

A collaborative environment for assisted 3d reconstruction of cuneiform tablets



Dr Eugene Ch'ng, Dr Sandra I Woolley and Dr Rolf Erlend Gehlken

Abstract

This project aims to improve the worldwide collaborative workflow that allows cuneiform experts and enthusiasts to work on the reconstruction of 3D Cuneiform tablets via an interactive 3D interface.

The project involves the cataloguing of 3D cuneiforms in a structure that allows efficient network transmissions. Algorithms for automatic/assisted reconstructions will be integrated as part of the workflow. The success of this



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project will help us to recover more than three millennia of written history in one of the most important regions of the ancient world, but could also be extended for a range of different fields that requires collaborative works.

Work in progress (summer student placements):

The present research aims to understand how people work with 3D puzzles when they are presented physically and virtually. It aims to understand how people cooperate and collaborate, either in sequence or in parallel, to join a collection of 3D fragments together. The summer work is a small part of the larger goal of a project to improve the worldwide collaborative workflow that allows cuneiform experts and enthusiasts to work on the reconstruction of 3D Cuneiform tablets via an interactive 3D interface.

Luis Hernandez Munoz and David Nash are currently working as summer placements for the project

Volunteers are needed for experiments.

Please contact Dr Eugene Ch'ng (e.chng@bham.ac.uk (<mailto:e.chng@bham.ac.uk>)) if you are interested in the project.

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Summary of background

Cuneiform is, according to our knowledge, mankind's first ever script (3,300BC). The invention of writing was an intellectual breakthrough that made recording information possible.

Cuneiform was the medium of communication to the entirety of the ancient near east (from Egypt to Iran) and was even used at the beginning of the Christian era. Current collection of thousands of inscribed fragments from complete tablets is distributed in museums worldwide. Pieces of one tablet may be in different museums due to illicit and unprofessional excavations. The largest collections are found in the British Museum, the Louvre (Paris), the Vorderasiatische Museum (Berlin) and the Iraq Museum in Baghdad. Smaller sets of collections in Britain are being housed in The Ashmolean Museum of Oxford and also in The Birmingham Museum and Art Gallery. The University of Heidelberg houses a collection of about 2,000 unpublished fragments which belong to a single temple archived from the time of Nebuchadnezzar. Cuneiform tablets are continually being discovered. Recently, archaeologists find cache of tablets dating back to the Iron Age (1200 – 600 BCE) in a 2,700 year old Turkish temple. The majority of these collections are mostly catalogued as photographs and hand-drawn illustrations. In some cases, large collections of tablets numbering thousands remained un-catalogued even after a century of storage; one example is The British Museum which has un-catalogued collections from beginning of the 19th century. The ancient inscriptions on the fragments depict contents encompassing religious, literary, and scientific documentations including encyclopaedias, dictionaries, political texts, letters, administrative documentation, and school tablets of their age.

The urgent reconstruction of these fragments into a readable form can provide researchers valuable insights into the otherwise partial data related to the social, political, scientific and historical aspects of these ancient cultures. As time progresses, however, due to the nature of the fragments and the limitations of the human intuition and time, little progress has been made in the reconstruction of the tablets. As a result the surface of the fragments, particularly those not properly managed gradually disintegrate and the text is lost forever. It is of utmost importance that these fragments are digitised, reconstructed, and interpreted before the surfaces disintegrate, and the knowledge that these tablets recorded are perpetually lost.

People

Dr Eugene Ch'ng (Principal Investigator)

Dr Eugene Ch'ng is Innovations Director at the IBM Visual and Spatial Technology Centre and the Heritage and Cultural Learning Hub, the University of Birmingham. He is also a visiting professor at the Centre for Creative Content and Digital Innovation, University of Malaya. Dr. Ch'ng has formal education in a wide variety of fields (Fine Arts, Graphic Design, Interior Architecture, Computer Science and, Electronic, Electrical and Computer Engineering). His research has an overarching theme in Complex Systems Science research for studying and reconstructing physical, social and virtual landscapes. He specialises in advanced interactive Systems, enhanced Virtual Environments, Agent-based Modelling and Multi-Agent Systems requiring large computing clusters for processing of agent-interaction and computer graphics rendering. The fusion of 3D visualisation and complex systems modelling is a unique strength that is applicable to a wide variety of disciplines. His research focuses on a number of complex and interactive systems related to the reconstruction of terrestrial, social, political and virtual landscapes. He also applies cutting-edge technology for facilitating user experience and learning using emerging hardware and information computation in digital heritage. Dr Ch'ng has over 40 peer-reviewed scholarly publications and is actively involved in editorial boards, technical and program committees in international journals and conferences in his field. Dr Ch'ng is a member of the IEEE Computer Society.

