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Three-Minute Thesis

UNIVERSITY OF LINCOLN

THE DOCTORAL SCHOOL

"

Dr Ian Packer - Director of The Doctoral School

Welcome to the Postgraduate Research Showcase 2024.

This year's showcase conference brings together and celebrates the achievements of Lincoln's PGR community. It will demonstrate the strength and depth of postgraduate research taking place in all disciplines across the University.

The showcase will provide the opportunity to explore, debate, and share good practice and new knowledge in a supportive and friendly environment, and enable you to take what you have learned back into your own studies and research practices.

We hope you enjoy the showcase and look forward to meeting you!

Welcome

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PGR
SHOWCASE

DAY 1
PROGRAMME

Day 1 - February 28th

9:30 | Welcome & Keynote Speech

Dr Ian Packer - Director of The Doctoral School

9:45 | Plenary Session - Decolonising the Curriculum

Simon Obendorf & Paul Igwe

10:15 | Presentations

Maureen O'Callaghan
Doan Thi My Linh
Ruth Alet Duniya

BREAK

11:15 | Presentations

Khaled Yaghi
Joanna Shelton
Luke Argyle

LUNCH

13:05 | Plenary Session

Maureen O'Callaghan

14:00 - 16:00 | PGR Poster Session & Networking Event

Stephen Langton Building - Atrium

PGR
SHOWCASE

DAY 2
PROGRAMME

Day 2 - February 29th

9:30 | Intro to Day 2

Dr Ian Packer - Director of The Doctoral School

9:35 | Doctoral School Interdisciplinary Grant Scheme

Nicki Pierce & Holly Stocks

10:05 | Presentations

Alex Shenstone   Callum Sivakumaran-Rogers

BREAK

11:05 | Presentations

Jack Shelbourn   Cecile Ogufere

Rana Ashraf Abdelkader Kandil

LUNCH

12:55 - 13:45 | Presentations

Obafemi Akinwotu
Caitlin MacNeill
Nicki Phillips

13:55 - 14:45 | Presentations

Tricia Reid
Rebecca Shipp
Vina Puspita

15:00 - 15:50 | 3MT Competition

Adam Barnett
Aarushi Kumar
Caitlin MacNeill

Luke Smith
Obinamuni Rajitha Madhawa
de Silva

Srikishan Vayakkattill
Yoon Ju Cho
Obafemi Akinwotu

15:50 - 16:30 | Prize Giving & Conference Close

Dr Ian Packer - Director of The Doctoral School

PGR
SHOWCASE

POSTERS

JACK SHELBOURN

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CREATIVE LIMITATIONS, PROBLEM SOLVING AND THE CINEMATOGRAPHERS ROLE IN TACKLING CLIMATE CHANGE

Film and television, through its history, has always been riddled with limitations. Be it the length of a film reel, the time the sun sets and the processing power of a CPU. As with many art forms, the artists behind film and television must make a choice. Allow these limitations to hamper creativity and bend to their will. Or find a way to use these limitations to enhance creativity and perhaps even make something better than originally intended.

There is no greater limitation that humanity currently faces than climate change. The need for society to embrace sustainable practices and change many of the habits and comforts we take for granted. To allow us to begin to limit the effects of climate change, let alone begin to reverse it. Will have an impact on the film and television industry just as much as anywhere else.
By its very nature film production is all about problem solving. The climate crisis is one major problem. Film should be at the forefront of the solution as the workforce are some of the best problem solvers around.7

This paper will ask the question:
What limitations are required for a film production and its crew to have meaningful impact on climate change? And how can these limitations result in new and exciting ways to tell story and fuel creativity in the art and craft of cinematography?

PHILIP JOHNSON

SOFT ROBOTIC GRIPPER ENHANCES THE SHELF LIFE OF HARVESTED BLACKBERRIES

Soft robotic grippers are intrinsically delicate while grasping objects, and can rely on mechanical deformation to adapt to different shapes without explicit control. These characteristics are particularly appealing for agriculture, where items of produce from the same crop can vary significantly in shape and size, and delicate harvesting is among the first concerns for fruit quality. Various soft robotic grippers have been proposed for harvesting different produce types, however their employment in field testing has been extremely limited.

We have developed the first closed structure soft gripper for the harvest of blackberries. We adapted an existing gripper concept, initially testing it on a sensorised raspberry physical twin. Then, followed grower-guided protocols to pick blackberries in farm polytunnels, and to evaluate the shelf life in comparison with berries picked by professional human pickers. Our results with ten experimental varieties showed a picking success rate of 95.4% demonstrating the capability of a closed structure gripper to adapt mechanically to fruit-shape variability. Moreover, a shelf life assessment on seven measured traits reported greatly improved shelf life of between 30 and 150%, across all traits for gripper harvested blackberries. Our study demonstrates the potential of soft grippers for delicate fruit harvesting, and indicates how to increase the impact of robotics in agriculture.

ROKSANA KULENGOWSKA

TRANSIT DEPTH VARIATIONS AS A METHOD FOR DETECTING MISALIGNED EXOMOONS

The poster shows the ongoing progress of a master's project investigating exomoons through transit analysis. The research employs mathematical equations and computational languages, specifically Python and MATLAB, to compute transit depths and identify variations. Additionally, the study integrates the radial velocity method to enhance the comprehensive analysis of exoplanetary systems.

The methodology involves comparing computed transits, utilising the detection method of transit depth, and using radial velocity to identify specific system characteristics. The research aims to discern potential indicators of misaligned exomoons by scrutinising variations within transits and radial velocity patterns. This multifaceted approach adds a valuable dimension to exomoon detection, contributing significantly to the broader research community's understanding of celestial bodies beyond our solar system.

The poster highlights the significance of mathematical models and computational tools, emphasising the role of Python and MATLAB in analysing transits combined with radial velocity and other necessary detection methods. Integrating these computing languages strengthens the research's foundation, enabling a more comprehensive exploration of potential exomoon signatures.

The poster presents the current progress and details the computational techniques employed; the poster positions this research at the forefront of exoplanetary science. The combination of transit depth, radial velocity, and advanced computational methods offers a promising avenue for uncovering new facets of our understanding of celestial bodies in distant solar systems, making a noteworthy contribution to the field.

KIMBERLEY BIRD

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PUSHING THE LIMITS OF CELL SEGMENTATION MODELS FOR IMAGING MASS CYTOMETRY

Imaging mass cytometry (IMC) is a relatively new technique for imaging biological tissue at subcellular resolution. In recent years, learning-based segmentation methods have enabled precise quantification of cell type and morphology, but typically rely on large datasets with fully annotated ground truth (GT) labels. This paper explores the effects of imperfect labels on learning-based segmentation models and evaluates the generalisability of these models to different tissue types. Our results show that removing 50% of cell annotations from GT masks only reduces the dice similarity coefficient (DSC) score to 0.874 (from 0.889 achieved by a model trained on fully annotated GT masks). This implies that annotation time can in fact be reduced by at least half without detrimentally affecting performance. Furthermore, training our single-tissue model on imperfect labels only decreases DSC by 0.031 on an unseen tissue type compared to its multi-tissue counterpart, with negligible qualitative differences in segmentation. Additionally, bootstrapping the worst-performing model (with 5% of cell annotations) a total of ten times improves its original DSC score of 0.720 to 0.829. These findings imply that less time and work can be put into the process of producing comparable segmentation models; this includes eliminating the need for multiple IMC tissue types during training, whilst also providing the potential for models with very few labels to improve on themselves.

SYLVESTER NDIDIAMAKA NNADI

MULTIMODAL FLEXIBLE STRAIN SENSOR FOR PERSPECTIVE SOFT ROBOTS

Medical and agricultural robots that interact with living tissue or pick fruit require tactile and flexible sensors to minimise or eliminate damage. Until recently, research has focused on the development of robots made of rigid materials, such as metal or plastic. Due to their complex configuration, poor spatial adaptability and low flexibility rigid robots are not fully applicable in some special environments such as limb rehabilitation, fragile objects gripping, human-machine interaction, and locomotion [1]. All these should be done in an accurate and safe manner for them to be useful. However, the design and manufacture of soft robot parts that interact with living tissue or fragile objects is as straightforward. Given that hyper-elasticity and conductivity are involved, conventional (subtractive) manufacturing can result in wasted material (which are expensive), incompatible parts due to different physical properties, and high costs. In this work, additive manufacturing (3D printing) is used to produce a conductive, flexible, composite flexible sensor. Its electrical response was tested based on various physical conditions. Finite Element Analysis (FEA) was used to characterise its deformation and stress behaviour for optimisation to achieve functionality and durability.

ROSEMARY M. HOYLE

AN EXPLORATION OF THE RELATIONSHIP BETWEEN THE BOARD CHAIR AND THE EXECUTIVE LEADER IN THE ENGLISH STATE EDUCATION SYSTEM; A LITERATURE REVIEW AND NEXT STEPS

There is broad agreement across a number of sectors that the relationship between the board chair and the executive leader is important not only to the functioning of governance but to the success of organisations. In the education sector studies by James et al. (2010; 2012a; 2012b) and Connolly and James (2022) argue that the importance of this relationship makes it a subject worthy of further research. Enshrined in guidance in the Headteachers' Standards, the Chairs' Handbook and in a guidance document, produced by the National Governance Association and education unions, there is commitment from government and both sides of the relationship to effective, professional working practices - but what makes the relationship work?

A literature review was undertaken using an interdisciplinary approach, necessitated by the lack of educational research in the English state education sector. The review draws on work from the corporate, non-profit and health sectors where similar organisational and governance structures exist. All sectors noted the paucity of research in this area and the search process was iterative as a series of themes were explored such as the chair as a leadership role, understanding roles and responsibilities, shared values, trust, and the role of power in the relationship. The methodological approach to the next stage of this research project was informed by reviewing those selected in the key studies identified in the literature review. Finally, the next steps involved in the upcoming data collection are described.

