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Undergraduate Research Program	
Project Name	Signal Design for Eye Tracking for Parkinsonsons Diagnosis and Treatment
Campus & Location in Mexico	Monterrey
Faculty	Engineering
Research Area	Telecommunications for Digital Transformation
Research Responsible	Cesar Vargas Rosales
Description of the Project	The development of a framework based on the theory of signal design with good correlation and distribution properties with applications in health treatment and diagnosis is the main goal of this multidisciplinary project. The project will be concentrated on the design and optimization of visual signals for the diagnosis and treatment of Parkinsonâ€ [™] s disease. The design of signals which are rich from spectral and distribution viewpoints is instrumental in achieving an accurate identification of disease-related symptoms. However, such joint signal design for achieving both good spectral and distribution properties has been difficult, and the literature on signal design for eye tracking focuses only on design for rich spectral properties at this point. The theoretical development in the project will focus on this joint design problem for the purposes of diagnosis and treatment of Parkinsonâ€ [™] s, leading to a considerable improvement in both. The development of this framework will be significant for several other neurological disorders with potential remote monitoring capabilities. We will focus on the joint design of signals that have good correlation properties, and also follow a given distribution. Results will form a base to build new diagnosis and treatment techniques for neurological disorders. The impact of this new research direction in the field of signal processing is significant, as it touches upon several open fundamental questions to be investigated resulting in joint publications and attraction of talent. The expected results will establish a base on which future comprehensive grant proposals will be written in order to attract external funds.
Training Provided	Analysis of scientific articles;Elaboration of theoretical framework;Scientific-based problem solving
Modality	Hybrid

Offered During

Semester

Student	
Tasks/Responsibilities	To document the techniques of signal design with application to Parkinson's disease detection. To identify performance metrics of signal design related to detection sensibility and determine typical values of them. To further the research by exploring potential applications of the use of signals for detection of different illnesses. To establish the design of potential smart methodologies for diagnosis and treatment of Parkinson's disease based on signal construction.
Required Language Proficiency	English (Advanced)
Required Skills and Abilities	Programming (Matlab, Python, C), processing, storage and analysis of large amounts of data. Writing, reading and speaking English. Some pluses are: analysis of signals and systems, time series, statistics, fundamentals of control theory.
Other Documents Required to APPLY for an Internship	 Being at least in your 2nd year of bachelor Accumulative grade point average (GPA) 2.5 Official Transcript 2 letters of recommendation of faculty members Resume Letter of intention explaining the reason why you would like to participate in the research program