 2020

15. M Arif Rahman, **Sarah M. Preum**, Homa Alemzadeh, Ronald D. Williams, and John Stankovic. *GRACE: Generating Summary Reports Automatically for Cognitive Assistance in Emergency Response.* The Thirty-Second Annual Conference on Innovative Applications of Artificial Intelligence (AAAI /IAAI), 2020

16. **Sarah M. Preum**, Sile Shu, Mustafa Hotaki, Ron Williams, John Stankovic, and Homa Alemzadeh. *CognitiveEMS: A Cognitive Assistant System for Emergency Medical Services.* ACM Special Interest Group on Embedded Systems Review, 2019

17. Sile Shu, **Sarah M. Preum**, Haydon M. Pitchford, Ronald D. Williams, John Stankovic, and Homa Alemzadeh. *A Behavior Tree Cognitive Assistant System for Emergency Medical Services.* IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019. [**CORE rank: A, Qualis rank: A1**]

18. Meiyi Ma, **Sarah M. Preum**, Mohsin Ahmed, William Turneberg, Abdeltawab Hendawi, John Stankovic, *Data Sets, Modeling and Decision Making in Smart Cities: A Survey*, Transactions on Cyber Physical Systems (TCPS), 2019

19. **Sarah M. Preum**, Rizwan Parvez, Kai-Wei Chang, John Stankovic, *A Corpus of Drug Usage Guidelines Annotated with Type of Advice*, International Conference on Language Resources and Evaluation (LREC), 2018 [Qualis rank: A2]

20. **Sarah M. Preum,** Md A. Mondol, Meiyi Ma, Hongning Wang, John Stankovic, *PreCluDe: Conflict Detection in Textual Health Advice*, IEEE International Conference on Pervasive Computing and Communications (PerCom), 2017 [**CORE rank: A*, acceptance rate 16.5%**]

21. **Sarah M. Preum,** Md A. Mondol, Meiyi Ma, Hongning Wang, John Stankovic, *PreCluDe2: Personalized Conflict Detection in Heterogeneous Health Applications*, Pervasive and Mobile Computing Journal, Volume 42, 226-247, 2017 [**Impact factor: 2.769**]

22. Meiyi Ma, **Sarah M. Preum**, John Stankovic, *CityGuard: A Watchdog for Safety-Aware Conflict Detection in Smart Cities*, ACM/IEEE International Conference on Internet-of-things Design and Implementation (IoTDI), 2017 [acceptance rate 29%]

23. Meiyi Ma, **Sarah M. Preum**, William Tarneberg, Mohsin Ahmed, John Stankovic, *Detection of Runtime Conflicts among Services in Smart Cities*, IEEE Smart Computing, 2016 [H-Index 8]

24. **Sarah M. Preum,** John Stankovic, Yanjun Qi, *MAPer: A Multi-Scale Adaptive Personalized Model for Temporal Human Behavior Prediction*, ACM International Conference on Information and Knowledge Management (CIKM), 2015 [**CORE rank: A**, **Qualis rank: A1**, **acceptance rate 26%**]

25. Enamul Hoque, Robert Dickerson, **Sarah M. Preum**, Mark Hanson, Adam Barth, John Stankovic, *Holmes: A Comprehensive Anomaly Detection System for Daily In-home Activities*, International Conference on Distributed Computing in Sensor Systems (DCOSS), 2015 [**acceptance rate 31%**]

26. Farhana Choudhury, Mohammed Ali, **Sarah M. Preum**, Suman Nath, Ishat Rabban, *Scalable Visibility Color Map Construction in Spatial Databases,* Information Systems Journal, Volume 42, 89-106, 2014 [**Impact factor: 4.267**]

27. **Sarah M. Preum**, Monjura Afrin, Syed I. Ahmed, *VizResearch: Linking the Knowledge of People and the People with Knowledge*. Procedia Computer Science, Volume 9, 1416-1425, 2012

28. **Sarah M. Preum**, Farhana Choudhury, Mohammed Ali, Sarana Nutanong, *Maximum Visibility Queries in Spatial Databases*, International Conference on Data Engineering (ICDE), 2013 [**CORE rank: A***, **Qualis rank: A1**, **acceptance rate 21.4%**]

PEER-REVIEWED ABSTRACTS

29. M. Arif Rahman, **Sarah M. Preum**, John A. Stankovic, Leon Jia, Eimara Mirza, Ronald Williams, and Homa Alemzadeh. "IMACS-an interactive cognitive assistant module for cardiac arrest cases in emergency medical service: demo abstract." In Proceedings of the 18th Conference on Embedded Networked Sensor Systems, pp. 621-622. 2020.