JIAXIN ZUO

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MUCOADHESION ABILITY OF PROTEIN FROM LOTUS (NELUMBO NUCIFERA GAERTN.) SEEDS, RELATIVE TO MILK CASEIN AND GELATINE AS WELL-RECOGNIZED MUCOADHESIVE BIOPOLYMERS

Mucoadhesive biopolymers such as of proteins and polysaccharides have been used in pharmaceutical industry in delivering active pharmaceutical ingredient (API) in drugs, however, was not extensively studied in food. Salt reduction can be made possible in the food industry without compromising taste by prolonging retention time on the mucosa using the mucoadhesion mechanism. The objective of this study was to investigate the mucoadhesive properties of lotus seed protein (LSP) alongside milk casein (CA) and gelatine (G). The ability of the biopolymers to interact with mucin was studied through mucin adsorption assay, turbidity increase during 6 h of interaction and viscosity increase (known as the 'force of bioadhesion'). The interaction was studied at different biopolymer concentrations (2-10% for proteins, except for G which was studied at 1-5%, due to its high gelling capacity). Samples were also treated with thermal treatment (H, 85^0C/30 min), ultrasounds (US, 50% amplitude at 40^0C/30 min) or heating followed by ultrasounds (H+US) to study the impact of such treatments on the mucoadhesion ability of proteins. The mucin adsorption and interaction with proteins have shown a clear trend with a descending order of CA > G > LSP. CA and G have shown higher mucin adsorption capacity than LSP. Increasing LSP concentration showed a declining trend in mucoadhesion, unlike CA which showed no significant impact on protein content. The increase in G content to 3% showed the maximum adhesion, which was then declined with further increase in concentration to 5%. Intact or heat-treated gelatine had high ability to interact with mucin, unlike US or H+US, which reduced adhesion. Similarly, higher mucoadhesion has been shown by intact CA. On the other hand, LSP did not show considerable changes with any of the treatments. The above tests provided a basis for selecting the concentration of the mucoadhesive material and the treatment method, and laid the foundation for subsequent exploration of the composite material.
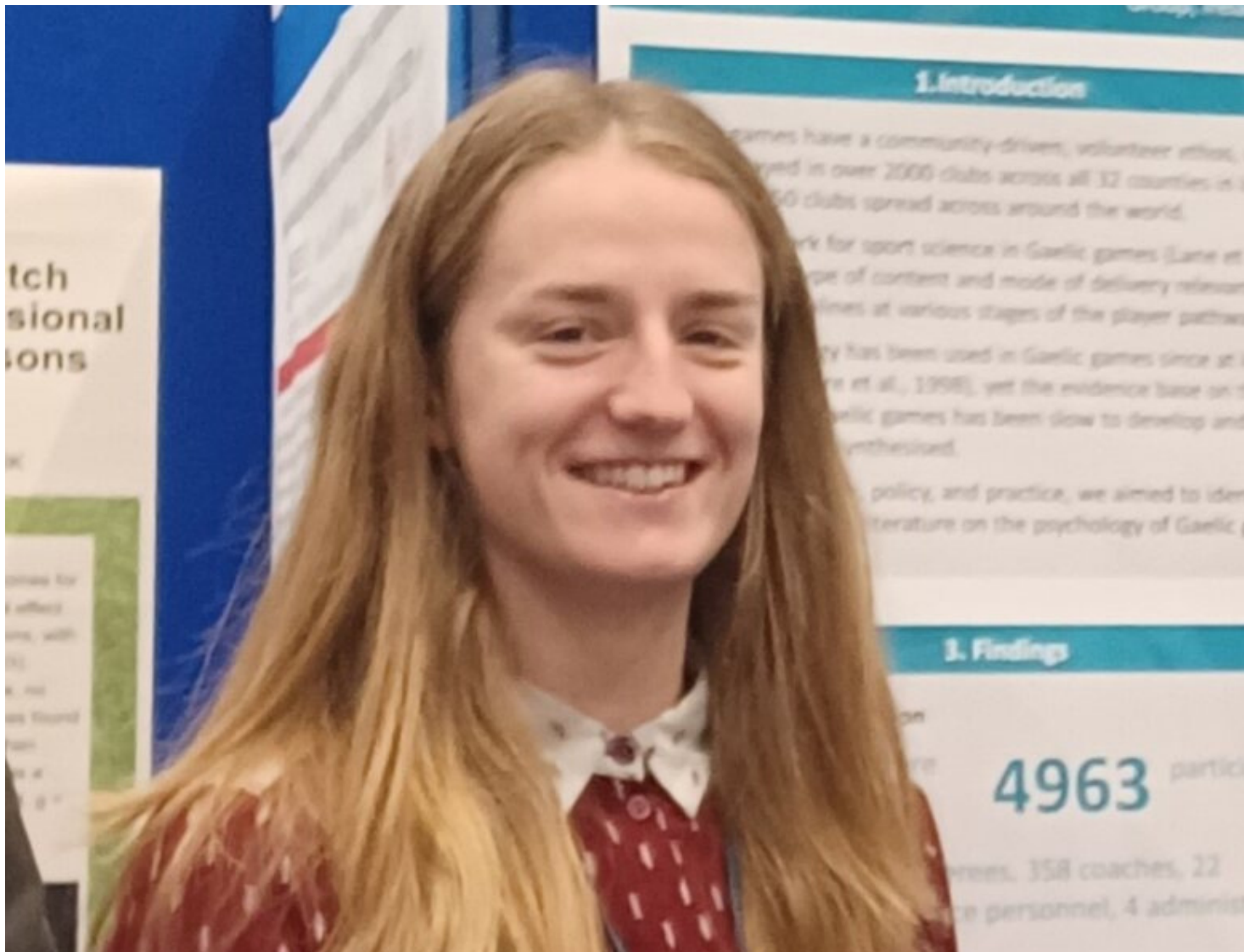
NICOLE WELLS

EXPLORING YOUNG PEOPLES' LIFE SKILL DEVELOPMENT AND TRANSFER THROUGH SPORT

Youth participation in sport has the potential to facilitate positive youth development (PYD). Life skills, a form of PYD, are defined as skills that individuals develop that allow them to be successful in the different environments in which they live. Although understanding has advanced for life skill development in young athletes and, to a lesser extent, life skills transfer, knowledge generated to date has focused on adults, and what they can and should do to facilitate youth development, rather than how young people experience this development and transfer. The aim of this PhD is to explore youth athletes' lived experiences of life skills development and life skills transfer, and to include young peoples' perspectives in the co-creation of a life skills intervention framework. An initial cross-sectional study was conducted to explore youth athletes' perceptions of the life skills they currently have, and their wellbeing, enjoyment of, and engagement with sport. Findings suggested positive relationships between life skills and wellbeing, with wellbeing also a predictor of each of the eight life skills measured. Future studies will use a longitudinal approach to further explore the development and transfer process and involve working with young people as co-creators to design a youth-centred life skill development intervention framework.

MONA ABDELMAKSOUD

DRUG RESISTANCE PROFILE AND WHOLE GENOME ANALYSIS OF HYDROGEN SULPHIDE (H2S) PRODUCING BACTERIA IN POULTRY SETTINGS: A STEP TOWARDS MANAGEMENT

Hydrogen sulphide-producing microorganisms are common in the poultry industry. Exposure to the noxious H2S gas can irritate the respiratory system and eyes, even at low concentrations. In this study, environmental swabs, faecal, carcass, and feather samples were obtained from poultry processing facilities in the United Kingdom. From each sample, Xylose Lysine Deoxycholate and Hektoen Enteric agars were used for selective isolation of H2S-producing bacteria. The antibiotic susceptibility profile of each isolate to ampicillin, ceftriaxone, ceftazidime, ertapenem, imipenem, meropenem, gentamicin, streptomycin, azithromycin, tetracycline, ciprofloxacin, nalidixic acid, pefloxacin, co-trimoxazole, and chloramphenicol was determined using Clinical and Laboratory Standards Institute guidelines for disc concentration and result interpretation. The whole genome of all isolates was sequenced for molecular characterization and identification of antimicrobial resistance genes (ARGs). A total of 28 H2S-producing bacteria were recovered and phylogenetic analysis identified 14% of the isolates as Salmonella enterica, while 32% and 54% belonged to Citrobacter (braakii and werkmanii) and Proteus mirabilis, respectively. All isolates were resistant to at least two antibiotics except for one strain of S. enterica. Interestingly, one strain of C. braakii, P. mirabilis, and C. werkmanii showed resistance to 7 (AMP-CN-S-AZM-TE-CIP-PEF), 3 (S-TE-CIP), and 2 (AMP-CIP) antibiotics belonging to 5, 3, and 2 antibiotic classes, respectively. The genomes of these isolates contained 10, 6, and 33 ARGs, respectively. While this project is ongoing, our current data provides insight into potential intervention strategies and emphasises the need for monitoring H2S-producing microorganisms in poultry settings to ensure food quality and staff safety.

CAITLIN MACNEILL

RAMAN SPECTROSCOPY AS A NOVEL NON-INVASIVE TECHNIQUE TO ASSESS WILDLIFE WELFARE

Chronic stress is a prominent issue for animal welfare because it can lead to long-term health issues. One method to assess animals long-term stress is to measure their hair cortisol concentrations (HCC). This non-invasive method gives an insight into the last few weeks to months of cortisol production. Current techniques to measure HCC include Immunoassays and Liquid chromatography-mass spectrometry (LC-MS), which is considered the gold standard in analysis. However, both of these methods have limitations. They are time-consuming, destructive, expensive, and LC-MS is impractical for field use. To combat these limitations, we propose using Raman spectroscopy as a rapid, cheaper, and non-destructive technique which also has in-situ applications, with the recent development of handheld devices. Raman works by irradiating the sample with a laser which causes molecular vibrations that scatter the light waves. The scattering is measured and produces spectra which are unique to specific molecules. Cortisol concentrations can be quantified by comparing the intensity of these spectra with known concentrations to create a calibration curve. Spectra from hair samples can be added to this calibration to determine the concentration of cortisol present within the hair matrix. These measures can then be validated by analysing the same hairs using LC-MS. Preliminary results have successfully created calibration curves of varying cortisol concentrations using both LC-MS and Raman. In future hair analysis using Raman, we expect overlapping signals from the hair matrix making it difficult to define cortisol concentrations using peak intensity alone. To minimise these effects, we intend to use multivariate analysis to remove all signals present that do not directly relate to cortisol. If successful, using Raman to monitor stress levels by hair analysis could greatly improve animal welfare by offering a rapid, in-situ detection method that may be applied to both wild and domesticated animals.

