

# Facial weakness monitor

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2812ICT Perceptual Computing Proposal

## Introduction:

Facial palsy is a condition that causes weakness in the facial muscles, usually on one side. It is usually the result of damage to the facial nerve causing swelling around the nerve. There are five branches of the facial nerve that control different facial muscles, they are also responsible for the production of tears, saliva and part of the tongue. Recovery can be a long process taking on average six months, with high risk of eye damage if not monitored, and the potential to never fully recover.

Once damage has occurred to the facial nerve, your face will look and feel floppy as the muscles are not being controlled. Once recovery starts some areas will recover faster than others, and once nerve branches recover balance will only return with slow, careful facial exercises. Initially movement may be asymmetrical and difficult but slow repetitive practice will eventually trigger the brain to remember the movements, small improvements will gradually build to a large overall change.

It can be a long and difficult road to recovery with patients having two hour therapy sessions only every 3-6 months. With exercise programs given as the primary source of recovery, in more extreme cases electroshock therapy or some forms of surgery are possible.

During therapy sessions systems like the Sunnybrook facial grading system can be used to assess the rate and progress of recovery. However this doesn't give much actionable data that gives feedback on the effectiveness of recovery techniques. The proposed project is a computer vision program to reproduce the facial grading system with more accurate metrics.

## Technical approach:

As the aim is to recreate the Sunnybrook facial grading system shown below, there are multiple techniques that need to be built into a single application. All exercises look at the symmetry of the face, the first column while resting and the next two while attempting movements.

For resting symmetry:

- To assess the symmetry in the eyes a bounding areas could be used to segment the eyes from the rest of the face and then compare these two areas, giving a value of symmetry.
- To assess the presence of the naso-labial fold on the cheek edge detection could be used to determine the size and intensity of the fold.

