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Surrey Uni to lead on speech to sign GBT computer programme

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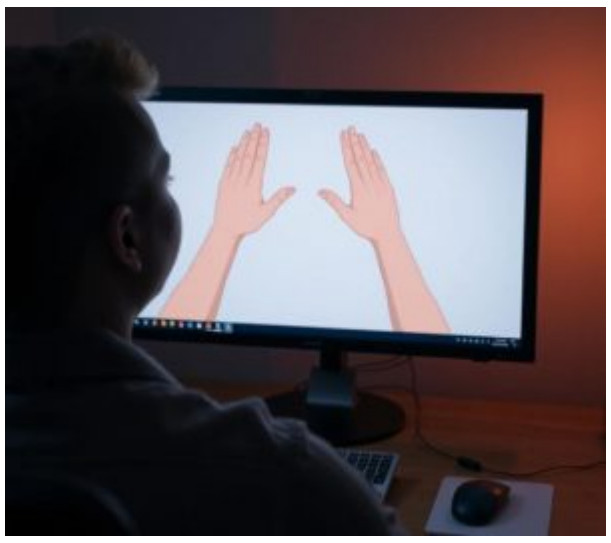

A large-language model (LLM) built to meet the needs of the Deaf community, translating between signed and spoken language, is the aim of a new project led by the University of Surrey.

SignGPT: Building Generative Predictive Transformers for Sign Language has been awarded £8.45m from the UK Engineering & Physical Sciences Research Council. The five-year project will build tools to allow spoken language to be automatically translated into photo-realistic sign language and video of sign language to be translated into spoken language – a complex translation problem that is yet to be solved.

Surrey will work alongside the University of Oxford, the Deafness Cognition and the Language Research Centre at University College London, key Deaf stakeholders, and the Deaf community.

Professor Richard Bowden, Principal Investigator of the project from the University of Surrey's Institute for People-Centred AI, said:

"Large language models such as those behind ChatGPT and Gemini are transforming many aspects of our personal and working lives – and that transformation is happening at a blistering pace. Our project, SignGPT, is not about replacing humans, but it is about ensuring the Deaf community is not left behind in this revolution.

"By creating technology that serves the community, we're enabling equal access to information, working towards seamless communication between the Deaf and hearing world, and demonstrating that AI can be a tool for inclusivity and empowerment. SignGPT isn't just about accessibility for Deaf people – it's about setting a standard for how innovation can address inequities, strengthen human connection, and build a more inclusive society. In a world shaped by rapid technological change, projects like this show that AI's potential is greatest when it uplifts everyone."

Globally, there are around 70 million Deaf or hard-of-hearing individuals, many of whom use sign language as their primary form of communication. For many, written/spoken languages serve as a second or third language, and proficiency in these languages can vary. There is no universal sign language: sign languages are natural human languages created over centuries by Deaf communities and are not derived from spoken languages. Their underlying rules and structures remain a rich area of linguistic study. Each sign language has its own unique grammar and lexicon, relying on both manual gestures (hands) and non-manual expressions (body and face), along with spatial elements, to convey meaning.

Professor Bencie Woll, sign linguist, co-investigator of the project, and founder of the Deafness Cognition and Language Research Centre at UCL, said:

"This project is a unique collaboration between vision scientists and sign linguists with Deaf and hearing researchers working together towards our common goals."

Mark Wheatley, CEO of the Royal Association for Deaf People (RAD), said:

"I am pleased that this important grant will empower the Deaf community to have further equal access by harnessing AI and large language models. We will ensure that the University of Surrey, Oxford University, and the Deafness Cognition and Language Research Centre at UCL, alongside Deaf-led stakeholders such as RAD, take a people-centred approach to ensuring ethical responsibility and the accuracy of translations so that we, the Deaf community, can use them for everyday purposes."

Professor Kearsy Cormier, one of the Co-Investigators on the project from University College London, said:

"So much work in sign language technology is undertaken by researchers with no understanding of how sign languages work, nor any lived experience of deafness themselves. This project will allow real co-creation/co-development of this technology with Deaf and hearing researchers in linguistics and deaf studies working alongside computer vision specialists – with each group learning from each other – and, importantly, building capacity amongst Deaf researchers so they may lead this field in the future."

