

Short Title:	Avatar Technology APPROVED
Full Title:	Avatar Technology
Module Code:	MHLT H6018
ECTS credits:	10
NFQ Level:	9
Module Delivered in	1 programme(s)
Module Contributor:	Robert Smith
Module Description:	In this module learners will investigate the concept of, and applications for, embodied agents. Topics addressed in this module include: communication and social interaction in virtual environments, HCI for AI, Sign language generation, and the 3D character development pipeline.
Learning Outcomes:	
<i>On successful completion of this module the learner will be able to</i>	
<ol style="list-style-type: none"> 1. By way of the literature in the field; discuss the state-of-the-art in real-time and batch rendering avatar technologies as they are used in the context of HCI and HLT with a focus on sign language generation 2. Analyse and critically evaluate current issues in the field of embodied agents and avatar technologies. These might include, but are not limited to: accessibility, social interaction, human emotion synthesis and collaborative virtual environments 3. Describe the various methods used to animate avatars. Including: motion capture, synthesis and traditional frame-by-frame animation 4. Analyse avatar and associated technologies in context of their application to sign language generation. 	

Module Content & Assessment

Indicative Content
<p>3D character modeling pipeline An introduction to the 3D character modeling pipeline. Including such topics as : 3D coordinate geometry, character design; polygonal mesh representations; data structures for polygonal meshes; armature structures; simulated physics; texture mapping; scripting within a 3D animation environment. Hardware and software issues; batch rendering vs. realtime rendering.</p>
<p>3D Character Animation An introduction to the complexities of character animation: Frame-by-frame animation techniques; animation principles; Lip syncing; Interpolation; articulated models; Inverse kinematics;</p>
<p>Data driven avatar movement Sign language generation techniques; Use of existing tools to perform 3D character animation; motion capture techniques; full sign language synthesis with Markup; language corpora</p>
<p>Avatars in Human Language Technology A learner driven exploration of existing avatar technologies; Exploring the technological and theoretical basis for the current the state of the art. Explore in which contexts are these technologies used and how have the technologies evolved over time.</p>
<p>Current challenges in signed language generation After gaining an overview of what is happening in the field, learners now identify current challenges facing avatar technologies in the context of Sign language generation and how these are currently being addressed.</p>
<p>Implementation of existing tools and/or frameworks Learners will report on a group implementation of a chosen signing avatar technology. These include, but are not limited to a motion capture implementation, a sign language synthesis frame work, and other taxonomic based systems.</p>

Indicative Assessment Breakdown	%
Course Work Assessment %	100.00%

Course Work Assessment %				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Written Report	Long paper. Literature review paper	2	40.00	n/a
Project	Implementation and written report (group work)	3,4	60.00	n/a

No Final Exam Assessment %

Indicative Reassessment Requirement
<p>Repeat examination <i>Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.</i></p>
<p>Reassessment Description Student will be required to complete a piece of work over the summer</p>

ITB reserves the right to alter the nature and timings of assessment

Indicative Module Workload & Resources

Indicative Workload: Full Time

Frequency	Indicative Average Weekly Learner Workload
Every Week	2.00
Every Week	2.00
Every Week	2.67

Resources

Recommended Book Resources

Ruttkay, Zsófia, and Catherine Pelachaud 2004, *From brows to trust: evaluating embodied conversational agents*, Kluwer Academic Publishers Netherlands

Brinkman, Willem-Paul, Joost Broekens, and Dirk Heylen, eds. 2015, *Intelligent Virtual Agents: 15th International Conference, IVA 2015*, Vol. 9238 Ed., Proceedings (Lecture Notes in Computer Science), Springer Delft, The Netherlands

Supplementary Book Resources

Chris Totten, *Game Character Creation with Blender and Unity* [ISBN: 978111817272]

!!!Book Not Found [ISBN: 978-1-84951-6]

Oliver Villar, *Learning Blender: A Hands-On Guide to Creating 3D Animated Characters* [ISBN: 978-013388617]

Recommended Article/Paper Resources

Kennaway R 2003, *Experience with and requirements for a gesture description language for synthetic animation*, 5th International Gesture Workshop, Genova, 300

Jennings, Elliot, Kennaway, Glauert 2010, *Requirements for a sign language avatar*, 4th workshop on representation and processing of sign languages: Corpora and Sign, Malta, 133

Smith, R.G., Institute of Technology Blanchardstown 2014, *The role of emotional and facial expression in synthesised sign language avatars.*, Thesis
https://www.academia.edu/8580298/The_role_of_emotional_and_facial_expression_in_synthesised_sign_language_avatars_-_Thesis

Smith, R.G. & Nolan, B. 2015, *Emotional Facial Expressions in Synthesised Sign Language Avatars: A Manual Evaluation*, Universal Access in the Information Society, Springer, May 2015 [ISSN: 1615-5289]
<http://link.springer.com/article/10.1007/s10209-015-0410-7#>

Supplementary Article/Paper Resources

Rincon-Nigro, Mario, and Zhigang Deng. 2013, *A text-driven conversational avatar interface for instant messaging on mobile devices*, Human-Machine Systems, IEEE Transactions on 43.3, 328-3

Morie, Jacquelyn Ford, et al 2012, *Embodied conversational agent avatars in virtual worlds: Making today's immersive environments more responsive to participants*, Believable Bots. Springer Berlin Heidelberg, 99-11

Ruttkay, Zsófia, Claire Dormann, and Han Noot 2004, *Evaluating ECAs-What and How?*, Evaluating Embodied Conversational Agents
http://vesta.informatik.rwth-aachen.de/opus/volltexte/2006/586/pdf/04121.Ruttkay_Zsofia.Paper.586.pdf

This module does not have any other resources

Module Delivered in

Programme Code	Programme	Semester	Delivery
BN_KMHLT_R	Master of Science in Computing in Multimodal Human Language Technology	2	Elective