Dr Sandra I Woolley (Co-Investigator)

Sandra Woolley is a lecturer in the School of Electronic, Electrical and Computer Engineering at The University of Birmingham, U.K. She trained as a graduate apprentice engineer with Lucas Aerospace, U.K. and received the PhD degree in electronic engineering from The University of Manchester in 1994 before working as a researcher at the National Institute of Standards and Technology (NIST), Maryland, U.S.A. She has lectured students in a variety of subjects, including microcontrollers, multimedia and computer networking. She has previously researched digital imaging and data storage, and her current research interests include aspects of e-health and, in particular, new applications in rehabilitation and assistive technology. She also works on multidisciplinary research in cultural heritage and has enjoyed contributing to two Leverhulme funded projects related to the digital heritage of cuneiform tablets.

Dr Erlend Gehlken (Co-Investigator)

Dr Erlend Gehlken is a physicist and Assyriologist. Erlend studied at the University of Heidelberg where he received a diploma in theoretical physics and a PhD. in Assyriology. In 2003, Erlend achieved Habilitation at the University of Marburg, and has since lectured in Assyriology at the Universities of Heidelberg, Frankfurt, Marburg, and Birmingham (UK). Erlend is currently associated with the University of Frankfurt/Main, and is editor of a Babylonian temple archive from the ancient city of Uruk.

Dr Tim Collins

Tim Collins is the Head of Education in the School of Electronic, Electrical and Computer Engineering at The University of Birmingham, U.K. His PhD was in the field of active sonar and he supervises research in applied signal processing for applications such as spatial audio, underwater acoustics and image processing. His interest in the project relates to the signal processing aspects of 3D cuneiform reconstruction.

Andrew Lewis (PhD Student)

Andrew Lewis is a PhD candidate at The Heritage and Cultural Learning Hub (do.collaboration) at the University of Birmingham and is currently working on a Leverhulme Trust funded research, exploring nature inspired methods for the semi-automatic and manual reconstruction of cuneiform tablets in virtual environments. With a background in web design, coding, and journalism, Andrew's skill base also includes 3D scanning, additive manufacturing, and mechatronics. His work has been featured internationally in publications as diverse as O'Reilly Make magazine and The Guardian and Observer.

Luis Hernandez-Munoz

Luis Hernandez-Munoz is a PhD candidate in the School of Electronic, Electric and Computer Engineering (EECE) at the University of Birmingham, UK. His research is related to pervasive computing for healthcare in support of people suffering from anaphylactic allergies. He has been a research fellow at the EECE school in the BraveHealth and the Next-TELL European projects. He obtained a 5-year degree in electrical and electronic engineering with honours at the National Autonomous University of Mexico (UNAM). He has recently joined a multidisciplinary Leverhulme Trust funded project related to the digital reconstruction of cuneiform tablets. Moreover, he has worked in the industry as a certified metrologist and now his personal interests are software design and programming, research in mobile health devices, human-centred design, usability, effectiveness and acceptance studies, and design and development of embedded systems.

Project news

- [Autumn experiments \(/facilities/digitalhumanitieshub/news/2013/autumn-experiments.aspx\)](/facilities/digitalhumanitieshub/news/2013/autumn-experiments.aspx)
01/11/2013
- [Strategic classification of cuneiform fragments and search space \(/facilities/digitalhumanitieshub/news/2013/strategic-classification.aspx\)](/facilities/digitalhumanitieshub/news/2013/strategic-classification.aspx)
18/10/2013
- [Summer placements students assisting in Leverhulme Trust Funded Project \(/facilities/digitalhumanitieshub/news/2013/leverhulme.aspx\)](/facilities/digitalhumanitieshub/news/2013/leverhulme.aspx)
19/07/2013

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