SignGPT's research team will produce the largest sign language dataset in the world and use it to build a sign language LLM that can provide the breadth of application to the Deaf community that current LLMs provide for written/spoken languages. In doing so, the project will also generate tools for data annotation that will be released for use by the wider community. The project already has Deaf members within both the research team and wider partners, but it is hoping to recruit more staff for whom British Sign Language is their primary language.

The challenge of automatically translating between sign languages and spoken languages is highly complex and remains unsolved. SignGPT will produce open-source toolkits for linguistic use, web-based demonstrations for accessible knowledge exchange and run outreach programmes alongside collaborative workshops.

Surrey University leading on alternative ADHD treatment

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A multisite clinical trial has launched in the United States to investigate whether non-pharmaceutical methods can be used to treat attention deficit hyperactivity disorder (ADHD) in children ages 7-12. This trial is currently recruiting new patients and seeking FDA clearance.

The trial uses a wearable device – Novostim 2 – developed by Innosphere Engineering Ltd. The company anticipates FDA clearance by Q3 of 2025 and has already received approval for sales in Israel.

The novel treatment builds upon years of research into non-invasive brain stimulation techniques led by the University of Surrey's Professor Roi Cohen Kadosh. The research team carried out multiple studies in which children with ADHD were treated with transcranial Random Noise Stimulation (tRNS) coupled with cognitive training (CT).

tRNS is a non-invasive technique that delivers a weak and painless electrical signal to the brain to enhance activity in regions associated with attention. In the studies, children who received tRNS and CT experienced significant improvements in their ADHD symptoms, working memory, and processing speed, along with changes in their brain activity, which could be linked to the improvement of their symptoms in the long-term.

Two clinical trials have been completed using Novostim 2 at Hadassah Medical Center in children aged 7-12, which showed significant improvement in ADHD symptoms, including a 43% reduction in ADHD symptom severity and overall symptom alleviation.

The trial, over a two-week period, involves 20-minute treatment sessions in which Novostim 2 is used to deliver tRNS over specific regions in the brain associated with ADHD and during which participants engage in attention-based digital games.

For more information on the latest trial, visit ADHDtrial.com

Professor Roi Cohen Kadosh, Head of the School of Psychology at the University of Surrey, said:

"We were thrilled by the success of the previous clinical trials, which brought us one step closer to providing a safe and effective non-pharmaceutical option for children with ADHD. The device's ability to modulate brain activity and enhance cognitive functions may hold the key to long-lasting benefits, potentially reshaping the landscape of ADHD treatment. By harnessing the power of psychology, neuroscience, and technology, we can empower young patients to improve their focus, attention and overall wellbeing. The need continues to grow, and I hope to see this technology become available to many children and their families soon."

Rami Shacour, co-Founder and CEO of Innosphere, adds:

"For decades, stimulant medications have been the cornerstone of ADHD treatment. At Innosphere, we're parents first, driven by a mission to give families more personalized, effective options for their children. With Novostim 2, we're redefining what's possible in ADHD care. We're thrilled to announce sales approval in Israel and eagerly anticipate FDA clearance this year. This is just the beginning, as we explore Novostim 2's potential to complement existing therapies and transform lives."

Image: Professor **Roi Cohen Kadosh**

Surrey Uni Doing the maths on virus transmission

21 January 2025

How prepared are we for another pandemic? Mathematical insights pinpoint lessons on airborne viral transmission

Half a decade on from the start of the COVID-19 pandemic, a study by the **University of Surrey** highlights the significant impact of combined public health measures in reducing airborne viral transmission. High-quality face masks were shown to reduce transmission risk by ninefold, while doubling indoor air ventilation cut the risk by nearly a third, providing valuable insights to support future prevention strategies for respiratory diseases.

In 2020, the world came to a near standstill as rising COVID-19 cases prompted unprecedented lockdowns, travel restrictions and widespread public health measures. The World Health Organization estimates that more than three million deaths were directly attributed to the virus during the first year of the outbreak, underscoring the devastating toll of the pandemic on global health and economies.

To better understand the dynamics of airborne transmission and inform future preparations, **Dr Richard Sear**, Associate Professor at Surrey's School of Mathematics and Physics, explored how the virus spreads during contact and the role of protective measures in reducing risk.

Dr Sear said:

"I've tried to measure how effective strategies, such as mask-wearing, are for the transmission of airborne viruses. This is both for any future pandemic, and for seasonal flu. I combined modelling with data from the UK's NHS COVID-19 app. While these estimates are highly approximate, they provide guidance on the value of measures such as face masks, social distancing and improved indoor air quality, which could be tested in the future."