BEHNAZ AZIMZADEH

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ENCAPSULATION OF ESSENTIAL OILS OF ROSEMARY, CINNAMON, OREGANO, AND THYME IN SACCHAROMYCES CEREVISIAE TO ENHANCE THEIR ANTIMICROBIAL ACTIVITY IN SELECTED FOODS.

Encapsulation of essential oils of rosemary, cinnamon, oregano, and thyme in Saccharomyces cerevisiae to enhance their antimicrobial activity in selected foods.

The biocompatible and biodegradable yeast cells can be exploited to microencapsulate a range of active compounds. The aim of the present study was to investigate the encapsulation of essential oils (EO) of rosemary, cinnamon, oregano, and thyme in Saccharomyces cerevisiae cells (SCC) and determine its application as an antimicrobial preservative in foods. In independent trials, the EO's was encapsulated into untreated and autolyzed SCC and the physicochemical and morphological characteristic of the loaded cells were examined. Scanning electron imaging showed that encapsulation at 45 °C for 15minutes preserved viable, loaded cells with no evident cell damage. EO encapsulated in SCC was quantified using an ultraviolet–visible spectrophotometer. Findings revealed that approximately 0.64 mg, 0.83 mg, 0.77 mg, and 2.82 mg of thyme, cinnamon, oregano, and rosemary was encapsulated in every 50mg of SCC. Autolysis of the SCC had no significant effect on the concentration of encapsulated essential oil. Gas chromatography mass spectrometry was used to identify bioactive compounds in the selected essential oils. The highest bioactive compounds in rosemary, cinnamon, in oregano, and in thyme were camphor, eugenol, carvacrol and thymol, respectively. This study has identified the optimum conditions for encapsulation of Eos, among the pretreatment methodologies explored, the autolysis method stands out for its ability to induce minimal damage to yeast cells while achieving a notably high encapsulation efficiency. Furthermore, the encapsulation of essential oils within yeast cells has demonstrated promise as a viable carrier, effectively preserving their antioxidant and antibacterial properties. However, identification of bioactive compound encapsulated in the SCC and its application as an antimicrobial agent in food is ongoing.

CECILE OGUFERE

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THE UNTOLD STORY OF NOMADIC EDUCATION FOR FULANI PASTORALISTS IN NORTHERN NIGERIA

The modern approach of 'education for all' as a global policy is acknowledged widely as an essential goal by most nation states in a World Conference held in 1990 in Jomtien, Thailand, and a vital tool for economic development (Imam, 2012). Nigeria has embraced this and developed a policy of providing universal basic education that includes the needs of its nomadic community. However, until recently literature has historically shown a postcolonial approach to the education needs of the masses, often excluding minority groups such as nomads that were in many respects represented as a 'hard to reach' group (Freire, 1970 and Dyer, 2014). For example, Carr-Hill and Peart found low school enrolment rates of pastoral nomads in a study of six East African countries (Carr-Hill & Peart, 2005). Indeed, past policies such as the 'universal primary education' in Nigeria, either excluded or fell short of the needs of the nomadic community. For instance, there are claims that prior education policies were designed to make nomads sedentary which is contrary to their way of life (Chatty, 2007). Other studies suggested that the English language of instruction provided Western influence that was frowned upon by the nomadic community (Akpan, 2015). Studies on nomadic education tend to be fragmented, offering 'single stories' instead of a wholistic picture. Research has yet to uncover other areas such as institutional challenges. Therefore, the thesis aims to offer a more complete representation of one nomadic group, that of the Fulani pastoralists and their relationship with education in northern Nigeria, uncovering various challenges and successes as a community. An indigenous methodological approach is taken, viewing emerging literature with postcolonial lens, while taking a communitarian and participatory approach when collecting primary data from focus groups of nomadic pastoralists. The outcome should contribute to improved policy making for their education.

ROSE YAA AMOAH MANTE

DEVELOPMENT OF A METHOD FOR THE DETECTION OF MICROORGANISMS IN FOODS

The UN's Food and Agriculture Organization's 2011 report approximated one-third of global food production is wasted or lost during the journey from farm to table (FAO, 2011). Reducing food waste is one of the prominent goals in the current research, which the United Nations have also set to achieve a more sustainable world by 2030. Microbial contamination is a leading cause of food spoilage, with bacteria affecting high water-content foods and moulds/yeast impacting low water-content ones. Various detection methods, from sensory to sensitive techniques, are employed to identify spoilage, as factors influencing spoilage contribute to a shorter shelf life of food. Spoilage microorganisms are responsible for product spoilage and place an economic burden on the producers, processors, and retail store owners for product losses. Foodborne pathogen contamination in foods presents a serious challenge which may result in severe diseases such as food intoxication, toxicoinfection, and infection. According to Chen et al., (2019), a good rapid detection method should follow the "ASSURED" principles as proposed by the World Health Organization, namely "(1) Affordable, (2) Sensitive, (3) Specific, (4) User-friendly, (5) Rapid and Robust, (6) Equipment-free and (7) Deliverable to end-users". Since the above-outlined methods do not fulfill all the "ASSURED" requirements, there is a need to develop a novel semi-quantitative detection method or technique capable of meeting these principles to enhance the rapid detection and quantification of microorganisms of interest in foods. Therefore, the objectives of this project are as outlined below.

1. Conduct a systematic review of the advances made in detecting microorganisms in foods and the detection factors that affect the growth and presence of microorganisms in food. **2.** Identifying the target organism(s) of interest for developing a rapid semi-quantitative detection method. **3.** Detection and quantification of microbial contaminants in food using molecular techniques. **4.** Development of a novel rapid semi-quantitative technique for microbial contaminants in food. **5.** Benchmark the detection method against existing detection methods.

FOLASADE AKINWUMI

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STRUCTURE, FUNCTIONAL AND PHYSICOCHEMICAL PROPERTIES OF STARCH AND PROTEIN FROM TWO RUNNER BEAN (PHASEOLUS COCCINEUS) VARIETIES

The growing human population and the impact of animal protein consumption on carbon footprints has increased the demand for plant-based foods by health-conscious consumers and the food industry. Neglected and underutilised crops such as runner bean are considered future food security crops that could be used to deliver value-added ingredients in the food industry. The underutilisation of many pulses including runner bean may be associated with the difficulty in cooking, high level of antinutrients and limited research to unlock their potentials. Runner bean is a starchy grain that contains relatively high protein (18.93 – 23.80%) and appreciable amounts of glutamic acid when compared to other pulses.

The starch and protein in runner bean represent valuable ingredients for the UK food and drink industry. For example, the starch could be modified and used as a thickening agent, while the postein hydrolysate and peptide fractions may be potentially used as ingredients in the formulation of functional foods and nutraceuticals against high blood pressure and oxidative stress. To enhance the use of runner bean grown in Europe including the UK as a food and industrial crop, a knowledge of their major components such as starch and protein is important. Hence, the aim of this research is to determine the structure, functional and physicochemical properties of starch and protein from two runner bean varieties (scarlet and white) using established methods.

A preliminary study on the colour parameters (L*= Lightness, -a*= greenness, +b* = yellowness) of the runner bean variant showed significant differences in their L* values (white = 84.98; scarlet = 31.04). This may be associated with the differences in their grain coat colour. This study is expected to unravel the potential of runner bean protein and starch isolates for food and industrial applications.

