



# BRINGING TOGETHER A TEAM FOR ONE HEALTH BENGALURU PROJECT

One Health is a concept that recognizes the interconnection between human, animal, and environmental health and calls for a coordinated effort among various disciplines to achieve optimal health outcomes. BeST cluster believes strongly in the concept of One Health and is working towards bringing various stakeholders working in this area in the city of Bengaluru. The BeST Cluster mobilizes a wide variety of stakeholders (from 25+ organizations) to integrate Human Health, Animal Health, and Environmental Health - Launch of The One Health Bengaluru City Consortium on 3rd March 2023, with the goal of building a unified healthy ecosystem in Bengaluru city - a global urban center.

To achieve this locally, the cluster is bringing researchers from NCBS, TIGS, IISc, Ashoka University, representatives from not-for-profit foundations such as Infectious Diseases Research Foundation, Biome Environmental Trust, ARTPARK, private players such as Molecular Solutions Care Health, industry representatives from BCIC, government bodies such as BBMP, and the list is growing. BeST cluster aims at bringing all the teams working in One Health Research under one umbrella and welcomes collaborations for the greater good of society. Together, the consortium focuses on building a framework for better health, disease surveillance, and preparedness for future disease outbreaks at a local scale, applicable to regional and global scales.

BeST  
Bengaluru Science & Technology Cluster

Office of the Principal Scientific Adviser  
to the Government of India  
Science & Technology Cluster

Launch of  
The One Health Bengaluru City Consortium  
on 3<sup>rd</sup> March 2023

ONE HEALTH BENGALURU CITY

ncbs  
B.B.M.P.  
TIGS  
ARTPARK  
INSTITUTE FOR CLIMATE ACTION  
Infectious Disease Research Foundation  
strand  
biome  
swissnex  
NEARSTRONG FOUNDATION  
C-CAMP  
Ahmedabad University  
MD  
ASHOKA  
echo network  
SOWKHYA  
Molecular Solutions Care Health  
IRTI INTERNATIONAL  
Azim Premji University  
PHFI  
PUBLIC HEALTH FOUNDATION OF INDIA  
carenet  
Center for Advancement of Global Health  
IAPMO

## INDUSTRY EXPERT SAYS...

BeST is like a NODE... we know the process of crystallization, it starts with that node around which the whole crystallization starts to happen. I am looking forward to collaborating with BeST... how do we leave Bangalore a better place than how we inherited it.



*Prashanth A  
Vice President  
Project House – Mobility Solutions*



# CROSS-SECTORAL COLLABORATIONS FOR URBAN MOBILITY SOLUTIONS

Bengaluru has been estimated to be home to about 20 million people by 2031. The city suffers from greater traffic congestion, a larger number of accidents, and transportation delays, due to various reasons including imbalances in modal split, inadequate transport infrastructure, and sub-optimal use. BeST's urban mobility initiatives encompass providing evidence-based scientific methods to develop long-term strategies for sustainable urban and megaregional mobility in Bengaluru.

BeST has actuated a cross-sectoral group of experts and players from IISc, IIITB, IUDX, Bosch, DULT, and BBMP on this project opening various opportunities. Connecting with public sector entities, such as BMTC and Bengaluru police, and private entities, such as Ola and Uber, for data sharing, bringing in more users at the leadership level to ensure last-mile delivery and the possibility of building city scale models using ongoing projects and combining them with other data such as environment and health are under discussion.



Increasing urbanization makes more economic sense to grow fresh produce within and around the city in protected and controlled environments. Agricultural yield is greatly influenced by factors such as light, temperature, humidity, soil characteristics, and so on. Precision agriculture is a modern farming management concept that uses information and technology-based systems to measure variations in conditions within a field and tweak the input accordingly to ensure optimal yield. Under this area, researchers at IISc, JNCASR, UAS, ICAR-IIHR, and ICAR-NBAIR have partnered with industries such as ATGC Biotech, Crop Care, Ankur Seeds, Indus Seeds, and Orbifold Solutions for developing various solutions.

