Note: The following are not actual co:labs but examples to illustrate what potential co:labs could be like. We are open to all research topics and new ideas.

Sample NISTH co:Lab 1: A behavioural approach to combat the increasing rate of climate change

Background / Research Topic

As the rate of climate change is increasing at an alarming rate, it is important for humanity to act quickly. Unfortunately, technology and science does not evolve as quickly as climate change and even some of the technologies used today has been in research for the last 10 years.

This means that humanity cannot wait for technology to combat climate change. Studies have shown that climate change is a direct result of human influence, this means that humans could also "uninfluence" climate change.

Aim and Objective

The proposal aims to combat climate change with an interdisciplinary approach to allow multiple solutions from different aspects for the best pincer movement. The aim is to work with government agencies, NGOs and the general public on 4 approaches/tracks: Investigation, Education, Empowerment & Policy changes.

The brief of each approach/track will be discussed below:

Investigate the impact of normal human activities that accelerates climate change
Experts in environmental science or engineering will work with social scientists to investigate areas where a paradigm shift would cause the most impact (if all of humanity stopped using straws? Stopping private transport?) This would help propel the next 3 tracks.

Educate the general public
Work with media companies and other agencies to spread awareness of climate change and the repercussions, different levels of difficulty could be investigated; simple concise explanations for children and elderly to full scientific lessons for anyone with deeper interest or within academia.

Experts in the area of science communication or better yet climate communication would investigate a means of bringing climate information to the general public. This would raise awareness outside of the world of academia/policy. Opening possible avenues of involvement from the general public.

Engineers and computer scientists could work with the above experts to create platforms and attractive "learning academies" to incentivize and increase the reach.

Empower the youth to take agency against climate change
The growing concerns of youth to save the environment and the lack of resources, platforms and not being taken seriously by adults are adding pressure to their mental & physical health

Experts in education could investigate bringing climate science into the curriculum to raise awareness in the youth.

Experts in the area of public policy or even climate policy could investigate an outlet or a channel to allow the youth to voice their opinions to be heard by policymakers. The fight for climate change is for everyone and having many minds to tackle the problem would benefit humanity. Especially if the youth are interested in being involved with the fight against climate change on their own accord.

Engineers and computer scientists could create a platform to allow youth to communicate with and educate other like-minded counterparts. This would not only promote personal growth but give them a means of stress relief and possibly create stronger bonds.

This can be an introductory test and be translated to empower the general public upon the success.

Policy changes to decrease the impact Singaporeans have on the environment
Work with the government to introduce useful and beneficial public policies, reducing single use plastics, increasing support for public transport and incentivise environmental supporters.

Experts in public policy would investigate trying to influence governments and large organizations to adopt strategies and implement policies to shift practices. (Should manufacturing industries share the burden to combat climate change? Can we encourage people to take public transport and not drive their own vehicles?)

Expected Outcomes

- More action taken against climate change by a larger number of people (general public, industries, governments).

- The general public and other usually uninvolved parties would start to take ownership and responsibility to combat climate change

Academic expertise needed

Education (NIE), Public policy (SSS), Social Science (SSS), Science Communication (WKWSCI), Computer Science (SCSE), Environment Engineering/Science (ASE), Mechanical/manufacturing engineering (MAE)

Possible external expertise

National Youth Council (NYC), Ministry of Culture Community & Youth (MCCY), National Environment Agency (NEA), NParks, Ministry of Sustainability & Environment (MSE), Marshall Cavendish, Ministry of Education (MOE), Mediacorp, Media Development Authority (MDA)

NTU2025 Humanity's grand challenges

This proposal closely ties up with 3 of the 4 NTU humanity grand challenges: mitigating our impact on the environment; harnessing the science, art and technology of learning; and addressing technology's impact on humanity

Sample NISTH co:Lab 2: AI for Ageing

Background / Research Topic

The growing ageing population, which is expected to double by 2050 results in prevalence of age-related diseases such as Alzheimer's and cardiovascular, dementia, frailty, and Parkinson's, that require constant monitoring by a healthcare provider. On top of that, ageing has a deteriorating effect on mental health and cognitive abilities that greatly complicates the lives of seniors through memory and behaviour impairment leading to reduction of life quality, lack of motivation, inhibited sense of worthiness and decreased social engagement, significantly amplified by physical weakness. This in turn places a big burden on families and healthcare systems.

