EVAN KRELL

Geospatial Computer Science — Artificial Intelligence — Marine Robotics

RESEARCH INTERESTS

My research interests are in autonomous marine vehicles (mission planning and onboard computer vision), coastal AI applications, and explainable AI. Projects include using metaheuristics and deep learning for efficient marine route planning, onboard classification of turbid underwater imagery for data-driven sampling and developing XAI techniques to explain models whose inputs are rasters with hundreds of highly correlated channels. This includes development of both novel XAI algorithms and interactive 3D visualization software to analyze high-dimensional XAI outputs.

EDUCATION

Texas A&M University — Corpus Christi, Texas *January 2017 - December 2018*
Master of Science in Computer Science
Department of Computing Sciences
Advisor: Dr. Scott A. King

Texas A&M University — Corpus Christi, Texas *August 2013 - December 2016*
Bachelor of Science in Computer Science
Department of Computing Sciences

SELECTED UNIVERSITY POSITIONS

Graduate Research Assistant *January 2021 - Present*
NSF Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES)
Labs: innovation in COmputing REsearch (iCORE), Conrad Blucher Institute (CBI)
Advisor: Dr. Scott A. King, Dr. Philippe Tissot
Project: Explainable AI for High-Dimensional Data With Spatio-Temporal Correlation Texas A&M University — Corpus Christi

Graduate Research Assistant *August 2019 - January 2021*
Lab: Control of Robots and Autonomous Agents Lab (CORAL)
Advisor: Dr. Scott A. King, Dr. Luis Garcia Carrillo
Project: Marine Robot Path Planning Texas A&M University — Corpus Christi

Adjunct Instructor *January 2019 - May 2019*
Texas A&M University — Corpus Christi

Genomics Core Informatics Tech *January 2016 - December 2018*
Lab: Genomics Core Lab
Advisor: Dr. Chris Bird
Project: Parallel Metabarcoding Pipeline
Texas A&M University — Corpus Christi

Undergradutate Research Assistant *August 2013 - December 2015*
Lab: Cyber Defense Lab
Advisor: Steve Alves

Texas A&M University — Corpus Christi

TEACHING EXPERIENCE

- COSC 1330 — Programming for Scientists, Engineers, and Mathematicians
- COSC 2465 — Linux Systems

INTERNSHIPS

Naval Research Enterprise Internship Program *Summer 2022*
Project: A Machine Learning Pipeline for PyroCb Prediction
U. S. Naval Research Laboratory- Marine Meteorology Division (NRL-MRY) Monterey, CA

AWARDS

- Poster *The influence of grouping features on explainable artificial intelligence for a complex fog prediction deep learning model* listed below was awarded the 3rd place Best Overall at 2022 Spring Student Research Symposium; April 8, 2022; Texas A&M University — Corpus Christi

OUTREACH ACTIVITIES

- AMS Artificial Intelligence Applications to Environmental Science STAC Committee, Student member. 2-year term starting January 2023.
- Trustworthy Artificial Intelligence for Environmental Science Summer School 2021 (Speaker), virtual event held by AI2ES and NCAR.
- Unmanned Aircraft Systems Summer Institute (Team mentor), Texas A&M University — Corpus Christi, TX, July 2018.
- Introduction to Unix and Linux Workshops (speaker & organizer), Texas A&M University — Corpus Christi, TX, 2016.

PUBLICATIONS

Journal Publications:

- Kamangir, H., Krell, E., Collins, W., King, S. A., & Tissot, P. (2022). Importance of 3D convolution and physics on a deep learning coastal fog model. Environmental Modelling & Software, 105424.
- Krell, E., King, S. A., & Carrillo, L. R. G. (2022). Autonomous Surface Vehicle energy-efficient and reward-based path planning using Particle Swarm Optimization and Visibility Graphs. Applied Ocean Research, 122, 103125.
- Krell, E., Sheta, A.F., Balasubramanian, A.P., & King, S.A. (2019). Collision-Free Autonomous Robot Navigation in Unknown Environments Utilizing PSO for Path Planning. Journal of Artificial Intelligence and Soft Computing Research, 9, 267 - 282.
- Drymon, J.M., Cooper, P.T., Powers, S.P., Miller, M.M., Magnuson, S.J., Krell, E., & Bird, C.E. (2019). Genetic Identification of Species Responsible for Depredation in Commercial and Recreational Fisheries. North American Journal of Fisheries Management, 39, 524-534.

Conference Publications & Presentations:

- Krell, E., Kamangir, H., Collins, W., King, S. A., & Tissot, P. (2023, January). The Influence of Grouping Spatio-Temporal Features on Explainable Artificial Intelligence (XAI): A Case Study with FogNet, a 3D CNN for Coastal Fog Prediction. In 103nd American Meteorological Society Annual Meeting. AMS.
- Krell, E., Nguyen, C.T., Nachamkin, J., Peterson, D.A., King, S.A., Tissot, P., Estrada, B., Tory, K.J., & Campbell J. (2023, January). Development of a Machine Learning System for Detecting the Atmospheric Potential of Wildfire-driven Thunderstorms. In 103nd American Meteorological Society Annual Meeting. AMS.
- Krell, E., Kamangir, H., Friesand, J., Judge, J., Collins, W., King, S. A., & Tissot, P. (2022, January). Explaining Complex 3D Atmospheric CNNs Using SHAP-Based Channel-Wise XAI Techniques with Interactive 3D Visualization. In 102nd American Meteorological Society Annual Meeting. AMS.
- Krell, E., Carrillo, L. R. G., King, S. A., & Hespanha, J. P. (2020, July). Game Theoretic Potential Field for Autonomous Water Surface Vehicle Navigation Using Weather Forecasts. In 2020 American Control Conference (ACC) (pp. 2112-2117). IEEE.
- Krell, E., King, S. A., & Carrillo, L. R. G. (2020, July). Autonomous Water Surface Vehicle Metaheuristic Mission Planning using Self-generated Goals and Environmental Forecasts. In 2020 American Control Conference (ACC) (pp. 2502-2507). IEEE.
- Gunasekaran, K., Krell, E., Sheta, A.F., & King, S.A. (2018). Map Generation and Path Planning for Autonomous Mobile Robot in Static Environments Using GA. 2018 8th International Conference on Computer Science and Information Technology (CSIT), 91-96.

Poster Presentations:

- Krell, E., Kamangir, H., Friesand, J., Judge, J., Collins, W., King, S. A., & Tissot, P. The influence of grouping features on explainable artificial intelligence for a complex fog prediction deep learning model. Poster presented at: 2022 SACNAS National Diversity In STEM Conference; October 28, 2022; San Juan, Puerto Rico.
- Krell, E., Kamangir, H., Friesand, J., Judge, J., Collins, W., King, S. A., & Tissot, P. The influence of grouping features on explainable artificial intelligence for a complex fog prediction deep learning model. Poster presented at: 2022 Spring Student Research Symposium; April 8, 2022; Texas A&M University — Corpus Christi.