BeST cluster kickstarted an academic-industry collaborative effort in the area of precision agriculture such as developing protected environments, climate control systems sensing, precision fertilization, automated irrigation systems, and pest management, to name a few. Researchers from IISc, University of Agricultural Sciences, have initiated work towards building innovative autonomous poly houses equipped with drone delivery platforms and associated sensors and pheromone-based pest traps. The cluster is also engaging various beneficiaries including farmers and agritech companies and start-ups at various stages of the project to ensure impactful outcomes.



## CONVERSATION WITH A QUANTUM PHYSICS SCIENTIST

Dr. Subhro Bhattacharjee from the International Centre for Theoretical Sciences is part of the quantum technologies theme for the BeST Cluster. He was recently awarded the INSA Medal for Young Scientists 2022. Quantum physics has made an enormous impact on society, both in terms of understanding the properties of materials based on their quantum origin and subsequent technological inventions such as semiconductors, superconductors, and lasers.

**You recently received the INSA Medal for Young Scientists for your contribution to quantum physics. Could you describe quantum physics and technology in simple language?**

I think that though we do not appreciate it, we are basically using quantum technology of various forms all the time. For example, inside our smartphones, there are different materials making up their sub-parts that have different functional properties which together make them work seamlessly. Such functional properties in most gadgets stem from the collective behaviour of many-many atoms and electrons that make them up. Now, these atoms and electrons are very small and, an accurate description of such small things requires quantum mechanics. Thus understanding the quantum aspect of our nature is critical to put them to technological use. This has been made largely possible due to the incredible development in our understanding of the basic quantum nature of the universe that we live in. So whenever we are using such a gadget, we are making use of quantum physics.

It is important to emphasize that functional properties have a collective macroscopic nature. To explain with an analogy, consider the pencil that we use daily. The marking tip of the pencil is made up of graphite which consists of carbon atoms. If you expose the same set of carbon atoms from a pencil to different conditions, they form a diamond that looks and behaves completely differently. So the same carbon atoms can be assembled to give completely different properties. This is because the difference in the behaviour of graphite and diamond is a collective property of the entire assembly of carbon atoms when put together in a particular form and not to individual members. Thus these are called emergent properties and they give rise to various functional properties which form the backbone of different technologies.

Quantum condensed matter physics provides a framework to understand such functional properties in materials by studying the collective behaviour of the many-many atoms and electrons that make them up. Now one can ask an interesting question: how does the emergent functional property exhibit the quantum nature of the underlying constituents in a many-body system? While there are many different ways, the recent buzz is about the possibility of the central feature of quantum mechanics — quantum entanglement — becoming manifest at a collective level. Quantum entanglement is one of the central reasons that makes quantum mechanics non-intuitive to us, but

we now know that this can help us revolutionize our computing and communication technologies. This has led to a global effort to understand and develop such platforms.

**Quantum has become a buzzword, and people think they don't understand these concepts. How do we encourage everyone to understand science concepts?**

I think the recent buzz is partly due to the global effort which has caught the public's attention. However, quantum mechanics has held the status of being a mystery, particularly to the uninitiated, because of its counterintuitive nature. Our intuition is built on the basis of our experience with the average behaviour of bigger objects which is OK for things like cricket balls or space shuttles. However, for smaller objects such as atoms or electrons such intuitions often fail miserably and we need to turn to quantum mechanics. However once one stops comparing the intuition gained from observing bigger things with the properties of smaller objects at the atomic level, quantum mechanics becomes much easier to understand. This requires some slightly different physics ideas and associated slightly sophisticated mathematics. However, the great thing is that quantum mechanics is everywhere around us, and as I mentioned in the previous answer, it can manifest through various functional properties in materials and electronic gadgets around us whose basic physics is very fascinating. So one possible way forward is to encourage ourselves to ask questions about the world around us in general, including the electronic gadgets that we use — why and how they work. This will lead to a basic understanding of several central ideas. One can take advantage of an ever-growing set of scientific outreach programs — both online and in-person — that caters to such issues. To know the full thing, we of course need to go to graduate school and take part in the very fascinating journey of finding newer emergent collective properties.

