IITB-Monash Research Academy

An Indian-Australian research partnership

Indian Institute of Technology Bombay | MONASH University

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|---|---|---|
| **Project Title:** | **Designing Web portal for Climate Resilient Agricultural Services** | |
| **Project Number** | **IMURA1150** | |
| **Monash Main Supervisor** (Name, Email Id, Phone) | Anuradha Madugalla; anu.madugalla@monash.edu, | *Full name, Email* |
| **Monash Co-supervisor(s)** (Name, Email Id, Phone) | | |
| **Monash Head of Dept/Centre** (Name,Email) | Professor Monica Whitty, monica.whitty@monash.edu | *Full name, email* |
| **Monash Department:** | Software Systems and Cybersecurity | |
| **Monash ADGR** (Name,Email) | | *Full name, email* |
| **IITB Main Supervisor** (Name, Email Id, Phone) | Subimal Ghosh, subimal@iitb.ac.in; | *Full name, Email* |
| **IITB Co-supervisor(s)** (Name, Email Id, Phone) | | *Full name, Email* |
| **IITB Head of Dept** (Name, Email, Phone) | Subimal Ghosh, Climate Studies, head.climate@iitb.ac.in | *Full name, email* |
| **IITB Department**: | Climate Studies | |

## Research Clusters:

## Research Themes:

| **Highlight which of the Academy's CLUSTERS this project will address?** *(Please nominate JUST **one.** For more information, see www.iitbmonash.org)* | | **Highlight which of the Academy's Theme(s) this project will address?** *(Feel free to nominate more than one. For more information, see www.iitbmonash.org)* | |
|---|---|---|---|
| 1 | *Material Science/Engineering (including Nano, Metallurgy)* | ***1*** | *Artificial Intelligence and Advanced Computational Modelling* |
| 2 | *Energy, Green Chem, Chemistry, Catalysis, Reaction Eng* | 2 | *Circular Economy* |
| 3 | *Math, CFD, Modelling, Manufacturing* | 3 | *Clean Energy* |
| 4 | *CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control* | 4 | *Health Sciences* |
| 5 | *Earth Sciences and Civil Engineering (Geo, Water, Climate)* | 5 | *Smart Materials* |
| 6 | *Bio, Stem Cells, Bio Chem, Pharma, Food* | 6 | *Sustainable Societies* |
| 7 | *Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng* | 7 | *Infrastructure* |
| 8 | *HSS, Design, Management* | | |

## The research problem

With the growing population, South Asia has experienced agricultural intensification but at the cost of groundwater extraction and resulting depletion. Climate-smart agriculture and irrigation management involving improved weather forecasts, high-quality satellite data, crowdsourced qualitative information and sparsely located sensor data can solve the problem. Here we propose to develop and implement such a solution to a village through a participatory framework involving farmers, NGOs, and other stakeholders. The methodology will include data-guided physics-based hybrid modeling, the use of advanced AI/ ML, data quality control, system development for data collection, and dissemination of advisory.

## Project aims

*The aims are:*

1. *Development of climate-smart agricultural and irrigation advisory system for a group of farmers in a village.*
2. *Participatory framework*
3. *High-resolution weather and S2S forecasts*
4. *Translating the new development to the field in village*

## What is expected of the student when at IITB and when at Monash?

*The student will develop expertise in climate and hydrology and make multiple site visits to understand the human-natural system. At Monash, he will develop the IT expertise to translate the knowledge into meaningful products*

## Expected outcomes

*Highlight the expected outcomes of the project:*

1. *Climate-smart agricultural system*
2. *Real-time monitoring and forecasting for farmers*
3. *Climate adaptation through the participatory framework*

## How will the project address the Goals of the above Themes?

*The project will use AI/ML for sustainability.*

## How well the IITB and the Monash supervisor(s) know each other

*Yes, we had a long discussion to derive this problem*

## Potential RPCs from IITB and Monash

*From IITB: Prof. Raghu Murtugudde*

*From Monash:*

## Capabilities and Degrees Required

M Tech in Water Resources Engineering/ Hydrology **OR** M Tech in Computer Science/ IT

## Necessary Courses

1. *Ecohydroclimatology CE 608*
2. A course on Probability, Statistics (if does not have background in CS or Statistics)

## Potential Collaborators

Select up to **(4)** keywords from the Academy's approved keyword list **(available at http://www.iitbmonash.org/becoming-a-research-supervisor/)** relating to this project to make it easier for the students to apply.

**Climate, AI/ML, Water**