

SEMINAR

AN INSANE VISION TOWARD A DATA-LEAN - KNOWLEDGE-INFORMED - FRUGAL AI

WHEN AND WHERE

Αίθουσα συνεδριάσεων Τμήματος Μηχανολόγων και Αεροναυπηγών Μηχανικών,

2^{ος} όροφος Πολυώροφο Μηχανολόγων.

ΠΕΜΠΤΗ 5/12 15:30- 18:30

Zoom Link:

<https://upatras-gr.zoom.us/j/93129056139?pwd=g2E2Mch2aLhCN7gsYpzLywXHdsbFZe.1>

ABSTRACT

Η ομάδα INtelligent Science ANd Engineering (INSANE) του Ινστιτούτου Πληροφορικής και Τηλεπικοινωνιών του Εθνικού Κέντρου Έρευνας Φυσικών Επιστημών «Δημόκριτος» θα παρουσιάσει ένα διαδραστικό σεμινάριο με έμφαση στις καινοτόμες εφαρμογές τεχνικών Τεχνητής Νοημοσύνης (AI) και Μηχανικής Μάθησης (ML) στους τομείς των φυσικών επιστημών και της μηχανικής. Το σεμινάριο θα περιλαμβάνει μια σύντομη παρουσίαση της ομάδας, καθώς και μια συζήτηση για βασικές έννοιες -και παρανοήσεις- που σχετίζονται με την Τεχνητή Νοημοσύνη και τον ρόλο της στην επιστημονική και μηχανική έρευνα. Θα περιγράψουμε διαφορετικές εφαρμογές και περιπτώσεις χρήσης που έχει εξετάσει η ομάδα, επισημαίνοντας συνοπτικά τις ευκαιρίες και τις προκλήσεις που προκύπτουν. Τέλος, θα μοιραστούμε το όραμά μας για ένα νέο παράδειγμα AI (οικονομικά αποδοτικό, αποδοτικό σε δεδομένα, πλούσιο σε γνώση, επεξηγήσιμο AI), εξετάζοντας μαζί πώς η παραπάνω έρευνα μπορεί να εφαρμοστεί στους τομείς εξειδίκευσης του κοινού και να δημιουργήσει προοπτικές συνεργασίας.

The INtelligent Science ANd Engineering (INSANE) group of the Institute of Informatics and Telecommunications at the National Center for Scientific Research “Demokritos”, will present an interactive seminar focused on innovative applications of Artificial Intelligence (AI) and Machine Learning (ML) techniques in physical sciences and engineering fields. The seminar will briefly introduce the group and discuss basic concepts -and misconceptions- related to AI and its role in scientific and engineering research. We will outline different applications and use cases examined by the group, briefly indicating opportunities and challenges therein. We will finally share our vision for a new AI paradigm (cost-aware, data-efficient, knowledge-rich, interpretable AI), examining together how the above research can be applied to the domains of expertise of the audience and bootstrapping avenues of collaboration.

THE INSANE GROUP

The **INSANE Group** (Intelligent Science and Engineering) is a research lab and knowledge-sharing hub at the forefront of integrating Artificial Intelligence (AI) with Physical Sciences. Driven by the vision of creating a new AI paradigm, the INSANE Group focuses on developing AI solutions that are **data-lean, knowledge-informed, explainable, frugal, transferable, and cost-aware**—a response to the challenges of modern AI's data and energy demands. Beyond academia, the INSANE Group provides consultancy services to industries such as **aeronautics, drug design, and material sciences**, using AI-driven approaches like inverse design and physics-driven models to tackle critical challenges with high efficiency and reduced costs, as a bridge across disciplines, INSANE fosters interdisciplinary collaborations, mentoring scientists and professionals, and enabling productive alliances between diverse fields of study.

SPEAKERS

GEORGE GIANNAKOPOULOS

George Giannakopoulos, PhD, is an Artificial Intelligence (AI) researcher at NCSR Demokritos (Greece) with 20 years of experience in AI applications across various domains. He specializes in Natural Language Processing, Machine Learning, Biomedical and Chemical Informatics, the Semantic Web, and others. Since 2017, he has been actively involved in designing and implementing four Master's programs. He has (co)supervised and mentored over 100 students in AI-related practical training, postgraduate theses, and PhD research.

PANAGIOTIS KROKIDAS

Dr. Panagiotis Krokidas is a physicist with an MSc and PhD in Computational Materials Chemistry, specializing in the intersection of Machine Learning and molecular simulations. His primary research focuses on functionalized nanoporous materials for energy-related applications, such as hydrogen storage and gas separations. He explores AI-driven methods, including active learning and Bayesian optimization, to optimize the cost and efficiency of both in-vivo and in-silico experiments.

CHRISTOFOROS REKATSINAS

Christoforos Rekatsinas holds a degree in Mechanical & Aeronautical Engineering (2010) and a Ph.D. (2016) from the University of Patras, specializing in the computational mechanics of composite and smart materials. His current research focuses on the optimization and machine learning-driven damage identification of composite structures through closed-loop computational program interfaces. He also aspires to develop knowledge-informed surrogate models utilizing Physics-Informed Neural Networks (PINNs) and Neural Ordinary Differential Equations (Neural ODEs).