

# **Student Exchange Program**

## **MIT, Center for Educational Computing Initiatives**

### **Diploma Theses Proposals 2010 Semester 1**

#### **Virtual 3D World for Physics Experiments in Higher Education (1 Thesis Position)**

In the science of physics the interrelation of physical theory, model and experiment is hard to comprehend, therefore group learning becomes more important. This fact, combined with the opportunity to work on practical experiences over distance in a collaboratively way, has raised worldwide the interest of creating new learning environments based on 3D virtual worlds. In the first phase of an prototype it has been focused on the integration of internetaccessible physics experiments (iLabs) combined with the TEALsim 3D simulation toolkit in Project Wonderland, Sun's toolkit for creating collaborative 3D virtual worlds. Within such a collaborative environment these tools provide the opportunity for teachers and students to work together as avatars as they control actual equipment, visualize physical phenomenon generated by the experiment, and discuss the results. In the next phase, research and development work on the following tasks: (a) Implement automatic generation of the simulation's controls in the Wonderland environment either as buttons, sliders and other control elements within the 3D space or as elements in the Heads Up Display. These controls will provide the standard Java event handling model. (b) Add the ability for avatars to directly interact withTEALsim elements, including moving elements and activating sensors. Changes in the environment would be updated in real-time. Depending on time & the level of integration of the game engine with the NPC avatars we may explore semi-autonomous tutors.

Further information can be found at  
<http://www.iicm.tugraz.at/home/cguetl/projects/ForceOnDipoleP1>

Supervisor MIT: Prof. V. Judson Harward'  
Supervisor TUG: Christian Gütl

#### **Procedure for Application (must be written in English):**

1. Prepare an Short CV  
including interests, programming and software design skills, practical work experiences, language skills and other relevant information
2. Progress Report (Overview) of the study program and average performance level
3. Short Application Letter (1 page)  
stating motivation/reasons why to apply for the Thesis position and outlining interest in the topics of the theses proposals

Time Schedule:

- October 20<sup>th</sup>, 2009 Application as PDF File via email to [cguetl@iicm.edu](mailto:cguetl@iicm.edu)
- October 21<sup>th</sup>, 2009 Preliminary decision by supervisors and letter of agreement for supervision by CBS, School of Information Systems, Curtin University of Technology
- October 31<sup>st</sup>, 2009 Application for scholarship  
Claudia Buchrieser, Office of International Relations, Graz University of Technology
- Master Thesis at MIT, USA  
from February 2010 until July 2010

**Further Information:**

***Local Contact:***

Christian Gütl, [cguetl@iicm.edu](mailto:cguetl@iicm.edu)

***Information about scholarship:***

Barbara Recla, [barbara.recla@TUGraz.at](mailto:barbara.recla@TUGraz.at)

[http://portal.tugraz.at/portal/page?\\_pageid=133,1&\\_dad=portal&\\_schema=PORTAL](http://portal.tugraz.at/portal/page?_pageid=133,1&_dad=portal&_schema=PORTAL)

***Information about MIT, CECI***

<http://caes.mit.edu/>