30. Elizabeth Shelton, Annie Chapman, **Sarah M. Preum**, Sile Shu, Arif Rahman, John Stankovic, Homa Alemzadeh, Poster abstract: *An Assessment of a Cognitive Assistant System Under Diverse Noise Profiles in the Context of Emergency Medical Services*, SRC TECHCON, 2019

31. **Sarah M. Preum,** Sile Shu, Jonathan Ting, Vincent Lin, Ron Williams, John Stankovic, Homa Alemzadeh, Poster abstract: *Towards a cognitive assistant system for emergency response*, ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2018

32. **Sarah M. Preum,** Md A. Mondol, Meiyi Ma, Hongning Wang, John Stankovic, Demo Abstract: *Conflict Detection in Online Textual Health Advice,* International Conference on Information Processing in Sensor Networks (IPSN), 2017

33. Meiyi Ma, **Sarah M. Preum**, John Stankovic, Demo Abstract: *Simulating Conflict Detection in Heterogeneous Services of a Smart City,* IEEE/ACM Second International Conference on Internet-of-Things Design and Implementation (IoTDI), 2017

34. Md A. Mondol, Ifat Emi, **Sarah M. Preum**, John Stankovic. Poster abstract: *User authentication using wrist mounted inertial sensors*. ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), 2017.

UNDER SUBMISSION || PRE-PRINT

35. **Sarah M. Preum**, Adam Perer, Jeremy Kahn, John Zimmerman. *Opportunities for Clinically Relevant Prediction Models in the Intensive Care Unit: A Narrative Review*. Journal of the American Medical Informatics Association (JAMIA), 2022 (under submission).

36. Matthew Seegmiller, John Stankovic, **Sarah M. Preum**, *ActSafe: Predicting Medical Temporal Constraint Violations for Health Safety*. ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (UbiComp / IMWUT), 2023 (under review).

37. M Arif Rahman, **Sarah M. Preum**, Homa Alemzadeh, Ronald D. Williams, John Stankovic. *miCaRe: Multimodal Interactive Cognitive Assistant in EMS Training for Cardiac Arrest Protocols*. ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (UbiComp / IMWUT), 2022 (under submission).

38. Md Abu Sayeed Mondol, Brooke Bell, Meiyi Ma, Ridwan Alam, Ifat Emi, **Sarah M. Preum**, Kayla de la Haye, Donna Spruijt-Metz, John C. Lach, and John A. Stankovic. "MFED: A System for Monitoring Family Eating Dynamics." arXiv preprint arXiv:2007.05831 (2020).

TEACHING EXPERIENCE

Professor/Instructor, Computer Science Department, Dartmouth College CS 74/274, **Machine Learning and Statistical Data Analysis**	Spring, 2022
Professor/Instructor, Computer Science Department, Dartmouth College CS 89/189, Transforming Healthcare with Machine Learning, Opportunities and Challenges	Fall, 2021; Winter 2023

Teaching Assistant, CS Department, University of Virginia
- CS 1112: An Introduction to Digital Problem Solving and Programming
  Conducted lab sessions for a class of over 100 students, graded weekly
  assignments, quizzes, and final exams, held weekly office hours,
- CS 1111: Introduction to Programming
  Held weekly office hours, graded weekly assignments, quizzes, and final exams
  [class of 80 students]
- CS 4750: Database Systems
  Held weekly office hours, graded weekly assignments, quizzes, and final exams
  [class of 80 students]

