GEOSPATIAL RESEARCH INSTITUTE *Toi Hangarau*
University of Canterbury | Te Whare Wananga o Waitaha
Private Bag 4800, Christchurch 8140, New Zealand Aotearoa
Website: https://geospatial.ac.nz/

Geospatial Research Institute (GRI) Toi Hangarau
PhD scholarship
Information sheet for applicants

Aim

The Geospatial Research Institute (GRI) scholarship has been implemented with the aim to increase the amount of novel geospatial research in all areas across the University of Canterbury.

The scholarship

Name:	The Geospatial Research Institute PhD scholarship.
Funds awarded:	Total NZ$35000/year, plus fees and $4000 expenses (over three years full-time, or pro-rata for part-time study).
Funding period:	The scholarship is tenable for the period necessary to complete up to 360 points of enrolment
Scholarships available:	One
Closing date for applications	**30 May 2025, 17:00 pm NZ Time.**

Selection of PhD candidates

The scholarship is open to national and international applicants and is awarded on a competitive selection process.

From all applicants, a selected group will be shortlisted and invited for an interview. The scholarship will be awarded to the best applicant.

In their application prospective students should identify which of the approved projects advertised they would like to complete for their PhD.

The funding will be awarded to one PhD candidate under the following conditions:

- The candidate meets all UC criteria for enrolment in the PhD program.
- The candidate applies for one of the geospatial projects advertised **(all projects can be found at the end of this file)**

- The candidate demonstrates prior geospatial training (e.g. GIS, remote sensing, spatial data analysis) and research experience; at least one publication in a peer-reviewed journal is expected, with publication of geospatial research highly regarded.
- The candidate demonstrates a clear interest in and aptitude for geospatial research.
- The candidate is selected based on application and interview performance.
- The candidate is approved by the Senior (main) Supervisor of their selected project at UC (this happens as part of the shortlisting and interview process). Prospective PhD candidates interested in one of the advertised projects are encouraged to contact the project main supervisor to discuss the topic, and their suitability for it.

Prospective PhD student applications must include the following five items:

- Cover letter explaining motivation for doing a PhD outlining interest and experience in geospatial methods and analysis.
- Application form: https://geospatial.ac.nz/wp-content/uploads/2025/04/04_GRIscholarship-ApplicationForm-2025.pdf
- Curriculum Vitae including a list of any prior publications.
- Contact details of at least two academic or professional referees;
- A GPA report obtained from https://support.scholaro.com/portal/kb/articles/canterbury (those with New Zealand or United States qualifications are not required to use Scholaro).

Please send your completed application to:

Geospatial Research institute: gri-enquires@canterbury.ac.nz

The deadline for submission of applications is 30 May 2025, at: 17:00 NZ Time.

FAQ

Can I apply/select multiple projects in my application?

Answer: No. Candidates should select one project only and are encouraged to contact the main supervisor to find out about it and discuss their suitability.

Please see the GRI PhD Scholarship Project Proposals selected for 2025 below:

GRI PhD Scholarship Project Proposals - 2025

<table>
<tr><td colspan="2">Project title

Exploring sources of natural airborne particulate matter in New Zealand</td></tr>
<tr><td>UC senior supervisor project leader
Associate Professor Laura Revell,
laura.revell@canterbury.ac.nz</td><td>Department/School
School of Physical and Chemical Sciences</td></tr>
<tr><td>Other members of the supervision team

Dr. Catherine Hardacre

Associate Professor Marwan Katurji</td><td>Department/School

School of Physical and Chemical Sciences

School of Earth and Environment</td></tr>
<tr><td colspan="2">Links with organisations outside UC

Dr. Perry Davy (Lead Scientist – Air Particulate Laboratory), GNS Science, Lower Hutt, New Zealand
Dr Liz Kendall, (Data Scientist), GNS Science, Lower Hutt, New Zealand
Dr Hamish Gordon, (Assistant professor – Centre for Atmospheric Particle Studies), Carnegie Mellon University, Pittsburgh, USA
Dr Matt Woodhouse, (Scientist - Aerosol and Chemistry Modelling team), CSIRO, Australia
Dr Sonya Fiddes, (Research Associate – Institute for Marine and Antarctic Studies), University of Tasmania, Australia</td></tr>
<tr><td colspan="2">Project outline

