Victor Ardulov

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SUMMARY

My research focuses on applying methods from dynamics and optimal control theory towards the analysis and improvement of human behavioral interaction. More specifically, in high stakes contexts such as forensic interviewing, psychological diagnostics, and therapy where one interlocutor is attempting to steer the interaction to a desired state. The approaches I have developed combine data driven methods from machine learning with methods from dynamics research and reinforcement learning.

EDUCATION

University of Southern California
August 2017 - *Present*

Doctor of Philosophy, *Computer Science*
Advisor: Shrikanth Narayanan
Expected Graduation: May 2022

University of Southern California
August 2017 - December 2018

Master's of Science, *Computer Science*

University of California, Santa Cruz
September 2013 - June 2016

Bachelor's of Science with Honors, *Computer Engineering*
Concentration: Robotics and Control Systems
Senior Project: Motor Assistive Glove

RESEARCH EXPERIENCE

Signal Analysis and Interpretation Lab
Research Assistant, Los Angeles, CA
August 2017 - *Present*

- Developed paradigm for reinforcement learning policies for robust adaptive diagnostic evaluation.
- Utilization of data-driven dynamics extraction for the analysis of child forensic interviews and evaluation of psychotherapists
- Using causal models to evaluate the affective coordination of children to detect truthfulness in the statements and predict disclosure of observed transgression
- Mentored and managed undergraduate and graduate students in the development and execution of research agendas
- Created Python implementation of Dynamic Mode Decomposition Methods for time-series analysis

CalypsoAI

Co-founder, Scientist, San Mateo, CA *(Remote - Part Time)* September 2018 - *Present*

- Scientific distillation of machine-learning model testing and evaluation techniques
- Development of a platform for unit testing models in enterprise learning settings
- Participated in product development and customer engagement

HRL Laboratories LLC

Research Software Engineer, Malibu, CA October 2016 - September 2018

- Developed mathematical frameworks for improved dynamical analysis for systems-of-systems
- Reinforcement Learning for complex multi-agent cooperation with hindered communication
- Natural Language Processing for human-machine hybrid forecasting

Jet Propulsion Laboratory

Volunteer Invited Researcher, Pasadena, CA June 2016 - October 2016

- Developed Virtual Reality tools for Earth science missions for immersive data visualizations
- Deployed work across multiple VR and non-VR platforms
- Presented work at IEEE VR 2017
- Presented work at SIGGRAPH 2016 - Virtual Village

Summer Intern, Pasadena, CA June 2015 - September 2015

- Developed new Mars geo-spatial visualization tool for operations analysis and planning.
- Presented Work at AIAA 2015

Baskin School of Engineering

Undergraduate Research Fellow, Santa Cruz, CA September 2014 - June 2016

- Developed and built prototype of motor assistive glove for patients recovering from stroke as member of CITRIS
- Assisted in developing and testing autonomous system technologies for water and land vehicles
- Recipient of Dean's Award for Excellence in Engineering
- Recipient of Crown College Undergraduate Research Fellowship award

TEACHING EXPERIENCE

Signal Analysis and Interpretation Lab

Undergraduate Student Mentor, Los Angeles, CA — January 2018 - *Present*

- Assisting undergraduate students at USC organize and progress research projects
- Developing skills to conduct research and prepare for future research opportunities

University of Southern California

Graduate Teaching Assistant (Intro. to AI), Los Angeles, CA — August 2020 - December 2020

- Produce, administer, and grade course work for undergraduate Introduction to Artificial Intelligence course
- Run discussion sessions exploring topics deeper than in lecture/those not covered in lecture.

Graduate Teaching Assistant (Intro. to Robotics), Los Angeles, CA — August 2019 - December 2019

- Produce, administer, and grade course work for undergraduate Introduction to Robotics course
- Run laboratory sections instructing and advising students in programming and electronics related assignments

MindMakers Project

Electrical Engineering Discipline Lead, Los Angeles, CA — January 2017 - July 2018

- Developing curriculum and assignments to deliver electrical engineering fundamentals
- Teaching electronics essentials to underrepresented groups in engineering, with potentially limited background in subject
- Integrating electronics and embedded systems design content within context of mechanical and software design components.

Computer Engineering Tutor

January 2015 - March 2016

Baskin School of Engineering, Santa Cruz, CA

- Provided supplemental instruction to lectures in Introduction to Computing Systems and Assembly
- Lead lab sections for multiple for Introduction to Computing System and Assembly, as well as, Computer Systems and C Programming
- Aided in the design of laboratory assignments and examinations

PUBLICATIONS and ABSTRACTS

Durante, Z., **Ardulov, V.**, Kumar, M., Gongola, J., Lyon, T., & Narayanan, S. (2022). Causal indicators for assessing the truthfulness of child speech in forensic interviews. Computer Speech & Language, 71, 101263.

