

11 am Introduction – Tea and Coffee

Faculty of Architecture, Computing and Engineering

Simon Thomas

Alternative Materials from Excavation Waste: Manufactured Topsoil

Jaymie Lee Phillips

LitreCat: A Methodological Way to Review Research Papers

Swansea College of Art

Joshua Rogers-Evans

Development of a repeatable process for the manufacture of bespoke sports helmets for children with unique head forms

12.30 pm to 1.00 pm Lunch

Faculty of Humanities and Performing Arts

Christos Papadopoulos

A biological distance analysis of Cyprus population from Chalcolithic to Bronze Age

Thomas Humphrey

Agency and the New Materialisms in Cypriot Archaeology

Christopher Fleming

Identities in Roman Archaeology: the Problem with Labels

Timothy Ihssen

Thich Nhat Hanh Needs to Set Himself on Fire: A Modest Proposal to End the Rohingya Crisis

Savoy Stevens

Origins and Becoming - A comparative creation theology of Genesis, John, and the Tao te ching . . . with a few musings from modern physics

Faculty of Business and Management

Tania Davies

Measuring UWTSD Staff Wellbeing: A Framework which combines the Capabilities Approach and the WbFG (Wales) Act (2015) and the Goal of 'a Healthier Wales'

2.45 pm to 3.00 pm Tea and Coffee Break

London Campus

Baffour Dokyi Agyei

The Impact of Employee Motivation on Employee Performance In The Ghanaian Large-Scale Textile Manufacturing Industry

Centre for Doctoral Training - Wales Centre for Advanced Batch Manufacture

Akash Gupta

The simulation of residual stress and mechanical performance of EBM-manufactured titanium test specimens

Mohammad Nauman Jalil

Evaluation of Additive Manufacturing Technologies for Tissue Engineering Scaffolds

4.30 pm Close

ABSTRACTS

Simon Thomas

Alternative Materials from Excavation Waste: Manufactured Topsoil

The use of landfill sites remains a major route of disposal for excavation waste soils, whilst soils delivered to construction sites fail to meet the British Standard Institute specification for topsoil (BS 3882:2015). This project aims to develop both an alternative disposal route for excavation waste soils and create an innovative soil product able to satisfy the requirements of BS 3882:2015. The development of such a recycling process can be considered a potential opportunity to conduct up-cycling within the circular economy. The environmental and economic benefits achievable from up-cycling excavation waste soils are encouraged by the European Union (EU) Waste Framework Directive and the Well-Being of Future Generations (Wales) Act 2015. Throughout the study, soil enhancers are introduced to excavation soils, including compost, sand, sawdust and fertiliser. Therefore, the goal being to determine the feasibility of introducing these enhancers, by assessing their impacts and implementation costs.

After the introduction of soil enhancers, an investigation of the changes which subsequently occur in the manufactured topsoil conducted. The obtained results are statistically analysed to produce an insight into the physiochemical changes which occur within manufactured topsoil. The range of physiochemical properties investigated are derived from BS 3882:2015.

The research being conducted in collaboration with Stenor Environmental Services Ltd (Stenor), based in Swansea. They have been a producer of manufactured soils since 2003 and are actively engaged in joint research projects with the University of Wales Trinity Saint David (UWTSD); these projects focus on the recycling of wastes originating from the construction industry.

Jaymie Lee Phillips

LitreCat: A Methodological Way to Review Research Papers

As research students, being able to validate and review research is a large part of the process in terms of search strategy, methodology and literature critique / review

This piece of software combines:

- CASP
- Evernote
- Data storage
- Onenote
- Thematically storing information
- Selecting relevant information

LitreCat is a program which allows you make an instant decision of which PDFs are relevant. The ones that are can then be dissected, labelled, organised and evaluated or analysed. The ones that aren't relevant are then discarded. This process can often be tedious and cumbersome when performing the process manually. Though the concept is not unique or novel its approach to how it categorises data in both graphical and textual forms whilst also linking like research provides many benefits. Currently existing apps and programs have similar functions (pictures, export, images, links), however, such software elements did not provide all such functions in one place. The major benefit of this software comes from its ability to link information from papers reviewed on almost any given attribute from year to category, which is difficult to find with the same features in other software. Though not strictly the focus of the research has helped immeasurably in the accumulation of information for the research.