This project will use geospatial data science and chemistry-climate modelling to understand natural sources of airborne particulate matter (‘aerosol’) in New Zealand. Aerosols cause respiratory illnesses in humans when inhaled, and influence climate through their interactions with light and clouds. Natural sources of aerosol include plants (secondary organic aerosol), wildfires, dust and the ocean (sea spray and phytoplankton-produced sulfate aerosol). New Zealand is unique in that much of the population is more frequently exposed to high levels of natural aerosol rather than human-created sources[1].
A recent report highlighted large gaps in our understanding of New Zealand’s natural aerosol sources and how they may respond to future climate change[2,3]. Our project will address this knowledge gap by deploying a chemistry-climate model over New Zealand. Chemistry-climate models simulate aerosol emissions, transport, chemistry, and climate interactions, and have never been run at sufficient resolution to capture regional variability in aerosol distribution over New Zealand. Recently, modelling experts in the US and Australia have developed a chemistry-climate model based on the global UK Earth System Model (which supervisory team members already use), but with flexible horizontal extent and resolution, making it suitable for deployment over New Zealand.
Over three research aims this project will develop a proof-of-concept chemistry-climate model for the New Zealand region. Geospatial analysis will inform its development, validation and an impact assessment of natural aerosol on air quality.
1. Build high-resolution emissions data sets for natural aerosols sources in New Zealand from geospatial surface cover and land use information.</td></tr>
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Validate the model's behaviour using spatially synthesized observational data.

Investigate how natural aerosol impacts air quality in New Zealand communities by using the spatial and temporal distribution of aerosol and population data to determine exposure metrics.

Technical model development and model simulations will be done by the supervisory team.

Project alignment with Vision Mātauranga.

While this research primarily addresses natural aerosol across the whole of Aotearoa, it holds significant potential to contribute to Māori resilience and adaptation strategies. Advancing our understanding of the inter-linked air quality and climate impacts of natural aerosol will benefit Māori communities who depend on environmental stability for their cultural, economic, and spiritual wellbeing. This project aligns with the Vision Mātauranga principle of Taiao (environmental sustainability), as improved understanding of natural aerosol will provide critical insights into air quality, and how it may change in the future, informing iwi and hapū decision-making for environmental stewardship and climate resilience. The knowledge generated could also support Hauora/Oranga (health and social wellbeing) by guiding strategies for communities vulnerable to air pollution impacts.

Although no direct engagement with Māori stakeholders is proposed at this stage, we recognise the importance of embedding indigenous perspectives in scientific research and for equitable outcomes. For example, enhanced air quality projections could inform co-designed adaptation measures with iwi and hapū, ensuring culturally relevant and effective solutions. We welcome opportunities to explore collaborative pathways with Māori advisors and researchers, ensuring that the project outcomes align with the values and aspirations of Māori, contributing to shared environmental and societal goals.

Importance of geospatial analysis to the proposed research.

In this project geospatial analysis will underpin the development and validation of a new chemistry-climate model for quantifying New Zealand's natural aerosol. Geospatial analysis will also inform an impact assessment for natural airborne particulate matter exposure in New Zealand.

Geospatial information will be used to create novel high-resolution emission data sets for natural aerosol sources by mapping New Zealand's surface cover and land use to the chemistry-climate model's surface cover classes. Emissions data sets describe how much, how fast, when and from where aerosol is transferred from the Earth's surface to the atmosphere. They are fundamental for chemistry-climate modelling because aerosol emissions are highly dependent on the surface type and land use.

The project will use geospatial analysis techniques to validate the model against different observational scales. This will ensure confidence in the chemistry-climate model's predictions and representativeness over the New Zealand region. We will use remotely sensed satellite observations in combination with ground-based point source observations and air-parcel back-trajectory analysis to assess the model's behaviour across a range of meteorological and atmospheric composition metrics.

We will then combine model outputs with geospatial population data to assess natural aerosol exposure and health impacts for New Zealand communities.

Novelty and transdisciplinarity of the project

This project will link geospatial analysis, chemistry-climate modelling and air quality management, creating new collaborative opportunities between researchers at GRI and the University of Canterbury, as well as national and international institutions. The project will create a new, proof-of-concept chemistry-climate model to study aerosol distribution and subsequent air quality and climate impacts in New Zealand. The new model advances Zealand's atmospheric modelling capability and standing as a centre for Southern Hemisphere climate and aerosol research and, importantly, develops and maintains critical atmospheric modelling capability in New Zealand. Our project will demonstrate one novel application for the model - understanding impact of natural aerosol on present day air quality in New Zealand. Because little can be done to control natural aerosol sources, this is essential for understanding the effectiveness of air quality management strategies targeting human-made aerosol pollution.