TAIWO EVELYN FABOYA

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PHYSICOCHEMICAL PROPERTIES OF FLOUR AND PROTEIN ISOLATE FROM NEGLECTED AND UNDERUTILISED LEGUMES AND THEIR POTENTIAL USE
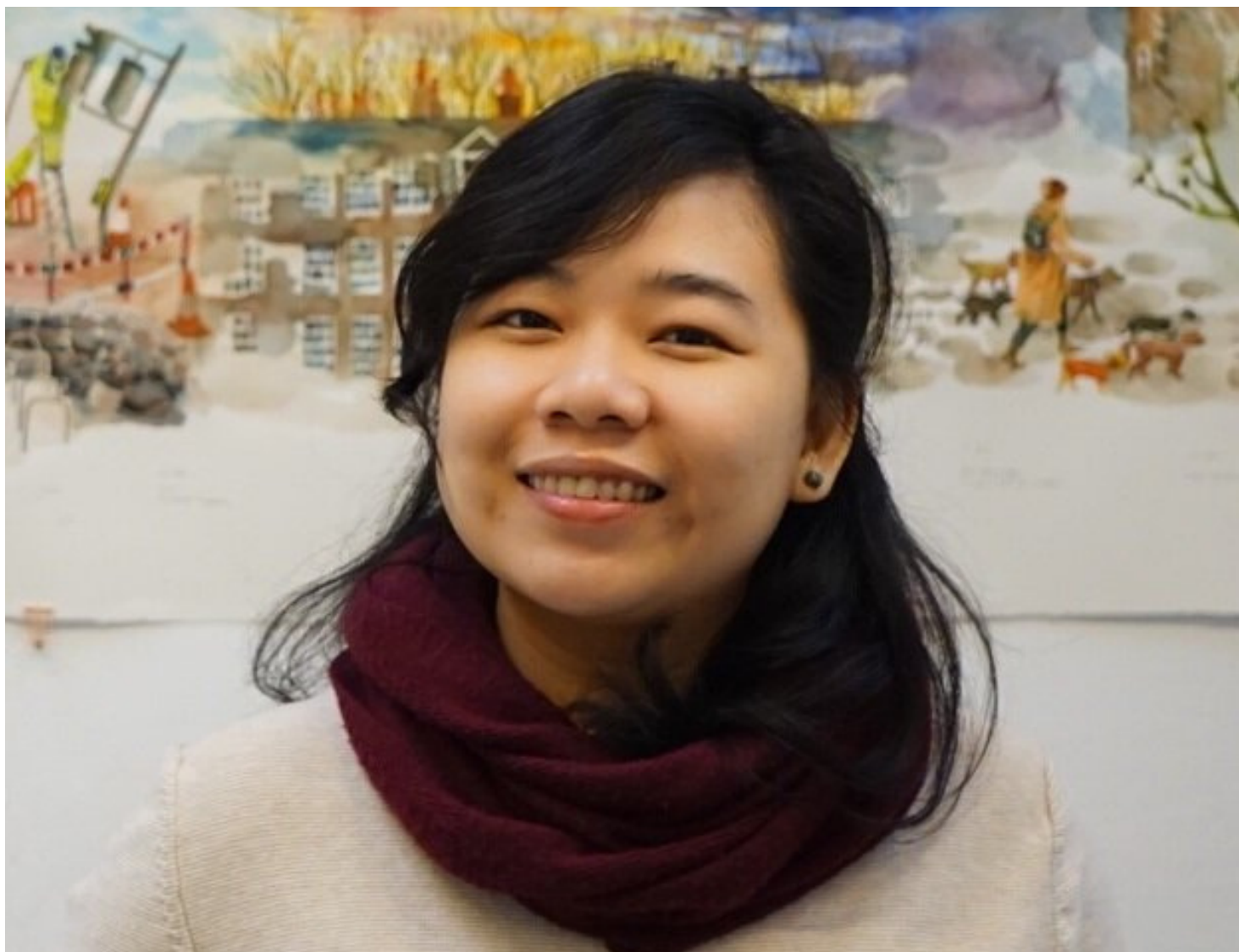
The growing need for plant-based protein and growing awareness of the nutritional and health benefits of alternative protein sources have encouraged researchers and the food sector to explore unconventional sources of protein. Six neglected and underutilised legumes including the African yam bean, broad bean, climbing bean, dwarf French bean, runner bean, and sugar pea, were examined in this study. The legume with the highest protein content was chosen for protein extraction using the alkaline method, which was followed by the isoelectric precipitation method. The protein isolate's yield, protein recovery, and functional characteristics were then examined. There was variation in the L*, a*, and b* values of the grain and flour. The flours showed lower a* values (0.28-5.83) and higher L* values (83.12-92.75), making them lighter and less reddish than the corresponding grains. The colour of the grain determines the colour of the legume flour and the resulting protein isolate. All six of the legumes flour that were examined are excellent sources of protein (18.45 -25.65%), but the broad bean had the highest percentage (25.65%). Broad bean also had more of the polar amino acids (13.95 g/100 g) when compared to other samples. The total Amino acid content was between 8.13 -9.71 g/100 g while the non -essential amino acid ranged between 9.37-13.95 g/100 g. Broad bean is high in protein and outperform other legumes investigated. Broad beans therefore provide the possibility to yield protein isolate for use in specialist foods.

JOHN ODGERS

STRENGTH AND CONDITIONING PRACTICES OF NATIONAL HOCKEY LEAGUE STRENGTH AND CONDITIONING COACHES AND SPORT SCIENTISTS

The purpose of this study was to provide an in-depth review of the current practices of strength and conditioning (S&C) coaches and sport scientists in the NHL and evaluate the new technology, exercises, and training methods being used. A survey was emailed to all 32 NHL S&C coaches and sport scientists/performance directors covering six main areas: Personnel Information, Physical Testing, In-season, Off-Season, Program Design, and Technology. The response rate was 62.5% (20/32). Ninety-five percent of teams had a head S&C coach, 85% had an assistant S&C coach, 50% had a performance director and 50% had a sport scientist. The most frequently assessed fitness variables were body composition (100%), power (95%), strength (80%), and dry-land anaerobic capacity (70%). All teams reported using a periodization model in the off-season, while only half used such an approach in-season. The most common types of technology used were heart rate monitors (100%), force plates/jump mats (95%), bar velocity tracking units (80%), Local Positioning System/inertial measurement units (70%), and the 1080 sprint (55%). The results of show an expansion in the personnel of NHL performance departments and extensive testing protocols with a high reliance on technology. This study serves as an in-depth review of the current practices of S&C coaches in the NHL, the new technology being used, and the new training methods being employed. This data can help guide S&C coaches on what practices and technology are being used at the highest level in ice hockey and provide a possible source for new ideas.

VINA PUSPITA

MEANINGFUL CHILD PARTICIPATION IN PEACEBUILDING: EXPLORING PARTICIPATORY MURAL ART IN JAKARTA'S URBAN NEIGHBOURHOOD

As an artist/researcher, my practice-based research explores participatory arts with young people in urban neighbourhoods in Jakarta to promote meaningful participation in peacebuilding. Focusing on the use of murals with children at risk of violence to express social and environmental issues, my study proposes a model of community-based participatory mural art that puts children at the centre, working alongside local leaders. The study explores the potential of public art to promote power-sharing and intergenerational collaboration while challenging the idea of children's participation in public space in Jakarta, which has always been contested. The research project involves children who are part of the Children's Forums at the urban village level. Within a series of mural projects, they work with different levels of government agencies and occupy different types of spaces. The study highlights the importance of child-friendly approaches, such as collaborative mural painting, in facilitating children's participation in society and encouraging critical reflection on their conditions. It reveals the complex issues facing young people in urban Jakarta and demonstrates how art can be used as a tool for advocacy and for bringing local leaders and young people into dialogue. The results demonstrate that participatory murals amplify children's voices and contribute to more meaningful participation by (1) decentring children's positioning, (2) exercising meaning through making, (3) building understanding through collaboration and dialogue, and (4) stimulating waves of action.

This study is part of Mobile Arts for Peace (MAP): Informing the National Curriculum and Youth Policy for Peacebuilding in Kyrgyzstan, Rwanda, Indonesia, and Nepal (2020-2024). MAP is a four-year international multidisciplinary project funded by the Arts and Humanities Research Council (AHRC) of UK Research and Innovation (UKRI) through the Global Challenges Research Fund (GCRF), with Professor Ananda Breed as Principal Investigator.

PGR
SHOWCASE

PRESENTATIONS

MAUREEN O'CALLAGHAN

ADOPTING AN ENTREPRENEURIAL APPROACH TO RESEARCH – ADDRESSING THE CHALLENGES

This presentation explores what it means to adopt an entrepreneurial approach to conducting research and commercialisation which are both underdeveloped themes in research. It is a rare example of the subject of the thesis also being the process of its development. These are areas worth investigating because of the increased requirement for research to have a sustainable impact.   The presentation identifies what challenges were faced in adopting this approach and the traits that were required to overcome these challenges. The presentation begins by reviewing the literature that includes Economic and Social Research Council (ESRC) guidance around achieving impact, it then introduces a cross disciplinary research study exploring prosocial behaviour in entrepreneurs,   before providing an overview of the arguments put forward for universities adopting an entrepreneurial approach, introducing the concepts of knowledge exchange and the commercialisation of research. The presentation then provides details of entrepreneurial activities that were undertaken to ensure the research had an impact which included setting up a community interest company, Beyond Money Education and Training CIC   It explores what this involved including some of the challenges that were faced and how these were addressed before concluding that while adopting an entrepreneurial approach to research helps to ensure impact, it is an approach that needs to be recognised as valid, is valued, and is consistently supported by the University. The presentation ends by making a number of recommendations.

DOAN THI MY LINH

GAMIFICATION STRATEGY IN ECOMMERCE MARKETING: INTERNATIONAL RESEARCH TRENDS SAND AVENUES AHEAD

In recent years, the advancement of technology has altered the way businesses interact with their customers. One of these strategies is Gamification, which is considered one of the top four marketing trends in the world in 2023 (Statista, 2023). Gamification has been growing in tandem with the proliferation of internet-enabled smartphones, and it is more and more appealing to young generations who have greater self-efficacy with digital experiences as well as greater expertise with digital games (Koivisto & Malik, 2021). Likewise, businesses, especially electronic platforms such as eCommerce and fintech organizations, have been utilizing this technique into their marketing strategies. However, studies on this area have been still fragmented, and in the absence of a unified and comprehensive understanding. To scrutinise this trend, we have performed a screening on 28,457 publications in the last decade from the Web of Science and Scopus, which are considered highly recognized academic database. VOSviewer and Bibliometrix package in R programming tool have then been employed to bibliometrically review the 1,399 shortlisted documents of 3,285 authors from 72 countries to identify key themes of research, uncover the most prolific authors and articles, and synthesise extant literature on the most recent trends that influence or alter the use of gamification techniques. The 31 elected eCommerce-related articles have then been systematically analysed in detail. The review has strategically generated a Thematic Map that proposes the developing literature with its transition from a traditional retail environment to online channels and identifies the emerging research trend in electronic commerce with the incorporation of the trendy Virtual Reality and Metaverse. The result asserts that the employment of gamified tactics in eCommerce marketing activities has a significant influence on the business outcomes. The study also sheds light on future research agendas.