Factors such as viral load, ventilation and individual susceptibility are likely to influence a significant variability in COVID-19 transmission rates, with some contacts posing a much higher risk than others. These findings highlight the importance of addressing environmental and behavioural factors in public health strategies.

In terms of personal protective equipment (PPE), high-quality face masks, such as N95/FFP2, were found to be particularly effective in reducing transmission risk, decreasing the effective reproduction number for COVID-19 transmission by a factor of approximately nine when worn by the entire UK population. Even individual use of N95 masks can lower transmission risk by threefold, no matter the duration of contact, whereas surgical and cloth masks are much less effective.

Ventilation also plays a critical role in controlling airborne transmission, as viral particles linger in poorly ventilated spaces, compounded by individual behaviours, such as close-contact interactions, speaking or coughing. By doubling the air turnover rate indoors, whether that's through open windows and doors or increasing speed on air conditioning systems, transmission can be reduced by as much as 30%. Complementing good ventilation with physical distancing further minimises the risk.

Dr Sear added:

"The COVID-19 pandemic was terrible for many of us, which is why it's important that we learn from our experiences. It also demonstrated how quickly we can develop and roll out vaccines when faced with a global health crisis. Moving forward, both we as individuals and our leaders have an opportunity to apply these lessons to better control respiratory diseases – not only to head off any future pandemics, but to also manage seasonal diseases such as flu and RSV."

The study has been published in Physical Review E.

Plant-based meat alternatives might be depressing

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There is mounting evidence suggesting that ultra-processed foods (UPF) are bad for our health, but if you stick to a vegetarian diet, is that still the case? Plant-based meat alternatives (PBMA) are considered to be ultra-processed foods and may be associated with similar harms.

In the first study of its kind, published in Food Frontiers, researchers from the University of Surrey found that vegetarians who consumed PBMAs had a 42% increased risk of depression compared to vegetarians who refrained from PBMAs.

The study analysed data from the UK Biobank and found no notable differences in intake of sodium, free sugar, total sugar, or saturated fatty acids between those vegetarians who ate PBMA and those who did not.

The researchers did find, however, that those who eat PBMAs had higher blood pressure and C-reactive protein (CRP) levels, a marker of inflammation, and lower levels of apolipoprotein A, a protein associated with HDL, a “good” cholesterol; PBMA consumption was, however, also linked to a reduced risk of irritable bowel syndrome (IBS) by 40%.

Professor Nophar Geifman, from the School of Health Sciences at the University of Surrey and senior author of the study, said:

“The overall findings are reassuring, suggesting that plant-based meat alternatives may be a safe option when they are part of an overall balanced diet. However, the potential link between these types of food, inflammation and depression warrants further investigation.”

The study presented some limitations due to the data collected, which was predominantly from a white population in the UK, and dietary information only being gathered at the beginning of the study, not accounting for potential changes over time.

Professor Anthony Whetton, co-author of the study from the School of Veterinary Medicine at the University of Surrey, said:

“Ultra-processed plant-based meat alternatives can be a useful way for people to transition to a vegetarian diet effectively, and that helps with sustainable agricultural practices. Further research, including longitudinal studies and trials with more diverse populations, is necessary to confirm these findings and the relationship between vegetarian foods and mood.”

Surrey first in image AI

21 January 2025

Surrey announces world’s first AI model for near-instant image creation on consumer-grade hardware

A groundbreaking AI model that creates images as the user types, using only modest and affordable hardware, has been announced by the Surrey Institute for People-Centred Artificial Intelligence (PAI) at the University of Surrey.

The model, NitroFusion, represents a world first and has been made open source by its developers – SketchX, a lab within PAI – a move that fundamentally transforms access to AI-enabled image creation models for creative professionals.

Professor Yi-Zhe SonG, Director of SketchX and Co-Director of PAI, said:

“NitroFusion represents a paradigm shift in making AI accessible to everyone, eliminating the need for large compute resources and the long waiting times between prompt and result that are common with most image generation platforms.”

Typically, similar technology is available only to corporate giants with vast computing resources. However, NitroFusion runs on a single consumer-grade graphics card – marking a decisive step forward in bringing advanced AI capabilities to individual creators, small studios, and educational institutions. The almost instant creation of images allows rapid artistic iterations and greater control over the generated imagery.