We also highlight where the new modelling capability can be used to understand the wide-ranging impacts of aerosol on air quality and climate in New Zealand, including:

The capacity to make future projections of natural and human made aerosol.

- Understanding the interactions between air quality and climate, such as the impact of dynamic land cover.
- The role of secondary aerosols from human sources such as nitrate aerosol from agricultural activity.

Understanding the role of air pollution on agriculture, such as microplastic deposition to crops and pasture.

Inform air quality monitoring in New Zealand through targeted site selection and interpretation of existing data sets.

- Understanding the fundamental processes and Earth system drivers of aerosol-cloud-climate interactions over remote Southern Hemisphere regions that contribute to uncertainty in global climate projections.

References:

[1] Revell, L.E. et al., incl. Davy, P.K. and Hardacre, C., (2024), Marine aerosol in Aotearoa New Zealand: implications for air quality, climate change and public health, Journal of the Royal Society of New Zealand, 10.1080/03036758.2024.2319753

[2] Davy, P.K. et al., incl. Hardacre, C., (2024), Evaluation of New Zealand's background particulate matter sources, Lower Hutt (NZ): GNS Science. 98p. Consultancy Report 2024/53

[3] Davy PK, Trompetter WJ. 2021. Elemental analysis results for air particulate matter collected in Auckland, 2006–2021. Lower Hutt (NZ): GNS Science. 57 p. Consultancy Report 2021/45.

Project title	
The Effects of Modern Pine Harvesting Techniques on the Movement of North Island Brown Kiwi (*Apteryx mantelli*)	
UC senior supervisor project leader Sara Kross, sara.kross@canterbury.ac.nz	Department/School School of Biological Sciences
Other members of the supervision team Vanessa Bastos Steve Pawson	Department/School School of Earth and Environment. School of Forestry
Links with organisations outside UC (if applicable)	

Save the Kiwi and the Kiwi Recovery Group- Department of Conservation.

Project outline

In recent decades, the Kiwi Recovery Group and Save the Kiwi have collaborated with the Forest Owners Association to develop protocols for managing kiwi in exotic forests. Earlier research in the 1980s (Waitangi Forest, Northland) and early 2000s (Waimarino Forest, central North Island) suggested that exotic forest harvesting posed a low risk to adult kiwi, particularly when undisturbed native vegetation was nearby (Colbourne & Kleinpaste, 1983). However, modern harvesting techniques, such as stockpiling felled trees and using haulers, may present more significant risks.

Under the Resource Management (National Environmental Standards for Commercial Forestry) Regulations 2017, foresters managing kiwi populations must identify and protect nest sites while avoiding or mitigating adverse effects. However, specific mitigation measures remain unclear.

This research aims to track kiwi movements through logging operations to assess potential risks and inform improved management strategies. The key objectives include understanding:

1. Movement patterns – How do kiwi move before, during, and after clear-fell harvest operations?
2. Displacement effects – Do harvest operations force kiwi to shift territories, affecting individuals in adjacent, unharvested stands?
3. Physical impacts – Are there documented injuries or fatalities resulting from clear-fell harvesting?
4. Mitigation strategies – Can our findings inform more effective mitigation measures at harvest or earlier in the forestry cycle?

The nature of this research will also provide important knowledge on kiwi ecology and behaviour in commercial forest systems. The study will track 20 adult kiwi (male and female) at five forestry sites (n=100 total), fitting them with transmitters and DoC-issued bands six months before harvest. Research is conducted under an approved Wildlife Act Authority permit and University of Canterbury Animal Ethics Approval (2024/09R).

Project alignment with Vision Mātauranga.

This project focuses on the protection of the *Kiwi-nui / North Island brown kiwi*, a national icon cherished by all cultures in New Zealand, but particularly by Māori. As a *taonga* (treasured) species, kiwi hold deep cultural, spiritual, and historical significance for Māori. Their feathers are highly valued for weaving *kahu kiwi* (kiwi feather cloaks), traditionally worn by Māori people of high rank. Given this cultural importance and the traditional knowledge surrounding the bird, *tangata* whenua are key stakeholders in kiwi management. For several local iwi and hapū across New Zealand, the *kaitiakitanga* (guardianship) relationship between *tangata whenua* and kiwi has been formally recognized in *Te Tiriti o Waitangi* (The Treaty of Waitangi) settlement claims, which include specific references to species recovery efforts that the outcomes of this project can support. The project's collaborators at Save the Kiwi have established relationships with mana whenua in the proposed study regions, and if successful we will prioritise recruiting a student from the communities this work will be embedded within.