**What is the 'National Mission on quantum technologies and applications'?**

It is a directed initiative to promote research and technological development on various aspects of quantum technology that I have tried to outline above. We are roughly at a crossroads. Historically we have been lagging in many areas for various reasons, but I think now it's more of a level playing field. So, these kinds of directed initiatives, if properly implemented and made available to the Indian research community, which is quite mature now, can lead to important outcomes.

### SCIENTIST SAYS...

**A channel like the BeST can bring together and articulate the objectives of different sections of society to solve useful problems. Sometimes there may not be an immediate solution but coherent efforts by professionals with diverse expertise can help achieve them. Initiatives such as BeST are central to nucleate such efforts with a focused greater goal.**



*Subhro Bhattacharjee*  
*International Centre for Theoretical Sciences*  
*Area of Research: Condensed Matter Physics*



# OUR TEAM IS GROWING

**Dr. Mrinal Kumar Sarma** as Project Manager: Mr. Sarma has an educational background in Zoology with B.Sc., Master's in Biotechnology, and Ph.D., in Energy from IIT Guwahati. After completing his Ph.D., he joined The Energy and Resources Institute (TERI), New Delhi as a research associate and then worked as an energy consultant at World Energy Council India, New Delhi. His skills include technical evaluation of project development, techno-scientific and project writing, product development, content writing, project management, and curation of project dossiers. He is experienced in efficiently delivering outcomes within strict time deadlines. He has a broad area of interdisciplinary experience in academic, industrial, and consulting arenas. He is well versed in interpersonal skills, fluent in oral and PowerPoint presentations with an independent thinking mind, and the ability to work as part of a team. He is an efficient project manager who maintains a consistent workflow without compromising its quality.



**Dr. Nidhya Nadarajan Joghee** as Project Manager: Nidhya has an educational background in Biotechnology with B.Tech in Industrial Biotechnology and Ph.D. in Metabolomics. She has diverse work experience in teaching, research, and entrepreneurship. She has been a part of the vibrant entrepreneurial ecosystem at IIT Madras Research Park (IITMRP) for her fellowship in social innovation and immersion by the Biotechnology Industry Research Assistance Council (Social Innovation program for Products: Affordable & Relevant to Societal Health) mentored by IITMs HTIC MedTech Incubator and Tata Institute of Social Sciences. With a keen interest in Biodesign Innovation Process and Social Entrepreneurship, she co-founded Spotdot Bioinnovations Pvt Ltd, which develops innovative point-of-care diagnostics for rural antenatal care through industry collaboration and government-funded projects. In her role as Project Manager, Dr. Joghee looks forward to putting her competencies to contribute to the unique collaborative innovation culture envisioned by BeST.



**Mr. Ravi Tennety** as Head, Operations: Mr. Tennety is an alumnus of the prestigious Indian Institute of Management passing with distinction, majoring in Marketing and Finance. Priorly he did his B.Tech. from Birla Institute of Technology, majoring in Electrical and Electronics. His career spans over 30 years, most of which were in Leadership Roles in large organizations such as Bharti, and Tata, among others. He was the CEO of a \$1 bn company, in his most recent assignment. He has completed Executive Programs from the University of Michigan and Ross, Harvard Business School, Indian School of Business, and Indian Institute of Management, Ahmedabad. He is a distinguished member of various policy-making bodies and has worked closely with various Ministries such as Rural Development, Skill Development, and Labor. He is highly regarded in the industry sector as a leader, speaker, and influencer. In his current role, he will drive the OPSA-funded projects to deliver committed outcomes while bringing the developments in Research to Industry for adoption and co-creation. He plans to create a sustainable supply of innovative scientific developments to Industry, thereby building scale with monetization and a meaningful interlock between Academia and Industry.