Dar-Yen Chen, the PhD researcher who helped to develop the project at PAI, said:

“NitroFusion leverages a novel dynamic adversarial framework that works like a panel of specialised art critics, each evaluating different aspects of the generated image to ensure high quality in a single step. The system’s flexible architecture allows users to optionally use between one to four refinement steps, providing direct control over the balance between generation speed and image quality.”

Professor SonG added:

“With NitroFusion, we’re not just releasing another image generation model – we’re pioneering an entirely new approach which democratises AI interaction.

“Following our DemoFusion release last year, which provided a new way to upscale AI-generated images, this innovation further establishes our position at the forefront of making powerful AI technology accessible to all.”

This breakthrough delivers multiple leaps for the users and industry:

- Instant image generation that responds as users type – a first in the field – enabling rapid iteration, greater control and better experimentation
- Improved sustainability through greatly reduced energy consumption
- Consumer-grade affordable hardware requirements (e.g. a single high-performance GPU) that mean individuals and small studios can create imagery affordably
- Open-source availability enables global innovation, adaptation and variations
- No cloud dependencies or subscription fees.

Professor Adrian Hilton, Director of the Institute for People-Centred AI at the University of Surrey, said:

“We believe we’re the first in the world to achieve interactive image generation at this scale and efficiency. This opens up access to state-of-the-art AI for image generation and is just the beginning of our commitment to democratising creative AI tools. Our Institute will continue to develop open-source, groundbreaking

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technologies that put professional-grade AI capabilities into the hands of creators everywhere.

“We’re particularly proud of the great work that our SketchX Lab, creating new concepts and advancing the science of generative AI. Our research is focused on ensuring that the future of creative AI technology is inclusive, responsible and accessible to all, and we’re keen to continue to work with organisations that share this ethos.”

The technology is available immediately through https://chendaryen.github.io/NitroFusion.github.io/, with comprehensive documentation and community support resources.

Call to address mental health of health workers

21 January 2025

Only a system-wide overhaul of the NHS that invests in staff wellbeing can address the psychological ill-health crisis amongst healthcare workers, according to research led by the University of Surrey in partnership with the University of Exeter. The research, which is funded by the National Institute for Health and Care Research (NIHR), focussed on nurses, midwives and paramedics who are disproportionately affected by psychological ill-health, which leads to significant consequences for both individual wellbeing and patient care.

The study found that whilst high-pressure environments, heavy workloads, and chronic staff shortages are key drivers of stress and anxiety among healthcare professionals, it is the features of the work environment, such as lone working and career stage, such as being newly qualified, that can be key. The NHS staff survey reports that almost half of all NHS staff reported feeling unwell due to work-related stress in the past year (47%), with many experiencing unrealistic time pressures and inadequate staffing levels.

The researchers identified several key findings, including:

- An underlying blame culture undermines staff psychological wellness by creating a toxic work environment.
- A prevalent “serve and sacrifice” culture prioritises institutional needs over individual wellbeing.
- Healthcare professionals often experience moral distress and emotional exhaustion due to the tension between upholding professional values and the realities of clinical practice.
- A more comprehensive approach is needed to address the cumulative effects of workplace stressors rather than only focus on individual-level strategies and acute stressors.
- Developing effective psychological wellbeing interventions for diverse healthcare workers is complex.

Professor Jill Maben OBE, Professor of Health Services Research and Nursing at the University of Surrey, said:

“ By addressing these systemic issues, the NHS will not only improve the psychological health of its workforce, but will also enhance the quality of patient care and reduce costs associated with turnover and absenteeism”.

A series of recommendations emerged, aiming to improve staff wellbeing and create a healthier workplace culture. First and foremost, prioritising staff wellbeing is crucial. This involves addressing essential needs such as providing access to food and hydration, break rooms, staff parking (including disabled parking), and financial security.

A holistic and collaborative approach to staff wellbeing is also recommended. By focusing on both prevention and intervention, organisations can adopt a systems-level strategy to promote and protect wellbeing effectively.

Other key recommendations include:

- Normalising and proactively managing psychological ill-health: Recognising that psychological stress and burnout are common challenges in healthcare is essential.
- Giving equal consideration to psychological safety alongside physical safety within the healthcare workplace.
- Developing compassionate leaders for the future: Investing in leadership development fosters a compassionate and supportive work environment.
- Fostering a learning culture and encouraging open communication: Creating a psychologically safe environment where staff feel empowered to speak without fear of retribution is vital.