Spring 2014,
Fall 2013

Spring 2014

Fall 2013

Lecturer/Instructor, CSE Department, Bangladesh University of
Engineering & Technology
- CSE 304 - Database Sessional
  Delivered lectures, conducted lab sessions, designed and graded weekly
  assignments and quizzes, supervised and evaluated term projects
  [class of 60 students]
- CSE 210 - Digital Electronics and Pulse Techniques Sessional
  Conducted lab session, graded weekly assignments and quizzes, designed and
  evaluated final exams [class of 60 students]
- CSE 206 - Digital Logic Design Sessional
  Conducted lab session, graded weekly assignments and quizzes, evaluated final
  exams [class of 30 students]
- CSE 404 - Digital Systems Design Sessional
  Evaluated term project [class of 30 students]

2013

SELECTED MENTORING EXPERIENCE

Graduate students	Fall 2020-present	Joseph Gatto, CS PhD student, Dartmouth College, *Natural language inference, medical informatics*
	Winter 2022-present	Matthew Seegmiller, CS PhD student, Dartmouth College, *Information extraction, timeseries modeling*
	Winter 2022-present	Xu Tian, CS PhD student, Dartmouth College, *Timeseries modeling, medical informatics*
	Winter 2022-present	Will Romano, CS PhD student, Dartmouth College, *Medical informatics*
	Winter 2022-present	Yunrui Lu, QBS Masters student, Dartmouth College, *Medical informatics*
	Fall 2018-fall 2021	Md Arif Rahman, CS Ph.D. Student, UVA, *Automatic incident reporting for emergency response* [**Results published in AAAI/IAAI 2020**]
	Spring 2017-Summer 2017	Rizwan Parvez, CS M.Sc. Student, UVA, *Semi-automatic annotation of textual medication guidelines* [**Results published in LREC 2018**]

Under-graduate students	Fall 2022-present	Gokul Srinivasan, CS'23 undergraduate student, Dartmouth College, Transcrptomic alterations implicated in skin photoaging
	Winter 2022-present	Clarissa Xu, CS'22 undergraduate student, Carnegie Mellon University, *Detecting credible medical information*
	Winter 2022-present	Natalie Ashgriz, CS'22 undergraduate student, University of Toronto, *Software keyboard for preventing hate speech on social media*
	Winter 2022-present	Garrett Johnston, CS'22 undergraduate student, Dartmouth College, *Information extraction, natural language processing*
	Winter 2022-present	Dae Lim Chang, CS'22 undergraduate student, Dartmouth College, *Information extraction, natural language processing*
	Winter 2022-present	Love Tsai, CS'23 undergraduate student, Dartmouth College, *Text Classification*
	Winter 2022-present	Zhanel Nugmanova, CS/Bio'23 undergraduate student, Dartmouth College, *Information extraction, Active Learning*
	Fall 2019-Spring 2020	Michael Tang, Senior CS student, UVA, *Domain-specific negation detection for decision- support in emergency response*
	Fall 2019-Spring 2020	Eimara Mirza, Senior CS student, UVA, *Developing training resources and effective interface for decision-support in emergency*

Spring 2019	Annie Chapman, Senior CS student, UVA, *Information extraction from emergency response narration* [**Results published in SRC TechCon 2019**]
Fall 2017	Vincent Lin, Senior CS student, UVA, *Transcription of noisy speech data for emergency response* [**Results published in ICCPS 2018**]