Novelty and transdisciplinarity of the project

This will be the first attempt to document the spatial behaviour of kiwi in response to a large-scale disturbance. Large-scale blowdowns are a natural periodic stand-replacing process in indigenous forests. Though infrequent, they have a disproportionate impact on biodiversity in affected areas. In production forests, such disturbance occurs in a predictable 30-year cycle due to harvesting. Hence, production forests provide an opportunity to study spatial movement patterns of kiwi in response to large-scale disturbance. Such data can then be used to reduce negative impacts of forest management practices or aid recovery of natural populations, which is important given the increase in the frequency and magnitude of disturbance as a function of climate change.

The NZ forest industry manages 1.7M ha of plantation forest land and relies strongly on geospatial data for plantation estate planning, e.g., planting, silviculture, and harvesting. Industry is increasingly using more data-intensive geospatial tools, e.g., LiDAR and satellite imagery. Plantations represent approximately 25% of NZ's remaining forest area and disproportionally more in lowland areas. This transdisciplinary PhD brings biologists and geospatial (particularly movement/tracking) specialists together to understand how our national *taonga* bird is affected by the largest single disturbance in a plantation forest stand's 30-year cycle. The research will inform future best practice guidelines under the National Environmental Standards. The PhD student will work alongside Save the Kiwi, community groups (e.g., iwis and hapū), harvesting contractors, and forest managers as part of their project. This provides excellent opportunities for community and Māori engagement that can bring different perspectives to their research.

Project title

Geographic Patterns of Parkinson's Disease in New Zealand: Environmental Exposures and Healthcare Accessibility Networks

UC senior supervisor project leader	Department/School
Dr Sinéad Moylett, sinead.moylett@canterbury.ac.nz	School of Mathematics & Statistics
Other members of the supervision team	**Department/School**
Dr Lukas Marek	Geospatial Research Institute
Dr Toni Pitcher	New Zealand Brain Research Institute

Links with organisations outside UC

This project will establish key collaborations between the School of Mathematics and Statistics, the New Zealand Brain Research Institute (NZBRI), and the Geospatial Research Institute Toi Hangarau (GRI), bringing together expertise in epidemiology / data science, neurology, and geospatial analysis. The NZBRI, an independent research institution based in Christchurch who maintains a comprehensive Parkinson's disease cohort, has established connections with the University of Otago, University of Canterbury, and Te Whatu Ora – Health New Zealand Waitaha Canterbury. The School of Mathematics and Statistics at UC will provide statistical expertise for analysing disease patterns and outcomes, with geospatial expertise provided by the GRI. These collaborations will strengthen existing research networks and create new opportunities for knowledge exchange between UC and other major health research institutions in the Canterbury region and across New Zealand, while ensuring access to vital clinical and geospatial data necessary for this research.

Project outline

The project will assess geographic patterns of Parkinson's disease (PD) progression and outcomes in New Zealand, examining environmental risk factors and care pathways. While emerging evidence suggests environmental exposures contribute to PD outcomes, the spatial relationship between disease patterns, environmental factors, and healthcare access remains in its nascent stages of investigation. The NZBRI maintains a well-characterized PD cohort that provides an opportunity to examine specific environmental exposures and healthcare access patterns that may influence disease outcomes.

This study will utilise multiple data sources: the NZBRI PD cohort, and separately, the Integrated Data Infrastructure (IDI) where we will identify people with Parkinson's disease using NZBRI's established Bayesian model applied to comprehensive healthcare data including hospital admissions, prescriptions, and mortality records from 1988 onwards. Using residential location data, we will conduct a nationwide population-based spatial analysis of PD outcomes. We will employ various spatial analytical approaches, including Bayesian models, while accounting for demographic characteristics and multiple comparisons. Environmental and social determinants of health will be integrated using geospatial techniques, incorporating the established Healthy Location Index and its domains, alongside official geographic classifications from Health NZ and Stats NZ. Additionally, we will analyse care pathways using national health datasets to assess healthcare accessibility and utilisation patterns.

