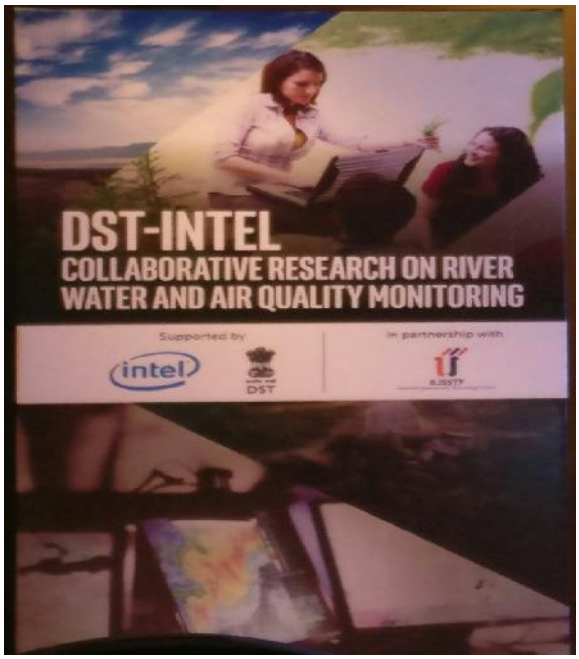
DST-Intel Collaborative Research for Real-Time River Water and Air Quality Monitoring

Recognizing the importance of developing the online River Water and Air Quality Monitoring (WAQM) systems, Department of Science and Technology (DST), Government of India and Intel are collaborating to jointly initiate “DST-Intel Collaborative Research for Real-Time River Water and Air Quality Monitoring soliciting proposals from Academic/Research Institutions and providing grant-in-aid support to the selected project(s).



Speaking on the occasion of Launch of the collaboration, Minister of State for Science & Technology and Earth Sciences Y.S.Chowdary said that it is joint programme of Public-Private Partnership (PPP) mode.

The Minister said that this programme is very critical for the restoration, conservation and preservation of the environment. Under the leadership of Prime Minister Narendra Modi, top priority is being given to R & D in science and technology to come out with appropriate solutions to challenges facing the nation.

"At the core of any initiative, we see the role of Science and Technology everywhere, " he said adding: “Global experience will come in handy to tackle local challenges.”

The aim of this initiative is to develop key technologies for sensing, communication and analysis of large-scale data collected from autonomous networks of perpetual/long-lived sensor nodes, followed by integration and deployment for water and air quality monitoring in real-time.

The program will be administered by the binational Indo-U.S. Science and Technology Forum (IUSSTF). River systems have been the birthplace of civilizations all over the world. They are woven into the social and economic fabric of society and penetrate deep into the psyche of the people living around them. Nowhere is this more evident than in India where the Ganga, Indus, Narmada and other rivers possess the cultural identity transmitted down the ages through sacred literature, the Puranas and the Vedas, as well as through popular myths and legends.

The Ganga is the largest and the most important river of India, with its watershed covering 10 Indian states, namely Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Himachal Pradesh, Rajasthan, Haryana, Madhya Pradesh and Delhi. The river Ganga (commonly called as Bhagirathi in the stretch Gangotri to Devprayag and Hubli in the stretch Farakka to Ganga Sagar) occupies a unique position in the ethos of people of India. Emotional attachment to the river and the centers of pilgrimage on its banks runs deep and long in the Indian History.

Discharge of untreated sewage from urban centres is a major cause of water quality degradation in the river. The total wastewater generation from 222 towns in Ganga basin is reportedly 8250 MLD, out of which 2538 MLD is directly discharged into the River, 4491 MLD is disposed into its tributaries and 1220 MLD is disposed on land or low lying areas. River Yamuna is another one of the most grossly polluted rivers in the country.

Air pollution is another emerging public health concern as there is increasing amount of evidence that the quality of air significantly affects our health due to the presence of various toxic pollutants. Linking air pollution from source to adverse human health effects is a complicated phenomenon that requires a multidisciplinary approach for better understanding. Further, air quality networks need to be developed that can depict and forecast pollution levels for public with health advisories and pollution emergencies measure. It is well known that increasing levels of air pollution are linked with more illness,

higher use of health services, and premature death among the exposed population groups. Further, both Household Air Pollution (HAP) and Outdoor Air Pollution (OAP) have reported to have largely detrimental effects on the quality of life.

The recent report of Global Burden of Disease (GBD) has ranked air pollution among the top ten killers in the world, and as the sixth largest killer in South Asia. In a study by UNEP-WHO, it was estimated that about 6.3 million deaths worldwide are caused by air pollution, out of which 3.3 million are due to OAP and 3.5 million due to HAP. There is increasing amount of evidence that the quality of air significantly affects our health due to the presence of various toxic pollutants and therefore air pollution is emerging as a major public health issue. GBD also estimated that air pollution causes 6,20,000 deaths everyyear making it the 5th leading cause of mortality in India.

One of the main causes of pollution in Delhi-NCR is high levels of Particulate Matter 10 (PM 10) and PM 2.5 particles smaller than 2.5 micrometers in diameter that lead to hazardous smog and causes asthma and respiratory diseases. Air quality in Delhi and National Capital Region (NCR) worsened recently to alarming levels recording PM 2.5 reading of 500 on the air quality monitoring portals, putting the pollution level in the “severe” category.

In order to eliminate problems associated with manual water quality monitoring, DST and Intel have come together for development of state-of-art solutions for real-time river water quality monitoring. The goal of this research would be to enable the development and eventual deployment of low-cost, low-power, autonomous wireless sensor networks to provide a fine-grained view of several critical water and air quality metrics over large geographic areas (cities, rivers, watersheds etc.). These online sensor networks for river water and air quality monitoring will provide the pre-remedial quality status and would enable to assess efficacy of post remedial interventions based on real time reliable factual data. This real time data will significantly further strengthen and complement the Missions of National priority like Namami Gange Programme and others by serving as critical data feeders for pre and post treatment analysis.

Such networks may also eventually replace the current paradigm of environmental quality management via localized stations. The development of such an Internet of Things (IoT)-based solution will require innovations in sensor technology for miniaturized platforms for continuous, always-connected multi-modal sensing, ultra-low power radios for efficient communication and energy harvesting technologies to enable very long or perpetual operation of sensor nodes. These key blocks will need to be woven together by a data analytics framework that spans edge devices, gateways and cloud-based analytics, to enable inferencing and sense-making in a low-latency manner.

Speaking on the occasion, Jitendra Chaddah, Senior Director, Operations & Strategy, Intel India, said, “Intel has been engaged in supporting innovation and technology research, aimed at creating solutions to help address different community challenges and improve quality of life. We are very excited to collaborate with Department of Science & Technology

in this advanced research program that would bring prominent academic and research institutions together to work on technology breakthroughs that can positively impact human lives."

The development of such an end-to-end solution comprising of several individual research elements can also potentially impact environmental quality monitoring systems in diverse contexts such as urban, domestic and industrial settings.

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Ref: Joint press meet of DST and INTEL