SMART Centre for Environmental Sensing and Modeling (SMART CENSAM)

Dr Intan Nurhati (left) and Dr Jani Tanzil with a coral sample and drill that they use to collect specimen from reefs, which serve as records of environmental change, aiding climate and ocean research.

Programme Leader

Prof Leslie Norford, Massachusetts Institute of Technology

Prof Leslie Norford is the Programme Leader of SMART CENSAM. He is also a consultant to the Natural Resources Defense Council and numerous electric utility companies and universities.

CENSAM IRG is one of the five IRGs in the Singapore-MIT Alliance for Research and Technology (SMART) Centre. CENSAM IRG started in July 2008 (Phase II started in Jan 2013) and is a research programme funded by the National Research Foundation (NRF), under its Campus for Research Excellence and Technological Enterprise (CREATE) programme.

Research

CENSAM seeks to provide pervasive monitoring, modelling and control within the highly developed urban environment of Singapore.

MIT and Singapore collaborators work together to develop sensor networks and correlated models. The information derived from these studies is used to address environmental problems in Singapore in three main areas:

1. Urban: Urban heat island effect, urban air and water quality, and development of wireless sensor networks to monitor and control urban systems
2. Marine: Chemical sensing systems for deployment in autonomous marine vehicles, which incorporates elements of biomimicry
3. Climate: Predictions of regional climate change and global climate modelling

Researchers

There are about 160 researchers in SMART CENSAM, consisting of research scientists, post-doctoral fellows, research engineers and PhD students. Leading the research teams are 18 Principal Investigators from MIT. One of the SMART researchers, Dr Iqbal Mudasser (see photo below), became co-founder of a spin-off company resulting from the programme, and was chosen as one of the top 10 finalists of the EmTech Singapore TR35 Award in recognition of his scientific achievements.

Highlights

Wireless sensor network to monitor Singapore's water distribution system

Working in collaboration with PUB, CENSAM developed the necessary sensors, data logging and wireless transmission hardware and software for a wireless sensor network, which is used to detect leaks, bursts and water quality anomalies in the local water distribution system. Visenti Pte Ltd, a start-up company for which one of the founders is Dr Iqbal Mudasser (see photo on right), is a spin-off from this innovation. It commercialises the technology and is now contracted by PUB to monitor the entire water distribution system.

Development of multi-scale climate models

CENSAM has established a climate modelling system that includes global, regional and city-scale atmosphere models. Atmosphere models are used to forecast future climate changes, identify main contributing factors to the increase in urban air temperature, and study the dispersion of particulates from land-clearing fires.

Coastal Environment and Sediment Transport (CEST)

CENSAM has built a WCS (waves, current and sediment) facility that allows researchers to study with unprecedented accuracy the physics underlying the transport of sediment under real coastal conditions with waves and current.

For more information about the SMART CENSAM programme, please contact Senior Programme Manager Dr Veronique Blanc at veroblanc@smart.mit.edu
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