Joshua Rogers-Evans

Development of a repeatable process for the manufacture of bespoke sports helmets for children with unique head forms

Working to manufacture bespoke sports helmets for children with cranio-facial abnormalities presents several technical issues. Cerebra Innovation Centre (CIC) have previously produced two such helmets to allow safe participation in horse riding activities. These were achieved by using traditional manufacturing techniques and a high specification 3D scanner, however this required highly trained staff to operate.

It is hoped that by investigating alternative methods for capturing the 3D geometry, a solution will be identified that can be send out to parents, carers or schools. The 3D data can then be gathered quickly and remotely, thus reducing the cost of production and widening participation in general.

The end solution must:

- Gather accurate (within 1mm STL/OBJ - 3D Data) geometry of skull morphology of each child with cranio-facial abnormalities.
- Be easy to operate – without specialist training.
- Adapt to variations in lighting/movement for each subject/location.
- Reduce the cost of gathering data – transport, equipment etc
- Provide sufficient detail to manufacture each helmet - Conforming to British Standards (BS VG1).

To assess the viability of existing technologies to capture data by non-specialists (parents and carers) in a domestic setting, the following techniques will be investigated.

- Photogrammetry – Single Camera / Multi-array
- 3D Scanning – Mobile Devices / Sensors
- Traditional relief casting

The suitability of the techniques mentioned above will be critically evaluated against the following marking criteria:

Accuracy, Cost, Ease of Use, Portability, Reliability & Comfort.

A matrix evaluation will be conducted using baseline data to measure each of these considerations. Geometric accuracy can be quantified and qualitative anecdotal findings from feedback will inform the evaluation following the development / testing of the design solutions.

Christos Papadopoulos

A biological distance analysis of Cyprus population from Chalcolithic to Bronze Age

Throughout the Bronze Age (c. 2400–1100 BC) the island of Cyprus went under a process that led to major social, economic, and cultural transformations. The question of migration, colonisation and hybridisation of the Cypriot population during this period is the subject of ongoing debate among archaeologists. This is in part due to the characterisation of each phase of Cypriot prehistory as discontinuity: the abandonment of the existing settlements and the establishment of new ones, the introduction of new types of architecture associated with changes in material culture.

Bones and teeth stand as direct source of biological information from past human groups. Biological distance or biodistance is the measurement and interpretation of relatedness or divergence between populations based on polygenic skeletal and dental traits. These variables can either be nonmetric, discrete skeletal or dental traits that vary in presence or degree of expression or quantitative traits that are derived from linear measurements of bone or teeth. Dental traits are important source of biological information on relatedness as they are under relatively strong genetic control.

Modern statistical and genetic anthropological biodistance studies within Cyprus have been poorly developed and very few studies have been conducted to examine dental biological relationships in Cypriot archaeological material in contrast to significant research in this field in neighbouring Mediterranean regions. This study seeks to establish continuity between the Cypriot pre- and protohistoric populations, focusing on their dental remains.

Thomas Humphrey

Agency and the New Materialisms in Cypriot Archaeology

This paper considers New Materialisms and how this theoretical approach, which is gaining increasing traction in the Social Sciences, is being applied and critiqued within Cypriot archaeology (Steel 2017; Knapp 2018).

The New Materialisms fundamentally question the nature of matter and the place of human beings within the material world and demand detailed analyses of our daily interactions with material objects and the natural environment (Coole and Frost 2010, 3-4). The New Materialisms seek to remove human beings from their privileged position, conceiving of matter as active, rather than massive and inert (Coole and Frost 2010, 10). This 'flat ontology' (Fox and Alldred 2018) removes the separation between humans and the material world, situating them within it. By applying this to the study of archaeology we gain a more complete understanding of how people in the past were situated in and were part of the material world and the recursive relationships this entails.

My case study comprises Late Bronze Age anthropomorphic terracotta/clay/ceramic figurines from Cyprus. These I will examine through the lens of the New Materialism to explore their materiality, agency and incorporation within material worlds. I will be considering the agency of matter (clay, water, fire) involved in the creation of these objects, and the context of deposition, to examine how these figurines were active 'participants' in the material world of Late Bronze Age Cyprus, rather than merely passive objects of human agency.

Christopher Fleming

Identities in Roman Archaeology: the Problem with Labels

This paper will aim to demonstrate a select few theoretical approaches to ‘identity’ in Roman archaeology. For several decades, there has been reluctance among classical archaeologists to engage with wider theoretical approaches in the same way as ‘non-classical’ archaeologists (e.g. approaches to Palaeolithic cave art). Roman archaeologists who have engaged with theory have, until recently, been predominantly concerned with the process of ‘Romanisation’ in the archaeological record (Haverfield 1906 was one of the key contributions in early discussions; more recently Wallace-Hadrill 2007). There are, however, critiques of this approach in scholarship (Mattingly 2011; Gardner 2013) who have raised issues concerning the Romano-centric approach in a postcolonial society.