SELECTED INVITED TALKS

February 2022	*Intelligent Assistants for Improved Health: Teaching Machines to Understand Data,* **Biomedical Data Science Grand Rounds**, Dartmouth College
February 2022	*Intelligent Assistants for Improved Health: Teaching Machines to Understand Data,* MSDA Seminar, Department of Computer Science, Dartmouth College
April 2021	Panelist, REsearch Exposure in Socially Relevant Computing (RESORC) program, Syracuse University
March 2021	*Navigating academic research in Computer Science: through the lens of an outlier, Preparation for Research through Immersion, Skills, and Mentorship* (PRISM) seminar, Department of Computer Science, **University of Toronto**
February 2021	WiCS Dinner (Women in Computer Science), Department of Computer Science, Dartmouth College
September 2020	*Future Directions for Clinical Decision Support*, Clinical Decision Support (CDS) Workshop (virtual) hosted by the **Office of the National Coordinator for Health Information Technology (ONC)**
July 2020	*Towards a cognitive assistant for emergency response*, **Public Safety Broadband Stakeholder Meeting** (virtual) by NIST
April 2020	*Information Extraction & Fusion for Improving Personal & Public Health Safety,* • Senseable City Lab, **Massachusetts Institute of Technology (MIT)**, Cambridge, MA
March 2020	*Information Extraction & Fusion for Improving Personal & Public Health Safety,* • **Human-centered Artificial Intelligence**, **Stanford University**, Stanford, CA • Department of Computer Science, **Dartmouth College**, Hanover, NH • School of Electrical, Computer and Energy Engineering (ECEE), Arizona State University, Tempe, AZ
July 2019	*Towards a cognitive assistant for emergency response*, Public Safety Broadband Stakeholder Meeting by NIST
April 2018	*CognitiveEMS: A Cognitive Assistant System for Emergency Medical Services*, **CPS week 2018**
March 2018	*Data-driven, resource-constrained, resilient decision support systems*, **Bosch Research and Technology Center**, Pittsburgh
February 2018	*Increasing health safety using timeseries analysis and natural language* processing, Department of Psychology, University of Virginia

February 2018	Presented multiple posters on my research focusing on decision support for health safety at the UVA Link Lab open house
July 2017	Presented poster and demo on health safety using NLP and knowledge extraction at the CS UVA open house
March 2017	*Preclude: Conflict Detection in Textual Health Advice*, IEEE International Conference on Pervasive Computing and Communications (**PerCom**), 2017
March 2017	*Conflict Detection from online information using NLP*, Student mentoring session of **Smart and Connected Health PI meeting**
October 2015	*MAPer: A Multi-Scale Adaptive Personalized Model for Temporal Human Behavior Prediction*, ACM International Conference on Information and Knowledge Management (**CIKM**), 2015
June 2015	*Holmes: A Comprehensive Anomaly Detection System for Daily In-home Activities*, IEEE International Conference on Distributed Computing in Sensor Systems (**DCOSS**), 2015
April 2013	*Maximum Visibility Queries in Spatial Database*, International Conference on Data Engineering (**ICDE**), 2013

SELECTED DEMONSTRATIONS

- **NIST Public Safety Broadband Stakeholder Meeting, 2019**: *CognitiveEMS*: Towards a Cognitive Assistant for Emergency Response
- **IPSN 2017**: Personalized Conflict Detection in Online Textual Health Advice
- **Smart and Connected Health PI meeting, 2017:** Personalized Conflict Detection in Online Textual Health Advice
- **Cyber-physical Systems PI meeting, 2016**: Conflict Detection in Online Textual Health Advice
- **IoTDI 2017**: Simulating Conflict Detection in Heterogeneous Services of a Smart City

PROFESSIONAL SERVICES AND ORGANIZATIONS

Associate Editor	ACM Transactions on Computing for Healthcare (ACM Health)
Panelist	NSF CISE Panel 2022
Organizer	Workshop on Advances in Data Management, Bangladesh, 2013
Technical Program Committee	- AAAI Conference on Artificial Intelligence (AAAI), 2022, 2021 - PerIoT, Co-located with PerCom, 2021 - ACM International Conference on Information and Knowledge Management (CIKM), 2022

Reviewer
- IEEE International Engineering in Medicine and Biology Conference, 2022
- Journal of American Medical Informatics Association (JAMIA), 2021
- Language Resources and Evaluation Conference (LREC) 2020
- IEEE Transactions on Knowledge and Data Engineering (TKDE), 2019
- American Medical Informatics Association (AMIA), 2019
- ACM Health Journal, 2020, 2019
- NCWIT Collegiate Award 2014

Member
- ACM student member, 2015-present
- AAAI student member, 2019-present
- IEEE student member, 2013-present
- Bangladeshi Women in Computer Science and Engineering, 2015- present