The findings will enhance our understanding of how environmental and social factors influence PD outcomes while identifying areas where healthcare delivery could be optimised. Care pathway analysis will reveal specific patterns in healthcare service utilisation and accessibility, including variations in specialist care access and treatment approaches. This research will provide one of the first comprehensive spatial analyses of PD outcomes in New Zealand, generating insights into environmental risk factors and healthcare delivery patterns. Results will inform evidence-based approaches to environmental risk reduction and guide healthcare resource allocation for PD patients.

Project alignment with Vision Mātauranga.

This project aligns with Vision Mātauranga by examining healthcare accessibility and environmental factors affecting all communities in New Zealand, including Māori, who have unique patterns of Parkinson's disease prevalence. Current research within NZBRI indicates that Māori communities experience lower rates of Parkinson's disease than might be expected based on population demographics, a pattern that warrants further investigation to better understand the complex interplay of environmental, social, and healthcare factors in disease development. Our geospatial and network analyses will examine healthcare accessibility patterns across different communities, focusing on identifying successful models of care delivery and environmental factors that might influence health outcomes. The analysis will be conducted separately for different communities to understand care pathways and healthcare utilisation patterns, with the goal of identifying effective approaches to healthcare delivery that could be expanded or adapted across New Zealand.

The project particularly aligns with the Hauora/Health theme of Vision Mātauranga, as it will generate knowledge about geographic and environmental factors that may disproportionately affect Māori health outcomes in relation to Parkinson's disease. By analysing care pathways and healthcare utilisation patterns, we can identify potential barriers to access and areas where service delivery could be improved for Māori communities. This knowledge will be valuable for informing culturally appropriate healthcare delivery and resource allocation decisions.

Importance of geospatial analysis to the proposed research

Geospatial analysis is fundamental to this research as it enables the identification of spatial patterns in Parkinson's disease outcomes that would not be detectable through traditional epidemiological methods alone. Through spatial statistical techniques, including Bayesian models, we can analyse geographic variations in disease outcomes and quantify their statistical significance, providing insights into potential environmental factors that may influence disease progression. The integration of environmental and social determinants of health through geospatial analysis, particularly using the Healthy Location Index and its domains, will identify key factors affecting disease outcomes. Furthermore, network analysis techniques will be crucial in examining healthcare accessibility, measuring travel times to specialist services, and analysing service catchment areas across New Zealand. This advanced spatial understanding of both disease outcomes and healthcare delivery networks will provide valuable insights for health service planning and resource allocation, potentially identifying areas where healthcare access could be improved. The combination of spatial statistics, network analysis, and epidemiological data represents a powerful approach to understanding the complex interplay between location, environment, healthcare accessibility, and Parkinson's disease outcomes in New Zealand.

Novelty and transdisciplinarity of the project

This project pioneers a novel approach to understanding Parkinson's disease in New Zealand by integrating epidemiological methods with advanced geospatial analysis, including sophisticated network and healthcare accessibility modelling. While environmental factors are widely suspected in Parkinson's disease development, direct evidence remains scarce. Spatial analysis offers a powerful tool to investigate environmental influences on disease pathogenesis, addressing limitations of previous studies that have shown inconsistent results regarding environmental risk factors, often hampered by imprecise definitions and limited sample sizes.

Our research leverages the comprehensive NZBRI cohort data, the national cohort based on health datasets in the IDI and environmental exposure data to create a robust analytical framework. This transdisciplinary approach merges epidemiology, environmental science, and healthcare systems research through sophisticated spatial statistical techniques and network analysis. By examining geographic variations in disease outcomes alongside detailed accessibility mapping of healthcare services, we will generate valuable insights into both environmental and social determinants of health through the Healthy Location Index, while identifying barriers to care access. The integration of network analysis will enable precise measurement of travel times, service catchments, and healthcare resource distribution, providing a detailed understanding of how geographic location influences patient outcomes.

The combination of these diverse methodologies and data sources will allow us to identify potential environmental exposures such as industrial activities and air quality measures, while quantifying healthcare accessibility through advanced network modelling. This will reveal how transportation networks, service distribution, and geographic barriers impact care delivery and patient outcomes. Our comprehensive approach demonstrates how innovative cross-disciplinary research can address complex health challenges while generating practical insights for healthcare delivery improvement. The resulting accessibility maps and network analyses will provide evidence-based recommendations for optimizing healthcare resource allocation and reducing geographic disparities in care access.

