Call for PhD student applicant

Producing 3D video sequences from 2D input video

We seek a suitable candidate to study for a PhD in Computer Vision under an ARC Linkage Grant. The candidate will receive the equivalent of an APA (Australian Postgraduate Awards) scholarship, along with a generous top-up from the Research School of Information Sciences and Engineering and the company Digital Dynamic Depth (DDD), who are our industrial partner in this research. Since DDD is located in Perth, a student working on this project would need to spend some time each year in Perth interacting with DDD researchers.

The goal of the project is to develop algorithms for producing 3-dimensional video from 2-dimensional input video. The output video should be suitable for display on a 3-dimensional display device. The purpose is to facilitate the transformation of old video footage, such as films to 3D format, so as to support the developing market for 3D display devices.

The project provides the opportunity to engage in cutting-edge computer vision and graphics research in partnership with a leading industrial partner.

Industrial Partner

The company Digital Dynamic Depth (DDD), the industrial partner in this researcg, is a provider of 3D television monitors used to view television material in 3D. DDD markets special TV monitors which allow 3D viewing without any special viewing glasses. The method is based on presenting different images to the two eyes, based on the eye position.

A new type of 3D display technology which enables multiple observers to view the same 3D image without the need for glasses and with less restrictions on viewing position is emerging from the research labs of large display manufacturers such as Philips, Sanyo and ViewSonic. This display technology is becoming increasingly viable as the necessary processing power required to drive these displays is becoming available on consumer CPUs and graphics cards.

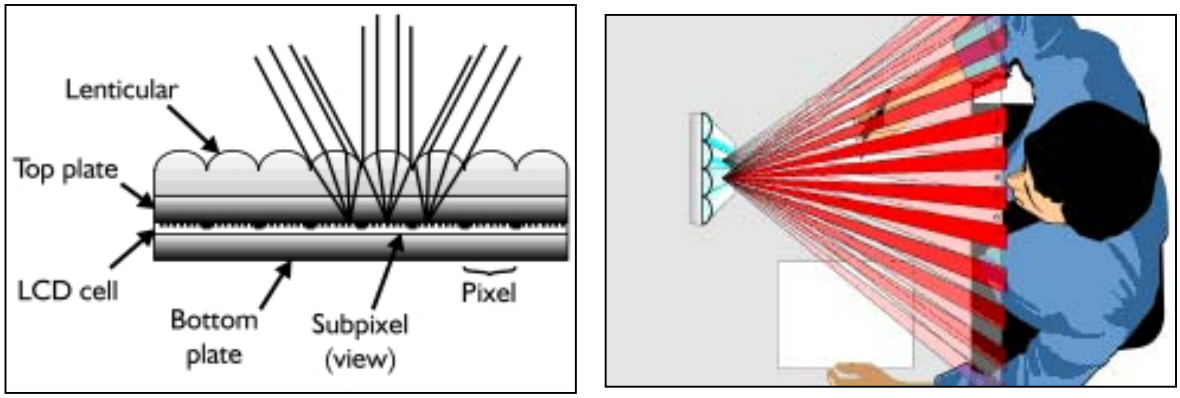

Figure 1 Cross section of a lenticular 3D display and the associated viewing zones seen by an observer

