Sam Raymond, Ph.D

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Experience

7/22 – Current **Databricks**, *Senior Machine Learning Engineer Consultant.*
Health and Life Sciences-focused MLE consultant applyinng MLOps and data science solutions in Big Data and AI for Databricks customers

9/21 – 7/22 **MIT**, *Impact Fellow*, Climate and Sustainability Consortium.
Independent fellowship focusing on the Big Data demands on Climate Change and Sustainability and the effects on Human Health

3/20 – 9/21 **Stanford University**, *Postdoctoral Scholar*, Dept. Bioengineering.
Advisor - Prof. David Camarillo
Research Topics - Investigation of the use of deep learning and Finite Element simulation in the prediction and rapid diagnostics of traumatic brain injuries using smart mouth guards. COVID-19 emergency ventilator design, testing, prototyping.

Education

2016–2020 **MIT**, *Doctor of Philosophy*, Cambridge, MA, Center of Computational Science and Engineering.
Advisor - Prof. John Williams
Thesis Title - Combining numerical simulation and machine learning – modeling coupled solid and fluid mechanics using mesh free methods

2012–2014 **Monash University**, *Masters of Engineering*, Melbourne, Australia, Dept. Mechanical and Aerospace Engineering.
Thesis Title - Application of meshless methods to manufacturing processes

2008–2011 **Monash University**, *Bachelor of Engineering*, Melbourne, Australia, Dept. Mechanical and Aerospace Engineering.
First Class Honors

Awards / Recognition

2021 **MathWorks**, *Development and Research Collaborative Grant [160,000 USD].*
This grant is focused on the development of a PIML implementation of the Ocean-on-a-Chip concept.

2021 **NVIDIA**, *Academic Hardware Grant [6,000 USD].*
A joint collaboration between MathWorks and Amazon's AWS to power research into novel biomedical device designs and the use of computation and AI in the life sciences. Read more.

2020 **Amazon Web Services | MathWorks**, *Case Study.*
A joint collaboration between MathWorks and Amazon's AWS to power research into novel biomedical device designs and the use of computation and AI in the life sciences. Read more.

2020 **Meet the Researcher - NVIDIA**, *Featured Article.*
An overview of my research to date dealing with applying machine learning and simulations for biomedical research with NVIDIA GPU and cloud technology. Read more.

2020 **COVID-19 Rapid Response Ventilators**, *Stanford.*
Raising awareness for the efforts of our team to build this life-saving device during the 2020 pandemic. Read more.

2019 **MathWorks Gift**, *Unrestricted Funds [80,000USD].*
Based on the work conducted in my graduate degree, MathWorks awarded a gift to pursue this promising research. Read more.

2018 **Mikio Shoji Award**, *MIT.*
Awarded for Innovation in Information Technology for my graduate work. Read more.

Recent Relevant Publications

2022 **S.Raymond**, Nicholas J. Cecchi, Hossein Vahid Alizadeh, Ashlyn A. Callan, Eli Rice, Yuzhe Liu, Zhou Zhou, Michael Zeineh, David B. Camarillo **Physics-Informed Machine Learning Improves Detection of Head Impacts**. *Annals of Biomedical Engineering.* https://doi.org/10.1007/s10439-022-02911-6

2022 Zhou Zhou,Xiaogai Li,August G. Domel, Emily L. Dennis, Marios Georgiadis, Yuzhe Liu, **S.Raymond**,Gerald Grant, Svein Kleiven, David Camarillo, Michael Zeineh. **The Presence of the Temporal Horn Exacerbates the Vulnerability of Hippocampus During Head Impacts**. *Frontiers in Bioengineering and Biotechnology.* https://doi.org/10.3389/fbioe.2022.754344

2021 Zhou Zhou, Xiaogai Li, Yuzhe Liu, Madelen Fahlstedt, Marios Georgiadis, Xianghao Zhan, **S.Raymond**, Gerald Grant, Svein Kleiven, David Camarillo, Michael Zeineh. **Toward a Comprehensive Delineation of White Matter Tract-Related Deformation**. *Journal of Neurotrauma.* https://doi.org/10.1089/neu.2021.0195

2021 Xianghao Zhan, Yiheng Li, Yuzhe Liu, August G. Domel, Hossein Vahid Alizadeh, Zhou Zhou, Nicholas J. Cecchi, **S.Raymond**, Stephen Tiernan, Jesse Ruan, Saeed Barbat, Olivier Gevaert, Michael M. Zeineh, Gerald A. Grant, David B. Camarillo. **Predictive Factors of Kinematics in Traumatic Brain Injury from Head Impacts Based on Statistical Interpretation**. *Annals of Biomedical Engineering.* https://doi.org/10.1007/s10439-021-02813-z