Project title

Geospatial Analysis of Play:
Capturing Social Patterns in Children's Natural Environments

UC senior supervisor project leader	Department/School
Graeme Woodward, Graeme.Woodward@canterbury.ac.nz *Note: The order of supervisors may change based on the candidate's background, recognising that it is a multidisciplinary project spanning engineering, geospatial data science, and paedology* (scientific study of children's behaviour and development). *A student with an engineering background would be preferred.*	Wireless Research Centre (Wireless positioning and sensing expertise)
Other members of the supervision team	**Department/School**
Cara Swit **Vanessa Bastos**	School of Health Sciences (childhood developmental psychology) School of Earth and Environment (geospatial and movement data analytics)

Links with organisations outside UC (if applicable)

Te Whare Kōhungahunga o UC | Early Childhood Learning Centre (ECLC) (for field trials and data collection)

ILR (Marcus Clyne): Electronics and Software Design (for low-volume manufacture of devices to facilitate data collection)

Project outline

Understanding early childhood social interactions is fundamental to promoting healthy developmental outcomes, yet current tools to study these interactions lack precision and scalability. This transdisciplinary project, led by researchers at the Wireless Research Centre (Dr Graeme Woodward) and Faculty of Health (A/Prof. Cara Swit), aims to develop a novel piece of wearable, wireless technology, with associated data management and analysis tools that non-intrusively captures both the positionality and verbal interactions of children in a shared social space (e.g., playground in an early childhood setting). The goal is to map spatial and temporal dynamics of social interactions with high precision, tracking movement patterns, proximity, group formation, and verbal exchanges in real time.

This technology will enable researchers to analyse the social epidemiology of peer interactions, distinguishing between positive, neutral, and negative interactions, and explore how patterns of inclusion, exclusion, conflict, or prosocial behaviour emerge in young children's interactions. This has wide applications in developmental psychology, education, and public health, providing an accurate level of data that has never been captured in this field before to enable targeted interventions that support social wellbeing from a young age.

This technology will be designed to operate in naturalistic settings without disrupting children's play and interactions, providing ecologically valid data on social interaction patterns that is rarely captured because of limitations of existing technology. The two lead researchers have been working on prototypes of this technology for the past two years and have collected sufficient data to be confident that such technology can be developed, with the right expertise, commitment and time, all that can be offered by a PhD scholarship. The proposed PhD project will focus on the refinement of the geospatial data collection, management and analysis, in addition to the application of this data in research on social developing in early childhood.

Project alignment with Vision Mātauranga.

Social connectedness and whanaungatanga[1] are deeply valued in Te Ao Māori (the Māori worldview) and critical for fostering hauora and oranga (positive health and wellbeing). This project strongly aligns with these values by developing wireless, non-intrusive technology to capture real-time social interactions among young children (between 3 and 5 years old) in natural environments, such as playgrounds. By observing and understanding how meaningful interactions are initiated, sustained, and disrupted, this research provides an important opportunity to support tamariki (children) in developing strong social foundations that contribute to lifelong wellbeing. Additionally, it offers the potential to identify patterns of inclusion, exclusion, and early social support networks, which are key determinants of oranga (wellbeing) and equitable developmental outcomes. The data generated through this innovative technology will help build more supportive, socially inclusive environments for tamariki Māori and all children, particularly in early learning settings where foundational social relationships are first formed. If successful, we will actively seek consultation with Māori advisors to ensure that Vision Mātauranga remains meaningfully integrated into the project's design, implementation, and long-term impact.

[1] A relationship through shared experiences and working together which provides people with a sense of belonging.

Importance of geospatial analysis to the proposed research.

The ability to track, visualise, and interpret complex social interaction patterns in everyday settings is central to this project. By capturing accurate positional data, the technology will identify spatial clustering, movement and proximity patterns across children over time and in relation to the surrounding environment. This will allow researchers to move beyond traditional static observational methods - which currently dominate the field - and instead capture the fluid and dynamic nature of real-world peer interactions. Geospatial analysis will support both geovisualisation and advanced modelling of interaction networks, enabling analyses of micro level structures and processes within social groupings. This level of insight presents a significant methodological advancement in child development research, opening up new possibilities for understanding how children interact, include, and exclude peers in social environments.

Novelty and transdisciplinarity of the project

This project brings together signal processing engineering (wireless positioning and sensing, wireless communications), developmental psychology, and geospatial (including movement), data analytics – fields that rarely intersect but offer a unique and novel approach to studying human social behaviour. The technology itself is novel in its design for use with young children: it will be wireless, wearable, and capable of capturing both movement and spoken interactions without intrusion. With the technology and expertise in children's social development, this study offers both methodological innovation and theoretical advancement and application to the field.