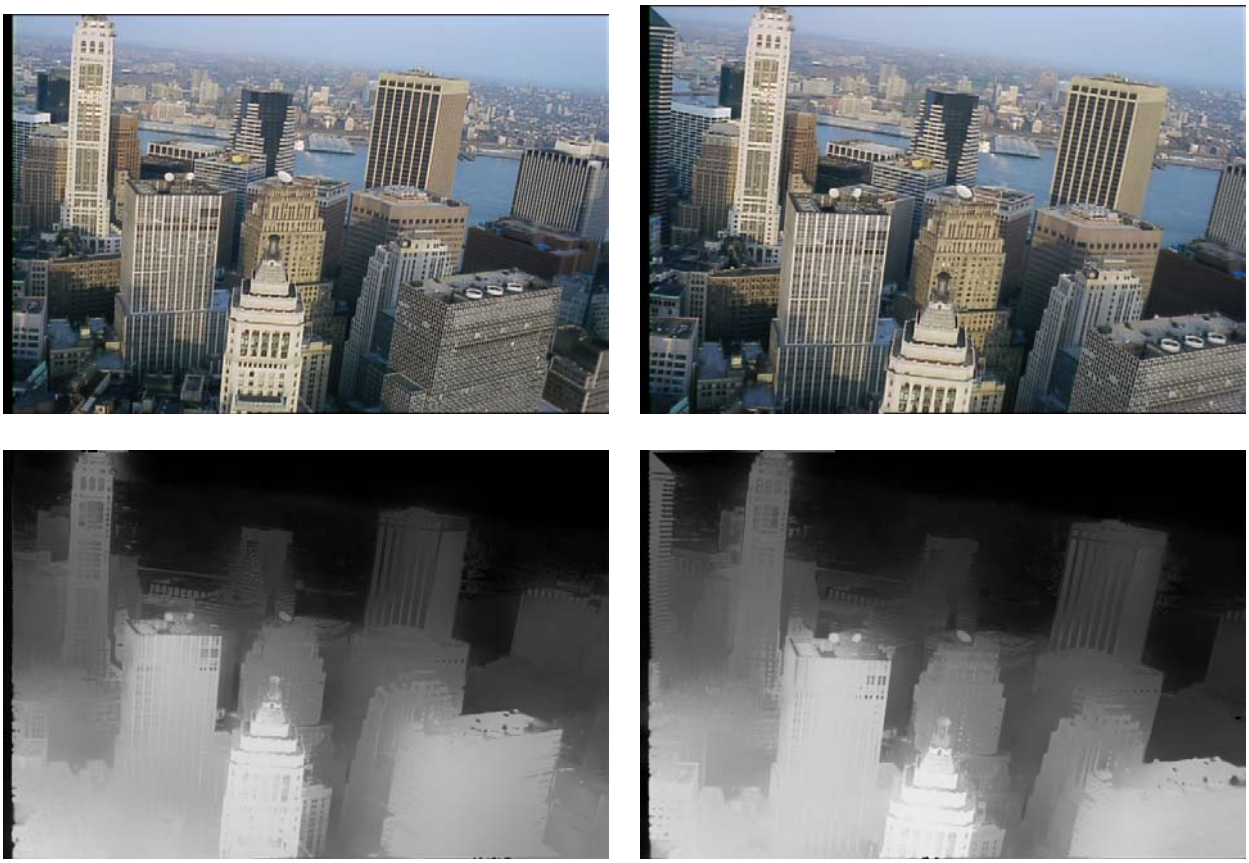

Figure 2. *Two images from a sequence of New York, and the recovered depth-maps. The depth (distance of the scene from the cameras) is coded by the intensity value of each pixel. Bright areas in the depth-map indicate close points, and dark represents distant points. Depth maps were extracted using software developed by Dynamic Digital Depth Research.*

Production of 3D viewable material.

Of utmost importance in the acceptance of 3D television is the availability of material that can be presented in 3D. We concentrate in this project on the process of preparing 3D versions of pre-existing films – this may be called 3-dimensionalizing the film. For a scene to be perceived in 3 dimensions by the human visual system, two (or more) slightly different images need to be presented to the two different eyes. The film in general contains a single monocular view of the scene, which might be presented to one of the eyes. To 3-dimensionalize the film, a second image must be synthesized, such as would be seen by a second eye. In order to do this efficiently for large amounts of film footage, automatic or semi-automatic computer aid is necessary. What is needed is for an automatic computer program to determine some sort of 3D representation or model of the scene and on the basis of this 3D model to synthesize the pairs of images to be presented to the two eyes. The goal of the project proposed here is to investigate new methods for doing this with the purpose of developing a reliable and rapid means of 3-dimensionalization.

One of the standard methods for producing different views is to create a depth map, such as the one shown in Figure 2. Knowing the depth of each object in the scene allows new views, such a stereo pairs to be generated. However, creation of a reliable depth map is not always possible.