RUTH ALET DUNIYA

REFLECTIONS OF A NORTHERN NIGERIAN WOMAN AND A UK-BASED AFRICAN

My thesis investigates how the livelihoods and wellbeing of internally displaced women (IDP women) and women in Urban Poor Households (UPHs) in Abuja, Nigeria, were impacted by the socioeconomic shocks resulting from COVID-19. This research aims to make a scholarly and policy-oriented contribution to the discourse on Social Development (SD) in a global context. Specifically, it seeks to explore how the lessons learned from the COVID-19 pandemic can inform the short, and long-term social development policies of the Nigerian government, United Nations development agencies, and other national or international development agencies. A reflexive statement was included in this qualitative research where I describe my experiences as I navigated the data collection process, in terms of conducting the focus group discussions with women IDPs and women in UPHs in Abuja and interviews with (a) community gatekeepers—leaders of local communities, IDP camp managers, and women leaders and (b) representatives of government, national, and international SD agencies. In this paper, I will present my reflexive statement for this research project. I shall begin with the importance of reflexivity in research and discuss what informed my decision to undertake this research project. Also, in my reflection, I draw on the complexities of my identity. First, as an African social development scholar based in the United Kingdom; and second, as a woman from northern Nigeria (the study setting, Abuja is also situated in northern Nigeria) conducting research in a familiar space.

KHALED YAGHI

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ATTACHMENT ORIENTATIONS AND MEANING IN LIFE

One is said to have meaning in life when they have coherence, significance, and purpose. My PhD investigates various factors that affect our senses of meaning in life such as our attachment orientations, ability to be mindful, authentic, trust others, and the type of motivation (intrinsic versus extrinsic).

JOANNA SHELTON

RECALLING A BEHIND-THE-SCENES ANIMAL ENCOUNTER IN A ZOO: AN INVESTIGATION INTO VISITORS' EXPERIENCES

Poor mental health and well-being are both nationally and internationally recognised as public health priorities. Recently health professionals have sought different alternative and more cost-effective approaches to improve well-being, including prescribing interacting with nature as a solution. Indeed, previous research has shown that nature-based activities were associated with improved wellbeing. Zoos could form a part of this approach; however, to date, there is little research linking well-being and zoo visits, and this research has not focused on the animal aspect of the interaction. Therefore, this research explores the impact of behind-the-scenes animal encounters at a zoo on visitor well-being. This research also investigated whether attachment to animals and connection to nature were associated with visitors' well-being.

189 participants were asked to recall their behind-the-scenes animal encounters and answer an online questionnaire about their experience and different measures of psychological restoration, well-being, learning, nature relatedness, attachment to animals and conservation caring. The findings indicated that most people (88%) reported a positive well-being outcome after their behind-the-scenes animal encounters. This was independent of a person's demographics, experience or type of animal encountered. Moreover, the results showed that learning was considered an essential part of a behind-the-scenes animal encounter, and important to a person's well-being. Moreover, the findings showed that attachment to animals and connection to nature were related to visitor's well-being, however, these two concepts were not related to each other, highlighting the difference in how people perceive nature and animal connections.

These findings highlight the need for further research focusing on behind-the-scenes animal encounters in zoos to better understand the specific outcomes of such encounters. Finally, further exploration of the relationship between nature and animal connections is crucial as these two concepts are often sought to be interconnected.

LUKE ARGYLE

EXPLORING A RANGE OF DOG-ASSISTED INTERVENTIONS USING ROBOTICS, VIRTUAL REALITY, AND VIDEOS

Animal-assisted interventions (AAIs) can provide beneficial effects to human wellbeing, and positive effects have also been shown for participants watching dog videos. So far, further areas of AAI application have remained unexplored, including integration of alternative intervention technologies. There is also a lack of longitudinal studies. The current study presents first results from short-term and longitudinal intervention effects using multiple dog-assisted interventions with real-life dogs (administered both in-person and remotely) and technology-based alternatives using robotic dogs, Virtual Reality (VR) dogs, and dog videos across a range of psychological measures in adults.

Methodology: Randomised controlled trials with repeated measures were utilised across 128 participants to assess effects of different intervention types before and after a 10 minute-intervention, and after 1 month. The study includes 6 testing conditions with 5 experimental intervention groups: 1) in-person dog-assisted intervention, 2) online dog-assisted intervention, 3) robotic dog, 4) VR dog, or 5) dog video, 6) no-treatment control group (reading a newspaper).

Main Results: ANOVAs of Condition (5 dog-assisted interventions and control) by Time (before/after interventions) showed significant improvements and beneficial effects: State and Trait Anxiety ($F(1,122)=56.573$, $p<0.001$, $\eta p^2=0.319$) and ($F(1,122)=77.824$, $p<0.001$, $\eta p^2=0.391$) respectively; Mental Wellbeing ($F(1,122)=34.356$, $p<0.001$, $\eta p^2=.221$); Stress ($F(1,122)=22.456$, $p<0.001$, $\eta p^2=0.157$) and Loneliness ($F(1,122)=18.073$, $p<0.001$, $\eta p^2=.130$). Improvements were not maintained after 1 month. Further results and implications will be discussed.

Principal Conclusions and Implications for Field: The present study is the first to explore effects of multiple dog-assisted interventions across a range of wellbeing assessments. Current results highlight the usefulness of alternative technologies on human wellbeing. These can be applied with those who cannot work with real dogs due to allergies, are located too remotely from dog handler access or cannot benefit from dog exposure due to setting or other restrictions. Further research will explore the effects of age and pet ownership.

ALEX SHENSTONE

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EPISTOLARY WRITING - WHY IS IT IMPORTANT?

My thesis, though formatted as a traditional novel, incorporates epistolary writing as an essential part of its narrative. Epistolary writing, the writing of letters, is something which has been fading out of society as we know it with the encroach of digital communications like e-mail, phone, and our many social media.. But in the past the sending and receiving of letters is all we had, particularly during times of conflict, and I use them as a key tool to show the growth and changes of my characters. As a result, much of my recent research has gone into the significance of letter writing in the 20th century, and how it has shaped our history and the ways we have developed as a social species. These observations, and how they relate to my thesis, are what I wish to share with you today.

CALLUM SIVAKUMARAN-ROGERS

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STRIPPED DOWN TO THE BONE?! THE STRIPPED-BACK STYLE OF EARLY 20TH CENTURY FRENCH MUSIC.

Style dépouillé—or, the stripped-back style—was a prominent compositional style in early twentieth-century France. French composers in the years surrounding the First World War felt it necessary to rediscover and reinvigorate what they perceived to be their waning French identity. Musique dépouillé (stripped-back music) represented one popular stylistic avenue for swathes of musicians who sought to restoke their own nationalism. In this presentation I underline the current musicological position on style dépouillé, and demonstrate how my work expands, reshapes, and repositions musicological research into the moniker. I look at the origins of the style, draw upon lesser-known examples from solo-piano repertoire, and propose a methodology for analysing whether a composer might have facilitated a process of dépouillement (process of stripping-back) in their compositional style.

JACK SHELBOURN

CREATIVE LIMITATIONS, PROBLEM SOLVING AND THE CINEMATOGRAPHERS ROLE IN TACKLING CLIMATE CHANGE

Film and television, through its history, has always been riddled with limitations. Be it the length of a film reel, the time the sun sets and the processing power of a CPU. As with many art forms, the artists behind film and television must make a choice. Allow these limitations to hamper creativity and bend to their will. Or find a way to use these limitations to enhance creativity and perhaps even make something better than originally intended.

There is no greater limitation that humanity currently faces than climate change. The need for society to embrace sustainable practices and change many of the habits and comforts we take for granted. To allow us to begin to limit the effects of climate change, let alone begin to reverse it. Will have an impact on the film and television industry just as much as anywhere else.
By its very nature film production is all about problem solving. The climate crisis is one major problem. Film should be at the forefront of the solution as the workforce are some of the best problem solvers around.7

This presentation will ask the question:
What limitations are required for a film production and its crew to have meaningful impact on climate change? And how can these limitations result in new and exciting ways to tell story and fuel creativity in the art and craft of cinematography?

CECILE OGUFERE

THE UNTOLD STORY OF NOMADIC EDUCATION FOR FULANI PASTORALISTS IN NORTHERN NIGERIA

The modern approach of 'education for all' as a global policy is acknowledged widely as an essential goal by most nation states in a World Conference held in 1990 in Jomtien, Thailand, and a vital tool for economic development (Imam, 2012). Nigeria has embraced this and developed a policy of providing universal basic education that includes the needs of its nomadic community. However, until recently literature has historically shown a postcolonial approach to the education needs of the masses, often excluding minority groups such as nomads that were in many respects represented as a 'hard to reach' group (Freire, 1970 and Dyer, 2014). For example, Carr-Hill and Peart found low school enrolment rates of pastoral nomads in a study of six East African countries (Carr-Hill & Peart, 2005). Indeed, past policies such as the 'universal primary education' in Nigeria, either excluded or fell short of the needs of the nomadic community. For instance, there are claims that prior education policies were designed to make nomads sedentary which is contrary to their way of life (Chatty, 2007). Other studies suggested that the English language of instruction provided Western influence that was frowned upon by the nomadic community (Akpan, 2015). Studies on nomadic education tend to be fragmented, offering 'single stories' instead of a wholistic picture. Research has yet to uncover other areas such as institutional challenges. Therefore, the thesis aims to offer a more complete representation of one nomadic group, that of the Fulani pastoralists and their relationship with education in northern Nigeria, uncovering various challenges and successes as a community. An indigenous methodological approach is taken, viewing emerging literature with postcolonial lens, while taking a communitarian and participatory approach when collecting primary data from focus groups of nomadic pastoralists. The outcome should contribute to improved policy making for their education.