Professor Cath Taylor, Professor of Healthcare Workforce Organisation and Wellbeing, said:

“We have produced a comprehensive guide to assist NHS leaders and staff in implementing our recommendations. This resource provides practical advice on how to address poor psychological wellbeing in nurses, midwives and paramedics to create a more supportive healthcare system, allowing staff to thrive and deliver excellent care for patients”.

For more information, and to view the guide, visit: https://workforceresearchsurrey.health/projects-resources/cup2/

This project was supported by the NIHR HS&DR programme with grant number 129528. The views and opinions expressed herein are those of the authors and do not necessarily reflect those of the HS&DR programme, the NIHR or the Department of Health and Social Care.

Surrey academic to lead plastic pollution fight

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Tackling the plastic pollution crisis: Legislation must evolve to address challenges for our climate, ecosystems and human health

Urgent legislative action is needed to stop the imminent threats of environmental harms caused by plastics. To help find solutions, Dr Noreen O'Meara from the University of Surrey has been awarded a prestigious Mid-Career Fellowship by the British Academy to lead vital research that seeks to reshape how we govern the lifecycle of plastics through effective legislation and policy.

Dr O'Meara's project aims to support national, European, and global efforts to combat plastics pollution at a time when negotiations for a Global Plastics Treaty are intensifying. This treaty represents the first international legally binding framework aimed at addressing the plastics crisis, and Dr O'Meara's research will play a crucial role in informing its development and implementation.

Dr Noreen O'Meara, Associate Professor (Reader) in Human Rights, European and
Environmental Law at the University of Surrey said:

"Plastics pollution is a toxic contributor to the triple planetary crisis of climate change, ecosystem degradation, and environmental pollution. Plastics production accounts for a rising proportion of the global carbon budget, which undermines states' net-zero goals and action under the Paris Agreement to achieve a safer climate. The plastics lifecycle creates serious risks to human rights and human health which must be mitigated in governance efforts to tackle plastics pollution.

"We must mitigate the serious risks to human rights and health that arise from the plastics lifecycle in our governance efforts. This fellowship gives us the opportunity to advocate for a rights-oriented model that not only addresses pollution but also respects human dignity."

With a strong background in EU and European Human Rights Law, Dr O'Meara's research delves into pressing challenges in climate law and environmental justice. She has been actively involved in the Intergovernmental Negotiating Committee (INC), which is working towards finalising the Global Plastics Treaty by mid-2025. As United Nations negotiations resume, her insights will be invaluable as states navigate the complexities of this treaty.

Image: Muntaka Chasant Creative Commons Attribution-Share Alike 4.0 International licence.

X-Ray vision wins Surrey Uni "spin-off" a prize

21 January 2025

Silveray, the digital X-ray film company and Surrey spinout, wins coveted Institute of Physics award with a new approach to X-ray imaging

Innovation in X-ray technology could be key to detecting cancer more accurately than ever before, says the CEO of a startup that has won this year's Institute for Physics Business Startup Award.

Silveray, a spinout from the University of Surrey, has invented a flexible, reusable, and cost-effective Digital X-ray Film (DXF) that is transforming industrial radiography for weld inspection. In the long term, the ground-breaking technology offers the promise of more accurate diagnostic X-ray imaging at lower radiation doses for earlier and more accurate tumour detection, leading to better patient outcomes.

Silveray's nanoparticle-based material for X-ray imaging is made of a semiconductor ink that is coated on to a flexible electronic backplane with pixels that captures the X-ray image. Unlike the current X-ray market status quo, Silveray's technology enables enhancements in image quality on a physically flexible medium at a cost-effective price point.

Dan Cathie, CEO and Co-Founder of Silveray, said:

"The X-ray imaging sector has seen relatively few revolutionary innovations since the advent of digital imaging. Our vision at Silveray is to develop technology that disrupts this way of thinking by creating financially sustainable, reusable, physically flexible Digital X-ray Film (DXF).

"We know there is more to be done but this award from the Institute of Physics is a recognition of the valuable potential of our technology for the industrial non-destructive test (NDT) market. Furthermore, our vision is to become game changers for mammography and other areas of X-ray imaging with our high-sensitivity, high-resolution, Digital X-ray Film invention.

"This award comes as fantastic recognition for the team at Silveray following the close of our recent funding round, led by Northern Gritstone."