It is my belief that there remain several unresolved issues with regard to identity in academic discourse to date. Many of the case studies supporting the differing positions are from Roman Britain and Roman Iberia. Building on their research, I shall present two case studies from a social and military context: one from Herculaneum (Italy), and another from Dura-Europos (Syria). The remains at both of these sites have been assigned various labels since their discoveries, and this paper will reassess the basis for these labels and the reasoning behind them. I shall then discuss the theoretical frameworks in the context of these case studies in order to highlight some issues that affect contemporary interpretations of ancient ‘identity’.

Timothy Ihssen

Thich Nhat Hanh Needs to Set Himself on Fire: A Modest Proposal to End the Rohingya Crisis

The Engaged Buddhist Movement, begun by Thich Nhat Hanh in 1954, burst onto the international scene when photos appeared of Vietnamese Buddhist monk Thich Quang Duc’s self-immolation on a Saigon street. Reflecting on that heroic act by his fellow monk, which helped begin the anti-war movement, Thich Nhat Hanh said, “Sometimes we had to burn ourselves alive to tell you that we didn't want this war.” The Rohingya political and humanitarian crisis in Myanmar is overseen by Nobel Peace Prize winner and practicing Buddhist Aung San Suu Kyi, and who has steadfastly resisted all pressure to end what some have called the “ethnic cleansing” of the Muslim minority. Hanh’s personal response to this crisis has been to send Aung San Suu Kyi two identical letters in support of two Buddhist journalists who are being held, not the 688,000 Muslims who have been driven from their home. This paper briefly charts the history of the Engaged Buddhist Movement and how Hanh and other EBM leaders have responded with sadness and advice, which has not been enough to pressure Aung San Suu Kyi into ending the crisis. Taking a cue from Liberation Theology, the Engaged Buddhist Movement must take drastic measures in order to regain its status as a moral exemplar and a vital force among the world’s leading religions. The paper will show that the best way to end the crisis is for Thich Nhat Hanh to set himself on fire.

Savoy Stevens

Origins and Becoming - A comparative creation theology of Genesis, John, and the Tao te ching . . . with a few musings from modern physics

This paper seeks to demonstrate a comparative theological approach to Christian, Hebrew, and Taoist origin motifs, that suggests creation is a dynamic process of self-organizing complexity, becoming, and unfolding, of which we are all a part of and contributors to. Pneumatological devices, which conceptualize a creative force at work in the world, Divine or otherwise will be identified and discussed in relation to cosmological discoveries and claims that “the universe is going somewhere.” The poems of the Tao te ching imagines primal waters of “nothingness” that are the deep source of everything. The ineffable “All-Mother” that invokes a formless infinity which nurtures all things and is the force that flows through all life in the universe. In the Jewish scripture, God’s Spirit or ruach is the life force of created things, and in the New Testament, God’s Spirit or pneuma is the life force of resurrection which, starting from Easter, makes everything eternally alive. Paired with concepts from modern physics and theological themes such as Wolfhart Pannenberg’s pneumatological “field of force,” Christian, Jewish, and Taoist texts reveal new ways of understanding the Divine as an active force in our world on individual and universal levels. This comparative reading will illuminate the creative force identified in origin motifs of three religious texts suggesting a sacred understanding of the universal motivating force pulling creation into greater and greater levels of complexity and orienting us towards the future.

Tania Davies

Measuring UWTSD Staff Wellbeing: A Framework which combines the Capabilities Approach and the WbFG (Wales) Act (2015) and the Goal of 'a Healthier Wales'

The aim is to create and utilise a Framework of Measurement with which to gain a wellbeing 'score' of academic staff within the UTWSD. It shall be linked to the Wellbeing of Future Generations (2015) Act and aim to provide an in depth examination and evaluation of the implementation of a new national policy within a Welsh University context.

The main framework utilised shall be the Capability Approach (Nussbaum, 2001; Nussbaum, 2016; Nussbaum, 2006; Sen, 1985; Sen, 2003). This is a normative paradigm which is used to evaluate individual well-being and social arrangements, as well as the design of social policy and proposals for social change (Robeyns, 2006; Harnacke, 2013; Smith, Hunter, & Anand, 2005). The central idea within the approach is that the well-being should be measured regarding the capabilities of an individual, and that this should reflect who and how they wish to be (Alkire, 2015). Therefore, expansion of these capabilities should increase well-being.

