BSc. Projects 2020

1. Fractional order Edge Detection   Electronics/ Comm / Networks

In recent years, fractional calculus has been rapidly developing in several multidisciplinary application domains and since three decades it has received a growing interest as an important branch of mathematical analysis In the image processing field, Fractional Calculus (FC) has been a useful mathematical tool that offers greater precision, than traditional integer order Calculus tools. Edge detection is a very important step in image pre-processing. Fractional order filters, unlike integer order filters, capture more details in high frequency regions of the images with better noise sensitivity too. This makes them more suitable for biomedical applications. The project aims at the optimization of fractional order edge detection filters, to fit different real life applications like autonomous cars, road obstacles detection and more.

2. Chaotic Steganography   Electronics / Networks

Data security is now a major concern for any means of communication. Steganography offers a unique form of securing data. It is commonly known as the procedure of hiding secret data into another form of data. Image steganography is the process of hiding any form of data into a digital image. The hiding procedure can be lossless, preserving data bits, or lossy. Different techniques can be used to implement image steganography. Chaos theory is known as the study of unpredictable behavior in nonlinear dynamic systems. The randomness and unpredictability of chaotic systems can be used for the generation of pseudorandom numbers. The design of a chaotic based steganography technique is the focus of this project as well as comparing different techniques in literature.

3. Image Segmentation   Electronics/ Comm/ Networks

Medical image segmentation has important applications in medical image visualization, and computer-aided medical diagnosis. Applications in clinical decision support these days rely heavily on automated medical image segmentation and edge detection which is one of the most frequently used techniques in image segmentation. Comparing different segmentation algorithms is the main focus of this project.

4. Chaotic Image Encryption   **Electronics**

Chaos Theory is the study of nonlinear dynamic systems that have unpredictable random behaviors with high dependence on initial conditions. Encryption systems have been a great focus of research lately, for securing all the date being transmitted through the internet. The main target of any encryption system is to have a large key space with high sensitivity to the key parameters to achieve high security levels. These keys are generated using various Pseudo Random Number Generators (PRNG), where the chaotic maps are being favored to design such generators. The design of such systems is a challenging task in recent research which is the main focus of this project.

5. Chaotic SW/HW Tool   **Electronics**

Chaos Theory is the study of nonlinear dynamic systems that have unpredictable random behaviors with high dependence on initial conditions. The applications of chaos theory are tremendous in different fields of research. The aim of this project is to design a GUI tool merging software analysis with hardware analysis of different chaotic systems.