National Workshop on Application of Wireless Sensor Networks and Robotics in Agriculture and Rural Development

A National workshop on Application of Wireless Sensor Networks and Robotics in Agriculture and Rural Development was organized by the Agriculture Division of the State Planning Board on 17th and 18th of March 2015. The venue for the workshop was Mascot Hotel at Thiruvananthapuram. Shri. K.M.Chandrasekhar, Hon'ble Vice Chairman, State Planning Board inaugurated the event in the presence of several other dignitaries.

The objectives and expectations of the workshop were explained by Dr.P.Rajasekharan, Chief (Agriculture) of the State Planning Board. The major objective of the workshop was to discuss the latest developments in sensor technology and its applications in agriculture and rural development and to develop a broad framework action plan for the state. In the inaugural session followed by the inaugural address by the Vice Chairman Sri.K.M.Chandrasekhar, Dr. Alok Sheel IAS, Additional Chief Secretary, Planning and Economic Affairs Department, Sri.P.K.Mohanty IAS, Additional Chief Secretary, Forest and Wild Life, Sri.C.P.John, Member State Planning Board and Dr.Anuradha Balaram IES, Member Secretary, State Planning Board spoke on the importance of technology for the development of agriculture and forestry.

There were four technical sessions in this two day workshop. *First* session dealt with Application of drones in Agriculture, *Second* session on Wireless Sensors for Agriculture and Environment Monitoring, *Third* on Robotics in Agriculture and *Fourth* on Industry Interface followed by the concluding session. Demonstration of drones was also arranged at the end of the first technical session.

Eminent speakers include Dr. T. Asokan , Professor from IIT, Chennai, Dr. S.N Omkar, Chief Research Scientist from IISc, Dr. Selvarajan, Chief Scientist from NAL, Mr. Jerry Daniel and Anish Sathyan from CDAC Thiruvanthapuram, Mr.Jatin Singh, CEO of Sky met weather services, Pritam Sahu from Edall systems, Dr. B.S. Manoj and Dr. V. Seena from IIST, Dr. M. Sreekumar , Assistant Professor, Indian Institute of Information Technology, Chennai, Dr. Manjunatha, Professor, Jawaharlal Nehru College of Engineering, Shimoga and Professors from various Engineering Colleges in Kerala.

The participants include faculties from Electronics and Communication Engineering, Electrical Engineering, Mechanical Engineering, Computer Science, development professionals in agriculture, scientists and extension professionals in agriculture, representatives of PSU, planners, policy makers, representatives of industries and selected MTech students.

Kerala being an agrarian economy, the highlight of the workshop was to explore the possibility of the application of wireless sensor networks so as to improve agricultural output in the State. Wireless Sensor Network (WSN) technology helps to revolutionize information and communication technology which enables the development of small holder agriculture in selected areas. The recent developments in the area of autonomous vehicles and mobile robotics offer potential applications in agriculture. This facilitates the small and marginal farmers to adopt farming as a viable livelihood option.

APPLICATION OF WIRELESS SENSORS, DRONES & ROBOTICS

Various sensors available for agriculture purpose include air temperature, relative humidity, leaf temperature, leaf wetness, soil moisture, soil temperature, solar radiation etc. Wireless sensors are advanced application over wired sensors. WSN consists of a number of sensors spread across a geographical area and can be programmed to record measures like temperature and humidity. Wireless sensor networks are found suitable for application such as surveillance, precision agriculture, smart homes, automation, vehicular traffic management, habitat monitoring and disaster detection.WSNs may also serve for the application such as pest detection, plant disease prediction, forest fire detection, cattle tracking etc. The development of this technology is envisaged to provide revolutionary strategies for observing, aliening and managing agricultural practices.

Unmanned Aerial Vehicle (UAV) commonly referred to as drones are remotely piloted aircraft or systems. They range from simple hand operated short range systems to long endurance, high altitude systems that require an airstrip. Recent technological developments in both hardware and software allow UAVs to capture high resolution, geo referenced still photograph of study area which helps to produce digital maps.

OUTCOME OF THE WORKSHOP

Eminent scientists /experts in the field from various reputed institutions delivered valuable papers .

1. Scientists observed that drones with advanced sensors and imaging capabilities offered new and cheaper ways of capturing data on crop health, soil characteristics, meteorological parameters and growth attributes of crops. This would reduce crop damage thereby enhancing the yield of agricultural output which ensures a sustainable livelihood for small and marginal farmers. There is a possibility to develop new sensors also for disease diagnosis.

2. WSN could be deployed for real time monitoring of soil conditions, pest attacks, ripening of fruits, land slide monitoring, water level monitoring and biological fertility. Data captured by the sensors would be sent to the base station for processing.

3. UAVs with powerful cameras and onboard computers will help in mapping crop area and vegetation, assessment of plant health , detection of crop diseases, and to identify various tree species in forests.

4. As drones are equipped with radar imaging and microwave technologies, drones can also be used to spot illegal activities such as ganja cultivation, poaching and movement of extremists inside forests. Moreover it also enables data collection to support yield and weather based crop insurance.

5. Steps are under process to develop UAVs with longer endurance, higher payload and better imaging facilities to provide more efficient inputs for the farm sector.

6. Robotics is a growing area with lot of potential application in agriculture. The suggested possibilities include development of robots for coconut and arecanut harvesting, fruit plucking, poly house based operations, grafting etc

7. The possibilities of using sensor technologies in animal management, M2M communication as well as indigenous sensors were discussed in the industry interface.

8. Problems faced by farmers were also presented before the audience.

SUGGESTIONS

1. At the concluding session of the workshop it was suggested to have further sub group level discussions in April 2015 to work out the details of action plan for each of the sessions discussed.
2. It was also recommended to identify the measures for utilizing the potential of the technology for the development of agriculture.
3. In order to discuss the wider application of drones for the management of forests, it is desirable to have a separate meeting for this sector.
4. A requirement mapping will also be prepared with short, medium and long term expectations on the technology as indicated in the panel discussion.

In his concluding address , Dr.Poulose Jacob, Professor of Computer Science and Pro Vice Chancellor of CUSAT stressed the potential of new technologies including nano technologies for the development of agriculture. The academic community has agreed to work out details of action plan for further discussion through project mode and student work. Considering the potential of the technology it was suggested to initiate pilot projects on all the three areas discussed in the first three technical sessions with the support of industries and leading institutions.