Silveray was founded in 2018 by Professor Ravi Silva, Director of the Advanced Technology Institute (ATI) at the University of Surrey. Since then, Silveray and the ATI have painstakingly worked on the technology that incorporates high-Z elements (heavy atoms known for their ability to absorb X-rays) into semiconductor polymer materials, creating flexible X-ray detectors that are both sensitive and adaptable to curved surfaces.

Professor Silva said:

"Traditional indirect conversion X-ray detectors are stiff, costly, and inherently force a trade-off between image quality, speed, and dose, but our innovation at Silveray changes that.

"Our direct conversion technology is flexible, reusable, and closely mimics human tissue, making it perfect for medical uses like accurate diagnosis for early tumour detection. Because it doesn't require complicated processing, this could make a real difference in improving medical X-ray imaging and radiotherapy."

Image: the Silveray team with the IoP award.

Surrey strategist secures stardom in Space Science

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Renowned astrophysicist Professor Adam Amara, Director of Space Strategy and Head of the School of Mathematics and Physics at the University of Surrey, has been appointed as the UK Space Agency's (UKSA) new Chief Scientist.

While remaining at Surrey, Professor Amara will split his time between his space strategy role at the University and his new role at the UKSA, in which he'll offer independent expert advice and strategic guidance on all scientific areas within the Agency's remit.

Professor Amara said of his appointment:

"I am honoured to be appointed as the UK Space Agency's Chief Scientist during such an ambitious and exciting time for the UK's space industry and its contributions to the UK economy. My role is to work with the space community across academia, government, and industry to ensure the UK seizes the opportunities ahead."

Professor Amara will now oversee a broad range of disciplines, including astronomy, astrophysics, planetary science, solar physics, space weather, lunar and Mars exploration, International Space Station experiments, and Earth and climate science. In addition to building relationships across the UK space community, Professor Amara will also be working closely with global agencies, including the European Space Agency (ESA) and NASA, to promote the UK's space priorities.

Professor Tim Dunne, Provost and Senior Vice-President at the University of Surrey, said:

"I want to congratulate Adam on this exciting opportunity to lead the UK Space Agency's scientific work. His appointment highlights the University of Surrey's lasting strength and rich heritage in space sciences, centred on the discoveries, innovation and industrial impact of the Surrey Space Centre."

The Surrey Space Centre, founded in 1979 by Professor Sir Martin Sweeting, pioneered small satellite technology, which is credited with changing the economics of space and laid the foundations for much of today's space industry. The Surrey Space Centre led to the creation of the hugely successful spin-out company Surrey Satellite Technology Ltd (SSTL) in 1985.

As we look to the future, Surrey has ambitious plans for Professor Amara and his outstanding team of researchers and educators, to once again propel the institution to the frontier of space science.

Surrey Uni to research mono-syllabic complexity

21 January 2025

The University of Surrey is part of an international team of researchers that has been awarded £8.3 million to better understand human language by researching one of the world's most complex linguistic systems.

Thanks to a prestigious Synergy Grant from the European Research Council, the project will explore the West Nilotic languages of East Africa. These languages are able to pack more information into a single syllable than any other known language family. Exactly how such systems could have evolved remains a mystery.

The project brings together experts from the Surrey Morphology Group, the University of Edinburgh, and France's CNRS, in partnership with institutions in the USA, and will engage stakeholders in South Sudan, Ethiopia, and Kenya to ensure wide-reaching impacts, including literacy initiatives.

Professor Matthew Baerman, who leads the project at the Surrey Morphology Group at the University of Surrey, said:

"Our aim is to discover how West Nilotic languages evolved structures of such complexity, and just as importantly, why other languages did not. It's a puzzle that could reshape how we think about the cognitive limits of human language."

The team's approach combines traditional fieldwork with cutting-edge experimental techniques to reconstruct the historical evolution of these languages. The findings promise to have far-reaching implications, offering new insights into the possible and impossible in human language evolution.

Professor Erich Round, Research Centre Leader of the Surrey Morphology Group. said:

"The Surrey Morphology Group has carried out world-leading research into the wonders of human language for over thirty years. We are delighted to have secured our second major grant from the European Research Council in two years, and our third since the Council's establishment in 2007. Most of all, we're thrilled to bring to the world's attention some of humanity's most astounding and illuminating linguistic systems."

Professor Baerman continued:

"The languages we find in the world today represent just a small fraction of what must have existed over the course of history, meaning much remains to be discovered about the full potential of human language. West Nilotic gives us the means to uncover this potential."

Faces and People (Sudan) a west-Nilotic language License details