Personal freedom and autonomy is a key factor in this framework, and assessing social policy in relation to the autonomy it affords individuals is paramount (Deneulin & McGregor, 2009).

The originator Sen stated that the framework can be adapted but 'clarity of theory has to be combined with the practical need to make do with whatever information we can feasibly obtain for our actual empirical analyses' (Sen 1985: 49). Therefore, any adaptation of the Capabilities Approach framework will be grounded in emerging data and simplified in accordance to the topics set by the Welsh Government indicators of well-being.

Baffour Dokyi Agyei

The Impact of Employee Motivation on Employee Performance In The Ghanaian Large-Scale Textile Manufacturing Industry

This paper evaluates the impact of employee motivation on employee performance in the large-scale textile manufacturing industry in Ghana. It focuses on contributing to the revival of the textile industry in Ghana, a major contributor to the country's GDP. This paper is drawn from an ongoing doctoral research that seeks to explore in detail the large-scale textile manufacturing with a focus on the employees in the industry to identify the factors that can enhance their performance and in turn increase productivity. A mixed methods approach that draws from pragmatism is used to gain rich data. It is intended that this study using 3 main large-scale textile manufacturing companies in Ghana will help managers within the industry formulate their Human Resource policies to meet the needs of their employees, hence impacting on employee and organisational performance, whilst serving as research basis and reference point for other industries and researchers.

Akash Gupta

The simulation of residual stress and mechanical performance of EBM-manufactured titanium test specimens

The Wales Centre for Advanced Batch Manufacture (CBM) employs an in-house ARCAM Q10 Electron Beam Melting (EBM) machine for the fabrication of bespoke medical implants. Previous research has shown that the build orientation of additive-manufactured parts can have a significant effect on the mechanical properties of metallic components. This study evaluates the impact of build orientation on additive-manufactured titanium samples through the numerical simulation of residual stress, elastic modulus and yield stress.

To support the numerical simulation work, a small batch of $n=6$ tensile test pieces were manufactured in two build orientations: horizontal and lateral. To compensate for the high stiffness of the Ti-6Al-4V alloy, the test specimen was designed algorithmically. Tensile test results for all six specimens demonstrated that the design was successful in achieving fracture within the gauge length and the elastic modulus and yield stress for both orientations were in reasonable agreement with the previous published values.

Literature review suggests that residual stress can have a detrimental impact on mechanical performance. Hence thermo-mechanical models were simulated to compute the stresses associated with the EBM process. The results demonstrated that the residual stresses generated were less than 0.5% of the yield stress of the material. To account for the distortion in the titanium parts due to temperature gradients, the fabricated samples were 3D scanned to determine the accuracy associated with each build axis.

The physical data obtained from tensile testing were employed to update the material library in Ansys. A multilinear plasticity model was employed to observe the transition from elastic to plastic region and zone for crack initiation. The simulation results for both orientations were in good agreement with the experimental data. The overall results indicate that the build orientation had no impact on elastic modulus but had a significant effect on yield stress.

Mohammad Nauman Jalil

Evaluation of Additive Manufacturing Technologies for Tissue Engineering Scaffolds

Aims

An important aspect of tissue engineering is the scaffold used to culture cells in a non-cytotoxic environment. The internal microarchitecture of these scaffolds is a disputed topic, where the performance of random porous structures has been compared to regular repeating porous structures. The aim of this research project is to harness additive manufacturing technology to optimise scaffold design in terms of mechanical integrity, fluid permeability and cell seeding efficiency.

Methods

This work makes use of CBM's in-house ProJet 3500 HD Max printer. Micro-scale mesh structures are generated with 3D CAD software and the resulting porosity and build accuracy analysed with CAD based algorithms and Micro CT scans. A specific set of geometries (triply periodic minimal surfaces) are designed, optimised and 3D printed.

The printing material is also tested for biocompatibility under sterile tissue culture conditions. Live cell seeding and extended culture in the presence of the material are performed, while fluorescent imaging is used to determine cell health.

Results & Conclusion

Approximate mathematical models of TPMS geometries were transformed into CAD models and 3D printed with specific pore diameters. Early biocompatibility testing resulted in the development of a more suitable cleaning and sterilisation protocol. Employing the new protocol resulted in contamination free cell culture, in the presence of the 3D printing material.