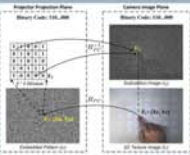


# IMI PhD INTERDISCIPLINARY SEMINAR

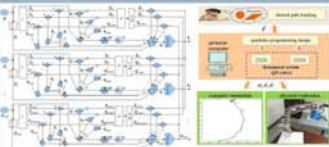
**DATE:** 11 April 2013, Thursday  
**TIME:** 11:00 am - 12:25pm  
**VENUE:** IMI Seminar Room, Research Techno Plaza, XFrontiers, Level 03-01  
50 Nanyang Drive, Singapore 637553  
\*Lunch will be served



**Dr Jingwen DAI**  
Postdoc  
University of North Carolina at Chapel Hill, USA

## ***TOUCHSCREEN EVERYWHERE: ON TRANSFERRING A NORMAL PLANAR SURFACE TO A TOUCH-SENSITIVE DISPLAY***

We address how an HCI (Human-Computer Interface) with small device size, large display, and touch input facility can be made possible by a mere projector and camera. The realization is through the use of a properly embedded structured light sensing scheme that enables a regular light-colored table surface to serve the dual roles of both a projection screen and a touch-sensitive display surface. With the projection display on the table surface being imaged by a camera, the observed image data, plus the known projection content, can work together to probe the 3D workspace immediately above the table surface, like deciding if there is a finger present and if the finger touches the table surface, and if so at what position on the table surface the contact is made.



**Dr ZHANG Zhijun**  
Research Fellow  
Institute for Media Innovation, Singapore

## ***DESIGN AND EXPERIMENTATION OF ACCELERATION-LEVEL DRIFT-FREE (ALDF) SCHEME SOLVED BY TWO RECURRENT NEURAL NETWORKS***

To solve the joint t-angle and joint-velocity drift problems in cyclic motion of redundant robot manipulators, an acceleration-level drift-free (ALDF) scheme subject to a linear equality constraint is proposed, of which the effectiveness is analyzed and proved via the theory of second-order system. The scheme is then reformulated into a quadratic program (QP). Furthermore, two recurrent neural networks (RNNs) are developed for solving the resultant QP problem. Comparison results demonstrate that the ZNN solver has faster convergence and fewer errors. In addition, the hardware experiments validate the physical realisability and efficacy of the proposed ALDF scheme and QP-solvers. Moreover, the error analyses indicate the accuracy of the proposed ALDF scheme and the corresponding RNN QP-solvers.



**Subbarao Nikhil NARAYAN**  
PhD Student  
EEE/IMI  
Nanyang Technological University, Singapore

## ***AUTOMATIC VOLUME ESTIMATION OF THE THYROID GLAND USING 2D ULTRASOUND IMAGING***

The thyroid gland is an endocrine gland that is responsible for iodine metabolism and hormone regulation in the human body. Disorders of the thyroid gland are caused due to imbalance in iodine uptake and present itself as a neck lump due to enlargement of the gland. The differential diagnosis of the disorders is done based on the volume of the diseased gland compared to the normal gland.

The aim of this research work is to eliminate the need for manual estimation of the thyroid gland volume and to provide a way to automatically estimate the volume accurately in real-time on an Ultrasound machine.

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