RANA ASHRAF ABDELKADER KANDIL

AI AND VR-ASSISTED APPROACHES FOR ENHANCING CARBON FOOTPRINT AWARENESS AND MOTIVATING SUSTAINABLE BEHAVIORS IN EUROPEAN UNION CITIES

The urgency of addressing climate change is underscored by increasing carbon emissions, with cities contributing approximately 70% of global CO_2 emissions. This research addresses the carbon footprint problem, defined as the total greenhouse gas emissions caused by an individual, event, organization, service, or product, expressed as carbon dioxide equivalent. In European Union cities, where urbanization and industrial activities intensify environmental impacts, understanding and reducing the carbon footprint is crucial. This study aims to leverage Artificial Intelligence (AI) and Virtual Reality (VR) to enhance public awareness and promote sustainable behaviors in EU cities. The Objectives include: 1) Quantifying current awareness levels and carbon footprint contributions; 2) Developing and implementing AI and VR tools for education and behavioral influence; 3) Evaluating the effectiveness of these technologies in promoting sustainable urban lifestyles. The proposed methodology employs a mixed-methods approach, integrating qualitative literature review and quantitative experimental research. The methodology involves initial surveys to gauge current awareness levels, followed by the design and implementation of AI and VR interventions. The effectiveness of these interventions will be assessed through post-implementation surveys and behavioral observation studies. Data will be gathered through pre- and post-intervention surveys, user interaction data with AI and VR tools, and environmental impact assessments. Statistical analyses and AI-powered data processing techniques will be used to interpret the data, focusing on changes in awareness, attitudes, and behaviors regarding carbon footprint reduction. The research is expected to demonstrate a significant increase in awareness and proactive behaviors towards carbon footprint reduction in EU cities. The outcomes are anticipated to provide a model for utilizing advanced technologies in environmental education and behavioral change, contributing to long-term sustainability goals. It is predicted that such technology-based interventions could lead to a reduction of up to 30% in individual carbon footprints in urban areas, aiding the EU's agenda for a sustainable and eco-friendly urban future. In conclusion, this study aims to bridge the gap between technological advancements and environmental sustainability, offering a novel approach to combating one of the most pressing issues of our time.

OBAFEMI AKINWOTU

THE DEVELOPMENT OF A FOAM-BASED DIET FOR DYSPHAGIA PATIENTS: INNOVATIONS AND CHALLENGES

Aim: The study aimed to explore methods for creating dysphagia-friendly foods for chronic dysphagia patients.

Method: Carrot-based puree with algae was produced at different blending ratios (1:0.25–1:0.75) and hydrocolloid concentrations (guar gum, k. carrageenan, xanthan gum) (2–5%), and then microwave-heated at 400W for 5 min. Instrumental tests (rheological and texture analysis) and visual tests, such as kitchen spoons and forks, as well as tests for phytonutrients (total phenolics and antioxidants), were employed.

Main Findings:
Investigations into the assessment of microwave-heated carrot puree resulted in carrot-water blends (1:0.5) with 2.5% xanthan gum and 2% guar gum. However, textural stability and phytonutrient levels were found to be affected by the cooking temperature.

Conclusion: Alternative processing technologies to microwave treatments, such as sonication and aeration treatments, can be employed. Additionally, the orange carrots, which were affected by the green chlorella, can be replaced with green peas. This exploration could lead to the establishment of a novel method with the potential to facilitate the oral intake of chronic dysphagia patients.

CAITLIN MACNEILL

RAMAN SPECTROSCOPY AS A NOVEL NON-INVASIVE TECHNIQUE TO ASSESS WILDLIFE WELFARE

Chronic stress is a prominent issue for animal welfare because it can lead to long-term health issues. One method to assess animals long-term stress is to measure their hair cortisol concentrations (HCC). This non-invasive method gives an insight into the last few weeks to months of cortisol production. Current techniques to measure HCC include Immunoassays and Liquid chromatography-mass spectrometry (LC-MS), which is considered the gold standard in analysis. However, both of these methods have limitations. They are time-consuming, destructive, expensive, and LC-MS is impractical for field use. To combat these limitations, we propose using Raman spectroscopy as a rapid, cheaper, and non-destructive technique which also has in-situ applications, with the recent development of handheld devices. Raman works by irradiating the sample with a laser which causes molecular vibrations that scatter the light waves. The scattering is measured and produces spectra which are unique to specific molecules. Cortisol concentrations can be quantified by comparing the intensity of these spectra with known concentrations to create a calibration curve. Spectra from hair samples can be added to this calibration to determine the concentration of cortisol present within the hair matrix. These measures can then be validated by analysing the same hairs using LC-MS. Preliminary results have successfully created calibration curves of varying cortisol concentrations using both LC-MS and Raman. In future hair analysis using Raman, we expect overlapping signals from the hair matrix making it difficult to define cortisol concentrations using peak intensity alone. To minimise these effects, we intend to use multivariate analysis to remove all signals present that do not directly relate to cortisol. If successful, using Raman to monitor stress levels by hair analysis could greatly improve animal welfare by offering a rapid, in-situ detection method that may be applied to both wild and domesticated animals.

NICKI PHILLIPS

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HOW DOES PERCEPTION OF ZOO ANIMAL WELFARE INFLUENCE PUBLIC ATTITUDES, EXPERIENCES, AND BEHAVIOURAL INTENTIONS? A MIXED-METHODS SYSTEMATIC REVIEW

The public expects zoos to provide high standards of animal care; failing to meet public expectations can have detrimental impacts on public experiences and behaviour, which in turn can compromise zoos' organisational goals relative to conservation and public education. Despite increased research interest in understanding how the public perceives animal welfare in zoo settings, to date it is still unclear what factors influence such perceptions. To address this gap in knowledge, we conducted a mixed methods systematic review using a PRISMA approach to identify the factors that influence public perceptions of zoo animal welfare and the potential ramifications of these perceptions on public attitudes, experiences, and behaviours. A total of 115 peer reviewed journal articles were analysed: 43 provided qualitative data for thematic synthesis, 85 quantitative data for content analysis. Three main groupings were identified that impacted public perception of animal welfare in zoos: human, animal, and environmental factors. Within the human factors, ethical justifications, direct interactions, and inappropriate visitor behaviours were particularly important. For the animal factors, animals' behaviour, apparent health status, and the suitability of certain taxa for captivity were found to be key. Finally, several aspects of the environment -- conditions of the facility, the exhibit, and welfare-related educational material --were influential. Overall, negative perceptions of animal welfare were associated with poorer visitor zoo attitudes and experiences and lowered likelihood to visit zoos and engage in conservation efforts. The articles in this review provided valuable insights into the factors affecting public perception of zoo animal welfare; however, future research may benefit from a more structured approach to increase comparability and validity of results across studies. We conclude by proposing a framework outlining 7 considerations to increase the robustness and validity of future research in this area.

TRICIA REID

LITERARY BIOFICTION: A COLLECTION OF FRAGMENTS. INTERTEXTUAL BORROWINGS IN 'THE MASTER AT ST BARTHOLOMEW'S HOSPITAL 1914-1916' BY JOYCE CAROL OATES.

My paper addresses how the structures of literary biofictions are made up of fragments, quotes, and borrowings of the subject's writings. Literary biofictions are stories (most commonly novels) about writers, and my research focuses on the rhetorical strategies involved in writing a fictional narrative about a fictional writer, in this case a short story. My talk is in two parts, in the first part I discuss the form of the short story, drawing attention to how its brevity means that the material is fragmentary, particular and limited, offering a glimpse. In the second part I analyse a short story biofiction about Henry James - 'The Master at St Bartholomew's Hospital 1914-1916' by Joyce Carol Oates, (2008). I focus on the intertextual dialogue between Oates's biofiction and James's writing, specifically two of his short stories, 'The Middle Years' and ' The Turn of the Screw' revealing how textual traces of James's writings emerge in Oates's story. I analyse how Oates appropriates, transforms, adapts, and modifies incidents and rhetorical features from James's stories into her own story. My focus on the rhetorical devices reveals how these apparently fragmentary traces form a distinctive, narrative whole. This identification of the inherent intertextuality of literary biofictions also highlights the appropriation -conscious or unconscious - of James's rhetorical devices by Oates, a practice I call double fictionality. I suggest that the practice of double fictionality is a productive lens through which to consider the potentially fragmentary nature of contemporary literary biofiction, providing a fresh approach to the poetics of the sub-genre.
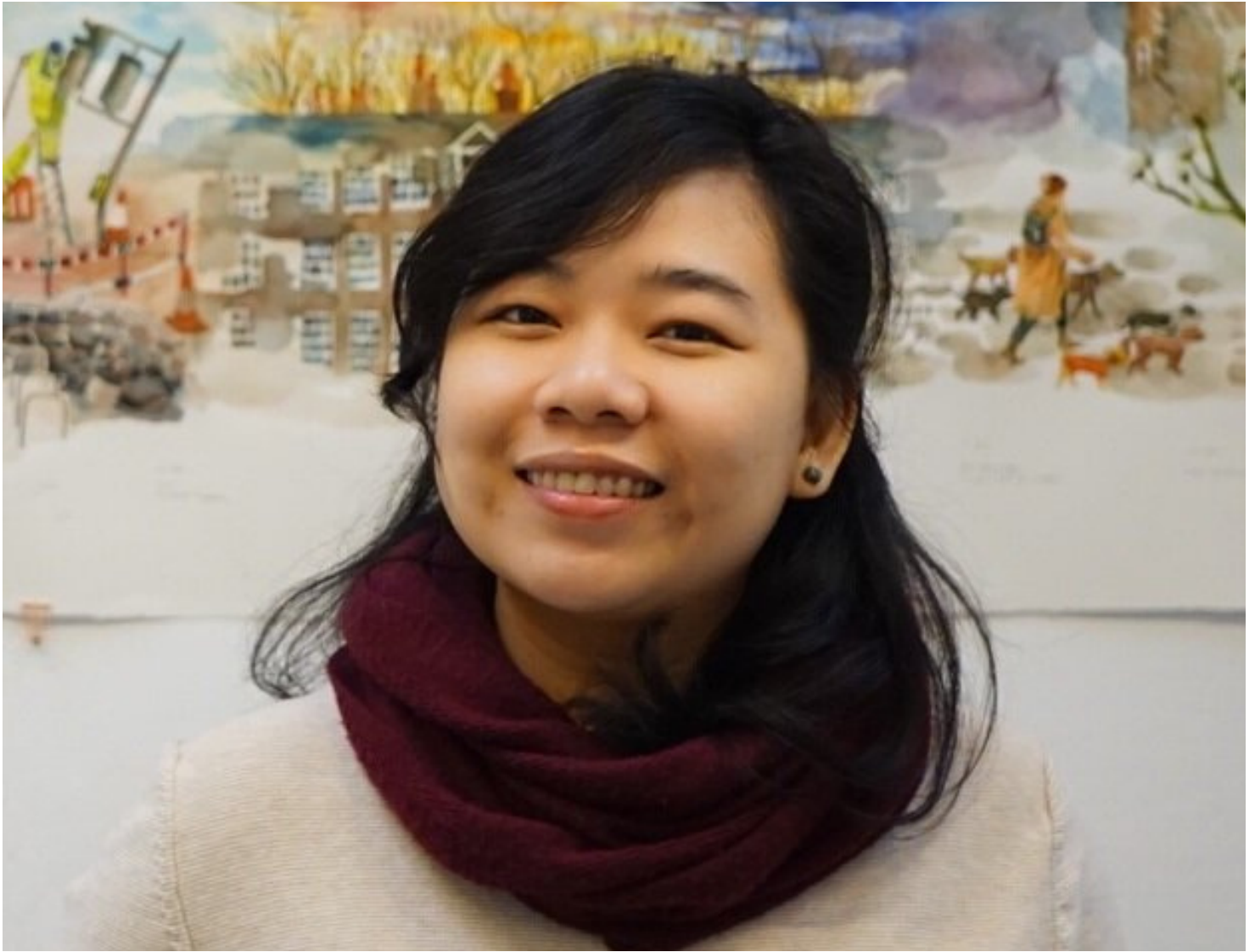
REBECCA SHIPP