Aim and Objective

We endeavour to identify the balance between technological capabilities of wearable electronics and robotics in terms of accuracy, functions, requests of elderly for comfort, aesthetics and ease of use and its potential to facilitate the eldercare and to increase social integration of elderlies into the society.

First, we aim to identify strong predictive model for disease progression based on continuous collection of digital biomarkers through the wearable electronics and robotics. To achieve it, we seek the inputs from medical experts in identifying necessary biodata to control vital signs; materials and robotics scientists to develop optimal wearable biosensors; as well as data scientists to deploy methods to process the collected data. Inputs from communication experts on how to enhance human-technology perception and to teach elderlies and their caregivers on the necessity of collecting bioinformation would also be valuable. We will involve social scientists to help understand standpoints of elderly towards hesitancy in accepting robotics and wearables and adopting them in long perspective.

Another issue that requires addressing to facilitate seamless integration of elderly into society is the design of inclusive urban living space and exploring the means of optimal social connectivity. In order to design living space enhanced by personalized artificial companions that would promote a thriving environment for complete satisfaction of physical, mental and emotional needs of elderly, we are seeking the help from social scientists to explore the existing barriers in interacting with technologies, as well as the difficulties in integrating people with disabilities into everyday activities. Architects, urban developers and behavioural scientists are expected to advise on design of user-centric living space in the most beneficial for elderlies way. We tap on expertise of communication scientists to understand the approaches to increase social integration of elderly into the society

Lastly, we attempt to reconsider existing healthcare systems and shift the focus on autonomous eldercare. We will explore how to create more effective and rapid public healthcare to account for the needs of ageing population and how to automate it by complementing with AI-empowered eldercare system. To achieve this, we are seeking expertise from public health scientists, as well as public and private hospitals. Besides, we invite organizational and business experts to develop cost-effective solutions for upscaled introduction of AI and robotics into healthcare system.

Expected Outcomes

As a result of encompassing studies, we aim to draft the guidelines for governmental and healthcare institutions on how to recommend, communicate and extensively deploy wearable electronics and robotics aimed at continuous collection of personal health-related data into society.

We will create a roadmap of integrating digital data into existing healthcare systems, transforming healthcare system for more effective, user-centred and safer care to cater to the needs of the elderly.

We will develop the protocols to ensure smooth communication about the benefits of implementation of artificial agents with elderlies, building on a premise that addressing ethical and social issues in wide adoption of technologies is essential.

We will assess the caveats of multi-stakeholder collaboration and devise recommendations and/or protocols for fruitful interaction with the aim to encourage translational science for the benefit of humanity.

Academic expertise needed

Materials Science (MSE), Big Data Analytics (SCSE, AI.R, CIL), Robotics (MAE, RRC, RRIS), Public Health (LKCSoM), Health of Elderlies (LKCSoM), Urban Design (CEE, NBS), Social Science (SSS), Public policy (SSS), Communication (WKWSCI), LILY, ARISE

Possible external expertise

Centre of Liveable Cities (CLC), Urban Redevelopment Authority (URA), Ministry of National Development (MND), National Healthcare Group (NHG), Institute of Mental Health (IMH), professional eldercare service centres.

NTU2025 Humanity's grand challenges

This proposal closely ties up with 2 of the 4 NTU humanity grand challenges: Responding to the needs and challenges of healthy living and ageing; and addressing technology's impact on humanity