# AI-Driven Engineering: Redefining Possibilities and Problem-Solving

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***Abstract*— Artificial Intelligence (AI) has been extensively applied over the past two decades and continues to be a prominent area of research, particularly in addressing complex, real-world challenges. Evolutionary and Swarm Intelligence (ESI) techniques represent a unique subset of AI, deriving their efficiency from mimicking the best features of natural and biological systems that have evolved over millions of years. This presentation focuses on the principles of ESI and their broader applications across various engineering domains. We will explore automated learning approaches, such as genetic programming, and highlight advancements in evolutionary learning for complex problem-solving. Additionally, the presentation will evaluate the general impact of AI in engineering, discussing key applications of ESI in optimizing complex, nonlinear systems. We will also demonstrate the advantages of ESI over traditional optimization methods, showcasing results from large-scale and multi-objective problems. Finally, adaptable heuristics that enhance ESI performance will be introduced, illustrating their potential to improve optimization outcomes.**

## Short Bio

Amir H. Gandomi is among the world's most cited researchers for his work in the fields of global optimisation and big data analytics, in particular, using machine learning and evolutionary computations.

He is an ARC DECRA Fellow at the Faculty of Engineering and Information Technology at UTS, where he is a Professor of Data Science. He has received multiple prestigious awards for his research excellence and impact, such as the 2023 Achenbach Medal and the 2022 Walter L. Huber Prize, the highest-level mid-career research award in all areas of civil engineering.

Amir has published more than 450 journal papers and 14 books, which collectively have more than 55,000 citations (H-inex=100+), and he has been named one of the world's most influential scientific minds and highly cited researchers by the influential Clarivate Analytics for six consecutive years. He is also ranked 18th among more than 17,000 researchers in the online computer science bibliography, Genetic Programming bibliography, and ranks first in Australia. In the recent most impactful researcher list, done by Stanford University and released by Elsevier, Prof Amir H Gandomi is ranked as the 24th researcher in the Artificial Intelligence & Image Processing subfield in 2023.

He has served as associate editor, editor and guest editor in several prestigious journals, such as AE of IEEE TBD, IEEE Networks, and IEEE IoTJ. He regularly delivers keynote addresses at major conferences.

Prior to joining UTS, Amir was an Assistant Professor at the School of Business at Stevens Institute of Technology in the US. He was also a distinguished research fellow in the BEACON Center at Michigan State University, where biologists, computer scientists, and engineers together study evolution and apply their knowledge to real-world problems.