PATHWAYS AND PEDESTRIANISM IN THOMAS HARDY'S 'THE WOODLANDERS'

My PhD research focusses on the walking habits of rural working communities at the turn of the nineteenth century, and in his 1887 text, 'The Woodlanders', Thomas Hardy uses this much-loved pastime of his to showcase the cultural idiosyncrasies of the inhabitants of Little Hintock, an isolated hamlet situated in Wessex. As the rustics move through the landscape on foot their relationships to each other, and indeed, to the land they live upon, is revealed.

The mythology of Wessex as a formed entity is well versed in Hardy scholarship, as his literary 'world-building' situates his stories in an established collective consciousness. In Hardy's novels, the value of the landscape is equitable with the events happening on it, and walking thus serves as a vital link between the two. It offers a physical connection between people and their earth, reinforcing notions surrounding the historic right to land. Additionally, one's individual gait also reveals the personality and character of rural folk. Walking is so deeply ingrained throughout the pages of 'The Woodlanders' that to dismiss it as simply a mode of travel is to ignore a key aspect of the way that rural residents existed.

This paper will present the peripatetic mode as integral to understanding the intricacies of Hardy's narrative vision, and argue that, for Little Hintockians, walking is not just a thing of necessity. Instead, it signifies a cultural significance surrounding locality and heritage. Drawing on critical works from scholars such as Dominic Head, Anne D. Wallace, and Alexandra Harris, this paper will investigate a previously un-explored aspect of Hardy's textual output and present an original interpretation of one of his most loved novels.
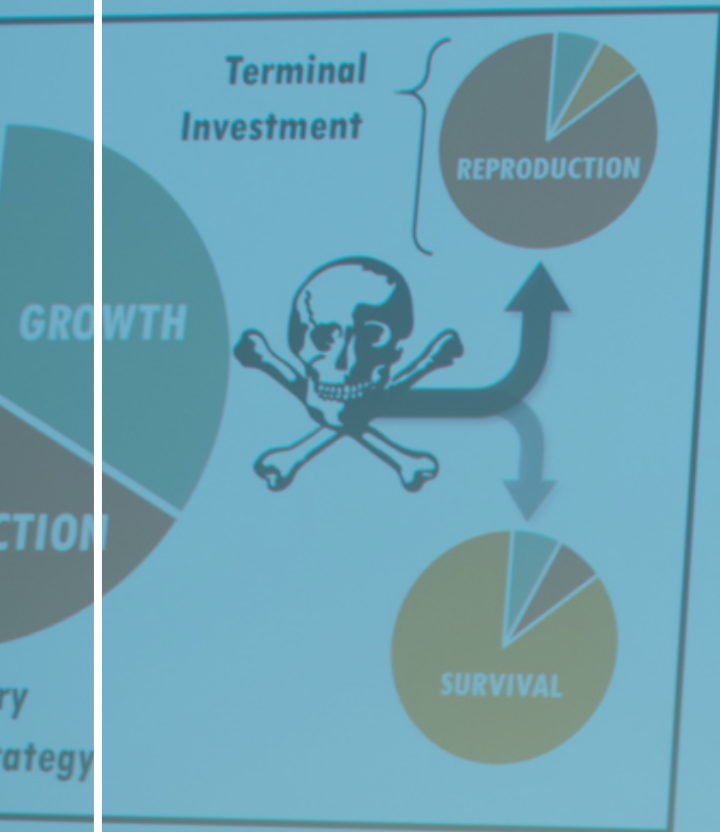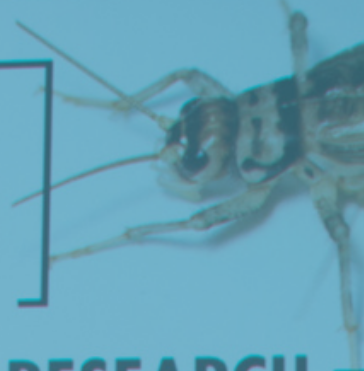
VINA PUSPITA

MEANINGFUL CHILD PARTICIPATION IN PEACEBUILDING: EXPLORING PARTICIPATORY MURAL ART IN JAKARTA'S URBAN NEIGHBOURHOOD

As an artist/researcher, my practice-based research explores participatory arts with young people in urban neighbourhoods in Jakarta to promote meaningful participation in peacebuilding. Focusing on the use of murals with children at risk of violence to express social and environmental issues, my study proposes a model of community-based participatory mural art that puts children at the centre, working alongside local leaders. The study explores the potential of public art to promote power-sharing and intergenerational collaboration while challenging the idea of children's participation in public space in Jakarta, which has always been contested. The research project involves children who are part of the Children's Forums at the urban village level. Within a series of mural projects, they work with different levels of government agencies and occupy different types of spaces. The study highlights the importance of child-friendly approaches, such as collaborative mural painting, in facilitating children's participation in society and encouraging critical reflection on their conditions. It reveals the complex issues facing young people in urban Jakarta and demonstrates how art can be used as a tool for advocacy and for bringing local leaders and young people into dialogue. The results demonstrate that participatory murals amplify children's voices and contribute to more meaningful participation by (1) decentring children's positioning, (2) exercising meaning through making, (3) building understanding through collaboration and dialogue, and (4) stimulating waves of action.

This study is part of Mobile Arts for Peace (MAP): Informing the National Curriculum and Youth Policy for Peacebuilding in Kyrgyzstan, Rwanda, Indonesia, and Nepal (2020-2024). MAP is a four-year international multidisciplinary project funded by the Arts and Humanities Research Council (AHRC) of UK Research and Innovation (UKRI) through the Global Challenges Research Fund (GCRF), with Professor Ananda Breed as Principal Investigator.

3-MINUTE THESIS

THREE MINUTE THESIS CHALLENGES PGR'S TO PRESENT A COMPELLING SPOKEN PRESENTATION ON THEIR RESEARCH TOPIC AND ITS SIGNIFICANCE IN JUST THREE MINUTES.

ADAM BARNETT

SCHOOL OF SOCIAL AND POLITICAL SCIENCES

POPULISM AT THE UN CLIMATE AND BIODIVERSITY NEGOTIATIONS

Climate change and biodiversity loss are the two existential issues of our era. Simultaneously, populism is on the rise. Since 1990, populists have risen to power on all continents, in emerging and mature democracies, and countries with the richest biodiversity and highest emissions. 30% of the parties to the UN's Convention on Biological Diversity, and 29% to the Framework Convention on Climate Change, have been populist-led - a significant amount of economic and political power. These are the only global forums through which climate and biodiversity are debated and managed - yet by their own measures, they have failed. It's therefore crucial to understand how populists interact with them: how they influence and disrupt, and ultimately either propel or undermine progress.

OBAFEMI AKINWOTU

NATIONAL CENTRE FOR FOOD MANUFACTURING

THE DEVELOPMENT OF A FOAM-BASED DIET FOR DYSPHAGIA PATIENTS: INNOVATIONS AND CHALLENGES

Aim: The study aimed to explore methods for creating dysphagia-friendly foods for chronic dysphagia patients.

Method: Carrot-based puree with algae was produced at different blending ratios (1:0.25–1:0.75) and hydrocolloid concentrations (guar gum, k. carrageenan, xanthan gum) (2–5%), and then microwave-heated at 400W for 5 min. Instrumental tests (rheological and texture analysis) and visual tests, such as kitchen spoons and forks, as well as tests for phytonutrients (total phenolics and antioxidants), were employed.

Main Findings: Investigations into the assessment of microwave-heated carrot puree resulted in carrot-water blends (1:0.5) with 2.5% xanthan gum and 2% guar gum. However, textural stability and phytonutrient levels were found to be affected by the cooking temperature.

Conclusion: Alternative processing technologies to microwave treatments, such as sonication and aeration treatments, can be employed. Additionally, the orange carrots, which were affected by the green chlorella, can be replaced with green peas. This exploration could lead to the establishment of a novel method with the potential to facilitate the oral intake of chronic dysphagia patients.