2021 Nicholas J. Cecchi, August G. Domel, Yuzhe Liu, Eli Rice, Rong Lu, Xianghao Zhan, Zhou Zhou, **S.Raymond**, Sohrab Sami, Heer Singh, India Rangel, Landon P. Watson, Svein Kleiven, Michael Zeineh, David B. Camarillo, Gerald Grant. **Identifying Factors Associated with Head Impact Kinematics and Brain Strain in High School American Football via Instrumented Mouthguards**. *Annals of Biomedical Engineering.* https://doi.org/10.1007/s10439-021-02853-5

2021 Yuzhe Liu, August G. Domel, Nicholas J. Cecchi, Eli Rice, Ashlyn A. Callan, **S.Raymond**, Zhou Zhou, Xianghao Zhan, Yiheng Li, Michael M. Zeineh, Gerald A. Grant, David B. Camarillo. **Time Window of Head Impact Kinematics Measurement for Calculation of Brain Strain and Strain Rate in American Football**. *Annals of Biomedical Engineering.* https://doi.org/10.1007/s10439-021-02821-z

2021 Cecchi, Nicholas J.; Domel, August G.; Liu, Yuzhe; **S.Raymond**; Zeineh, Michael; Camarillo, David; Grant, Gerald. **Identifying Risk Factors For Head Impact Exposure In High School Football Using A Validated Instrumented Mouthguard**. *Medicine and Science in Sports and Exercise.* http://dx.doi.org/10.1249/01.mss.0000760836.87607.b6

2021 Xianghao Zhan, Yiheng Li, Yuzhe Liu, August G. Domel, Hossein Vahid Alizadeh, **S.Raymond**, Jesse Ruan, Saeed Barbat, Stephen Tiernan, Olivier Gevaert, Michael M. Zeineh, Gerald A. Grant, David B. Camarillo. **The relationship between brain injury criteria and brain strain across different types of head impacts can be different**. *Journal of the Royal Society Interface*. https://doi.org/10.1098/rsif.2021.0260

2021 Zhan, Xianghao, Liu, Yuzhe, **S.Raymond**, Alizadeh, Hossein Vahid, Domel, August G., Gevaert, Olivier, Zeineh, Michael M., Grant, Gerald A., Camarillo, David B. **Improved detection of head impact events in sport from a smouth mouthguard using physics-informed machine learning**. *IEEE Transactions on Biomedical Engineering*. https://doi.org/10.1109/TBME.2021.3073380

2021 **S.Raymond**,August G. Domel, Chiara Giordano, Yuzhe Liu, Seyed Abdolmajid Yousefsani, Michael Fanton, Nicholas J. Cecchi, Olga Vovk, Ileana Pirozzi, Ali Kight, Brett Avery, Athanasia Boumis, Tyler Fetters, Simran Jandu, William M. Mehring, Sam Monga, Nicole Mouchawar, India Rangel, Eli Rice, Pritha Roy, Sohrab Sami, Heer Singh, Lyndia Wu, Calvin Kuo, Michael Zeineh, Gerald Grant, David B. Camarillo.**A new open-access platform for measuring and sharing mTBI data** *Scientific Reports*. https://doi.org/10.1038/s41598-021-87085-2

2020 **S.Raymond**,Janille Maragh,Admir Masic,John R. Williams. **Towards an understanding of the chemo-mechanical influences on kidney stone failure via the material point method**. *PLOS ONE*. https://doi.org/10.1371/journal.pone.0240133

2020 **S.Raymond**, David J. Collins, Richard ORorke, Mahnoush Tayebi, Ye Ai, John Williams . **A deep learning approach for designed diffraction-based acoustic patterning in microchannels**. *Scientific Reports*. https://doi.org/10.1038/s41598-020-65453-8

Patents and Devices

2020 Trevor Wesolowski, **S.Raymond**, Ryan van Wert, David Camarillo. Rapid Response Ventilator - O2U Inc. | Food and Drug Authority (FDA) Emergency Use Authorization Application

2018 **S.Raymond**, Konrad LeBlas, Stan Yakoff. Storage and management of medical data utilizing smart contracts and the decentralized storage network.

Professional Activities

- IEEE Member
- International Journal of Numerical Methods in Engineering - Reviewer
- Engineering Analysis with Boundary Elements - Reviewer
- Journal of Science and Medicine in Sport - Reviewer