title	Studies on Evolutionary Computation
name	Xiao-Hua (Helen) Yu
phone	756-2441
email	xhyu@calpoly.edu
additional	
department	Electrical Engineering
proj_desc	Evolutionary Computation is a research field inspired by nature, biology, and studies on human behavior. It provides powerful and new computational tools for engineers and mathematicians to solve complex problems where closed-form solutions are difficult to obtain, and to design systems which present nature-like patterns and human-like intelligence. The genetic algorithm is based on Charles Darwin's theory of natural selection. In Darwin's theory, the characteristics of each individual in a population are encoded in his/her genes, which are inherited from the parents during each generation. Over time, the desirable genes become more common than the undesirable ones, since individuals with those genes are more "fit" to the environment. Genetic algorithm has now been applied to parameter estimation and optimal control. This project is designed for two to three quarters. In the first quarter, the students will be guided to explore different evolutionary approaches, such as hill-climbing algorithm, simulated annealing, and the genetic algorithm. In the following quarter, the students will join and work with other graduate students in the research group to develop the applications, depend on their interests. Some past and current applications include rotorcraft acoustic noise estimation and adaptive control using neural networks, a neuro-fuzzy controller implementation using microprocessor, traffic signal optimization using genetic algorithm, nondestructive damage detection for bridges, adaptive signal detection in noisy environment, etc. The students are encouraged to talk to the PI (principle investigator) directly for more information.
inter_desc	Evolutionary computation, by its nature, is a research field for multidisciplinary studies, especially for students from Engineering disciplines (such as Electrical, Computer, and Biomedical Engineering), and Mathematics.
links	
students	2
majors	EE, CPE, CSC, BMED, MATH, ENGR, ME, CE
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