LUKE SMITH

SCHOOL OF EDUCATION

EXAMINING CULTURAL CAPITAL ACCUMULATION IN EARLY YEARS EDUCATION USING PARTICIPATORY METHODS: LISTENING TO CHILDREN'S STORIES

The research was designed and implemented to explore the impact and understanding of cultural capital theory in Early Years Education (EYE) following the inclusion of the term in recent Ofsted EYE guidance for practitioners. The research targeted a number of EYE settings, both at preschools and primary schools (on both sides of the Early Years Foundation Stage divide) within the North Kesteven District Council area of Lincolnshire, England. The methodology included the use of an existing research instrument, the Mosaic Approach (Clark & Moss, 2011) with a premise that involves child participants being asked to engage in a variety of participatory, multimodal tasks: photograph, map making, guided tours and roleplay. This child-led, inclusive and meaningful approach to data collection, allows the researcher to gain a sense of the (often overlooked) perception and opinion of child participants (in line with their educational rights), whilst celebrating their voices as 'experts in their own lives'. Further qualitative interviews of EYE practitioners were carried out during the period of fieldwork, where the researcher used the crystallised views of the child participants as organic themes for subsequent reflection and discussion, in answer to the research questions. Early findings indicate a confusion amongst EYE practitioners about the contextual application of the term cultural capital by Ofsted, together with barriers that exist between the dissemination of cultural capital and the interplay within which it is most effectively accumulated. This research will be submitted in the summer of 2024.

YOON JU CHO

LINCOLN INSTITUTE FOR AGRI-FOOD TECHNOLOGY

CANOPY ARCHITECTURAL AND SPECTRAL PHENOTYPES IMPROVE THE PREDICTION OF RADIATION USE EFFICIENCY IN WHEAT CANOPIES.

Feeding the world's population of 9 billion by 2040 is one of the major challenges of the agriculture sector. Wheat (Triticum aestivum L.) is the second most important staple crop, with a global production of 773 million tonnes per year, but the expected yields need to increase by 60% to ensure future food security. Achieving this requires the development of new cultivars with heightened expression of yield-associated traits, such as radiation use efficiency (RUE), which is fundamental to enhancing plant performance and yield. Recently, plant architectural phenotypes involving leaf inclination angle have shown promising traits in improving RUE at the canopy level. Specifically, the erectophile leaf arrangement exhibits a higher yield potential, receiving more even light distribution than the planophile arrangement, which is susceptible to light saturation on the top layer. This study used a mobile robotic phenotyping system with 3D-multispectral laser scanners and hyperspectral cameras. In 2022 and 2023, data were collected from 100 spring wheat canopies at the heading/anthesis and booting/anthesis stages, respectively. Using 3D data, we estimated canopy tangency angles, identified two architectural phenotypes, and incorporated them into one-dimensional (1D) convolutional neural networks (CNN) to predict canopy-based RUE. Canopy architectural phenotypes in CNN models improved the prediction accuracy of RUE. These findings underscore the potential of canopy architectural traits derived from 3D images as a critical parameter for enhancing RUE predictions in wheat canopies. It could potentially be used in other cereal crops.

SRIKISHAN VAYAKKATTIL

SCHOOL OF COMPUTER SCIENCE

DESIGN AND DEVELOPMENT OF A SOFT PROBE FOR HAPTIC LOCALIZATION AND HANDLING OF DELICATE OBJECTS

Over the last decade, there has been a notable shift in the role of robots, transitioning from controlled factory environments to versatile, unstructured spaces where they increasingly collaborate with humans. These robots have become integral in supporting human activities by navigating challenging areas, extending work hours, and undertaking tasks like heavy lifting. To execute these functions effectively, robots must be equipped to comprehend their surroundings, traditionally achieved through cameras or range sensors.

However, relying solely on vision or range-based systems presents challenges, especially in scenarios with varying lighting conditions or obscured objects. To address these challenges, this research explores the innovative integration of haptic sensors as a solution.

The research methodology revolves around combining haptic technology with soft robotics, creating a synergistic approach that enables a robotic manipulator to understand and interact with its environment. This proves crucial in situations where traditional range sensors are ineffective, and rigid robots risk damaging delicate objects, such as in soft fruit harvesting, biological specimen collection, or medical examinations.

The practical application of this research is demonstrated through the development of a ground-breaking solution named SoftProbe. SoftProbe aims to provide a soft haptic interface, enhancing a robot's ability to sense and interact with its surroundings. The study employs strawberries as a test case, contributing to the knowledge advancement in agricultural robotics, soft robotics, and haptic technologies. SoftProbe offers insights into the stiffness and weight of contacted fruits, and its modularity allows independent or combined use with vision-based systems. Notably, it operates both outdoors and indoors, making it a unique and versatile technology with no comparable alternatives. This technology extends beyond agricultural robotics, finding applications in environments where vision-based cameras might face challenges.

OBINAMUNI RAJITHA MADHAWA DE SILVA

SCHOOL OF COMPUTER SCIENCE

VISION BASED NAVIGATION FOR AGRICULTURAL ROBOTS

Autonomous navigation in outdoor agricultural environments require expensive hardware such as RTK-GNSS sensors. Despite the higher cost, such systems are not often reliable especially in regions with poor network reception and large obstacles. Autonomous navigation of robots and tractors is challenged by varying field conditions that arise in arable fields. These conditions could arise due to varying growth levels of the plants, shadows, weeds, missing plants in crop rows, tramlines, and different light levels. This research is aimed to study and develop a vision-based navigation system development in arable fields with row crops such as Sugar Beet and Maize plants in their early growth stages. The robot was required to perform two tasks while navigating a field: follow a crop row and switch to the next crop row when it reaches the end of current crop row. These steps would be repeated to complete navigating the entire field. Gathering a comprehensive dataset representing all the possible field variations is important in order to leverage the power of recent advancement of AI towards better understanding of the field environments. Existing datasets for crop row detection does not represent all the possible field variations. A dataset of sugar beet images was created representing 11 field variations comprised of multiple grow stages, light levels, varying weed densities, curved crop rows and discontinuous crop rows. The proposed pipeline segments the crop rows using a deep learning-based method and employs the predicted segmentation mask for extraction of the central crop using a novel central crop row selection algorithm. The novel crop row detection algorithm was tested for crop row detection performance and the capability of visual servoing along crop rows. Our algorithm demonstrated robust vision-based crop row detection in challenging field conditions outperforming the baseline.

CAITLIN MACNEILL
SCHOOL OF CHEMISTRY

RAMAN SPECTROSCOPY AS A NOVEL NON-INVASIVE TECHNIQUE TO ASSESS WILDLIFE WELFARE

Chronic stress is a prominent issue for animal welfare because it can lead to long-term health issues. One method to assess animals long-term stress is to measure their hair cortisol concentrations (HCC). This non-invasive method gives an insight into the last few weeks to months of cortisol production. Current techniques to measure HCC include Immunoassays and Liquid chromatography-mass spectrometry (LC-MS), which is considered the gold standard in analysis. However, both of these methods have limitations. They are time-consuming, destructive, expensive, and LC-MS is impractical for field use. To combat these limitations, we propose using Raman spectroscopy as a rapid, cheaper, and non-destructive technique which also has in-situ applications, with the recent development of handheld devices. Raman works by irradiating the sample with a laser which causes molecular vibrations that scatter the light waves. The scattering is measured and produces spectra which are unique to specific molecules. Cortisol concentrations can be quantified by comparing the intensity of these spectra with known concentrations to create a calibration curve. Spectra from hair samples can be added to this calibration to determine the concentration of cortisol present within the hair matrix. These measures can then be validated by analysing the same hairs using LC-MS. Preliminary results have successfully created calibration curves of varying cortisol concentrations using both LC-MS and Raman. In future hair analysis using Raman, we expect overlapping signals from the hair matrix making it difficult to define cortisol concentrations using peak intensity alone. To minimise these effects, we intend to use multivariate analysis to remove all signals present that do not directly relate to cortisol. If successful, using Raman to monitor stress levels by hair analysis could greatly improve animal welfare by offering a rapid, in-situ detection method that may be applied to both wild and domesticated animals.

AARUSHI KUMAR
LINCOLN INSTITUTE FOR AGRI-FOOD TECHNOLOGY

IDENTIFYING PHYSIOLOGICAL AND AGRONOMICAL TRAITS ASSOCIATED WITH HIGH YIELD IN LINSEED

Linseed, commonly known as flaxseed, has been recognised as a functional food, rich in Omega-3 fatty acids, dietary fibre, protein, and lignans, contributing to its growing integration into the food chain. Within the UK agricultural landscape, linseed (Linaceae usitatissimum L.) is emerging as a prominent break crop, surpassing oilseed rape.

According to available data, linseed production in the UK has increased from 2012 to 2022, with an average annual growth rate of +3.8%. However, the trend pattern shows notable oscillations, as evidenced by a decline of -12.0% in 2022 (Statista, 2023; IndexBox, 2023; Langyan et al., 2023). My research explores the impact of environmental factors and soil properties on linseed yield, oil quality, and performance, focusing on genotype x environment interactions. Utilizing both conventional and state-of-the-art methodologies, the study explores physiological and agronomical determinants at canopy and root levels. The study also identifies genetic variations within UK Linseed germplasm. This genetic analysis aims to assist the development of resilient linseed varieties capable of withstanding climate change, addressing knowledge gaps, and sustainable farming methods.

In the initial year, a polytunnel trial was conducted, and significant variations in chlorophyll content, biomass, seed number, and 1000 seed weight (TGW) under soil and drought stress conditions for two linseed genotypes, Alpaga and Atilla were seen. Alpaga surpassed Atilla by 32.87% in chlorophyll content, 38.47% in biomass, 105.26% in seed number, and 28.53% in 1000 seed weight (TGW). The second year will involve an extensive field trial with six different genotypes from spring and winter, assessing their interactions with the environment and among themselves. Additionally, a polytunnel trial will study Bio-stimulant interaction for rooting structures. This process will be repeated twice in the third year to determine the dominant genotype in terms of climate hardiness, yield, oil content, and root structure improvement.

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