

Research Interest May 2017

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My research interests span the areas of signals and communication systems. More precisely, I desire to investigate within the topics of mathematical modeling for nonlinear signals, data compression in data transmission, improvement on well-known least square method in signal applications and derive more accurate signal strength calculation in the field of wireless communication.

My first research topic was to generate a new mathematical model to enable accurate wireless path loss calculation in communication systems. The model involves self-extracted parameter values. This gives a big advantage, especially when the source of data is not known. The processing stages involve non classical calculus. The aim of this work is to model and implement the general model with less computational cost that produce more accurate results than the existing models. This project in particular allowed me to experience teamwork and interdisciplinary collaboration.

In my second research, I am interested to solve nonlinear differential equations generated by the electrical systems. The work generates bi-geometric Runge-Kutta4 method and applies for processing. It allows more accurate numerical solution to nonlinear differential equations. The application area is in the field of wireless communication. The first application would be to enable synchronization with a chaotic type circuit in communication systems. The motivation was to develop a comparison method for numerical solution to nonlinear differential equations. More precisely, my contribution to this research was a novel method to solve nonlinear equations. As of right now, we are using this method for systems represented with nonlinear differential equations.

In my third research, I try to maximize compression in discrete time data transmission. Such process is very important in digital transmissions. It allows less storage memory and less processing time in applications. The compression can be obtained through transformation method and digital filter banks. The method will be tested with Matlab software.

In my fourth research, we are interested to improve least square fitting method. The method is extensively applied to determine the best fit for experimental data. The work is based on real experimental project. The mathematical work is not covered in the existing literature and will allow application to all engineering fields.

Research plans

The ingredients of my research philosophy are hard work, dedication, adaptability, and collaboration. My success in research is directly related to 1) the effort allocated to understanding the problem and defining solutions; 2) the dedication to comprehending and embracing the needs of the sponsors and the vision of the leadership; 3) the adaptability to changes in research priorities and unexpected setbacks; and 4) the interaction with other experts to complement and enhance current ideas and approaches.

My preferred modus operandi is to break up a research project into a few short-term projects with clear objectives and deliverables. Also, I plan research around the intersection of problems and techniques. I believe that if we focus our research plans solely on a technique, we endanger our ability to do research beyond the development of that particular technique. Similarly, if we only focus our research around a well defined problem, it becomes difficult to contribute as more and more researchers investigate the problem. My research methodology for shape matching is an example of the combined problem-technique approach in that it can be extended to several issues like compression method, exponential data fitting model, path loss formulation, and so on.

My approach will be to search for new areas of research where I can transfer previous knowledge and expertise along with the further development of new applications that employ my current classification technique.

Final thoughts

Near East University has given me the opportunity to expand my research experience by being part of multiple interdisciplinary research projects sponsored by both private and public institutions.

I believe the benefits of working alongside with partners from both the academic and industry realms will expand beyond the research community and will positively impact students, the university, and the general community. In addition, I feel committed in engaging in research activities that promote the development of students and communities from underrepresented populations. Beyond any doubt, my passion and vocation is to help develop well prepared students and to contribute to science with creative and valuable ideas.