

# Engineering and Computer Science 2011



“At some point, I think all of us should just stop and think — What is the big picture of my work? — And, when we do that, we come up with some really sweet spots that needed to be looked at. And then, the field progresses.”

**Kalyanmoy Deb**

*Professor and Koenig Endowed Chair, Electrical and Computer Engineering, Michigan State University*

- B.Tech in Mechanical Engineering from the Indian Institute of Technology Kharagpur
- M.S. in Engineering Mechanics from the University of Alabama
- Ph.D. in Engineering Mechanics from the University of Alabama

Prof. Kalyanmoy Deb has made fundamental contributions to the emerging field of Evolutionary Multi-objective Optimization (EMO), where his work has led to significant advances in the areas of non-linear constraints, decision uncertainty, programming and numerical methods, computational efficiency of large-scale problems and optimization algorithms.



## Resolving the problem of conflicting goals



Evolutionary Multi-objective Optimization (EMO) is the process of simultaneously optimizing two or more conflicting objectives subject to certain constraints. But what does this mean?

Suppose you want to buy the best smart phone available. You consider battery life versus screen size versus weight of the phone versus the cost and of course how the piece looks before settling on the best phone based on your needs.

How would the phone manufacturer resolve those same problems on a larger scale and for maximum commercial rewards? Is there a way of objectively coming to the optimum conclusion factoring in every criteria even if they are in conflict with each other? This is where the process of multi-objective optimization comes in.

Prof. Kalyanmoy Deb has worked out a concept known as 'innovization'. This approach allows you to come up with innovative solutions while taking into account different criteria. It helps you learn more about the problem being solved, the factors that affect the solution and arrive at optimized ways to solve the problem.

Deb's solution known as NSGA-II Implementation was commercialized by various software companies.

This has in turn helped academic and industrial practitioners to come up with multiple trade-off solutions and analyze them before choosing a single solution.