Chen, Z., Flemotomos, N., **Ardulov, V.**, Creed, T. A., Imel, Z. E., Atkins, D. C., & Narayanan, S. (2021, November). Feature fusion strategies for end-to-end evaluation of cognitive behavior therapy sessions. In 2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) (pp. 1836-1839). IEEE.

Klein, L., **Ardulov, V.**, Gharib, A., Thompson, B., Levitt, P., & Matari, M. (2021, October). Dynamic Mode Decomposition with Control as a Model of Multimodal Behavioral Coordination. In Proceedings of the 2021 International Conference on Multimodal Interaction (pp. 25-33).
Ardulov, V., Martinez, V. R., Somandepalli, K., Zheng, S., Salzman, E., Lord, C., Bishop, S., & Narayanan, S. (2021). Robust diagnostic classification via Q-learning. Scientific reports, 11(1), 1-9.

Flemotomos, N., Martinez, V. R., Chen, Z., Singla, K., **Ardulov, V.**, Peri, R., ... & Narayanan, S. (2021). Automated evaluation of psychotherapy skills using speech and language technologies. Behavior Research Methods, 1-22.

Klein, L., **Ardulov, V.**, Hu, Y., Soleymani, M., Gharib, A., Thompson, B., ... & Matari, M. J. (2020, October). Incorporating Measures of Intermodal Coordination in Automated Analysis of Infant-Mother Interaction. In Proceedings of the 2020 International Conference on Multimodal Interaction (pp. 287-295).

Ardulov, V., Durante, Z., Williams, S., Lyon, T., & Narayanan, S. (2020, May). Identifying truthful language in child interviews. In ICASSP 2020-2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) (pp. 8074-8078). IEEE.

Ardulov, V., Somandepalli, K., Anand, N., Zheng, S., Salzman, E. E., Bishop, S. L., ... & Narayanan, S. (2020). Identifying measured characteristics on ADOS, ADI-R and SRS differentiating ASD from ADHD. In INSAR 2020 Virtual Meeting. INSAR.

Farmer, C., **Ardulov, V.**, Kumar, M., Kaat, A., Thurm, A., Kanne, S., ... & Lord, C. Identification of Parent-Report Questions Which Elicit the Most Accurate Estimates of Language Ability. In INSAR 2020 Virtual Meeting. INSAR.

Martinez, V. R., Flemotomos, N., **Ardulov, V.**, Somandepalli, K., Goldberg, S. B., Imel, Z. E., ... & Narayanan, S. (2019). Identifying Therapist and Client Personae for Therapeutic Alliance Estimation. Proc. Interspeech 2019, 1901-1905.

Ardulov, V., Mendlen, M., Kumar, M., Anand, N., Williams, S., Lyon, T., & Narayanan, S. (2018, October). Multimodal interaction modeling of child forensic interviewing. In Proceedings of the 20th ACM International Conference on Multimodal Interaction (pp. 179-185).

Ardulov, V., Kumar, M., Williams, S., Lyon, T., & Narayanan, S. (2018). Measuring conversational productivity in child forensic interviews. arXiv preprint arXiv:1806.03357.

Ardulov, V., & Pariser, O. (2017). Immersive data interaction for planetary and earth sciences. In Proceedings - IEEE Virtual Reality. `https://doi.org/10.1109/VR.2017.7892277`

Pariser, O., Calef, F., Manning, E.M., & **Ardulov V.** (2017). Immersive Interaction, Manipulation and Analysis of Large 3D Datasets for Planetary and Earth Sciences. In AGU Fall Meeting Abstracts

PATENTS

Ardulov, V., Serebryany, N., Sweatt, T., and Gibian, D. (2020). Artificial intelligence adversarial vulnerability audit tool, U.S. Patent No. 10,839,268. Washington, DC: U.S. Patent and Trademark Office.

Serebryany, N., Quinlivan, B., **Ardulov, V.**, Moisejevs, I., and Gibian, D. R. (2020). Machine learning model robustness characterization, U.S. Patent No. 10,846,407. Washington, DC: U.S. Patent and Trademark Office.

Ardulov, V., Jammalamadaka, A., and Lu, T. C. (2020). System and method for learning contextually aware predictive key phrases, U.S. Patent Application No. 16/710,640.