

1. Simulating and evaluating the effects of degradation of the human visual image:

The aim of this multidisciplinary project is to calculate filters that can simulate the effects of selective distortion or degradation of an image, as may be caused by eye disease, atmospheric conditions, optical materials or image compression.

The student will learn to use MATLAB to write their own programs and use two-dimensional Fourier analysis to compute the frequency content of conditions affecting image quality, derive generalizable filters and apply these to natural images and laboratory stimuli typically used to assess visual function.

The second part of the project will consist of analysis of the filtered images to determine the extent to which the degradation produced significantly affects human visual perception.

Further development of the project could be psychophysical evaluation of filtered stimuli, or analysis via a computational model of different stages of the visual system.

This investigation will produce results of relevance to the diagnosis of visual conditions, engineering challenges around human vision or digital image processing.

This is a flexible project that can be adapted to the interests of the student. It would be suitable for a **mathematically inclined** student with a background in neuroscience, psychology, or related subjects, or for engineering or computer science students with a strong interest in human vision and image processing.

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