

Applications of Space technologies

S. Selvi,

*Associate Professor, Department of Electronics and Communication Engineering,
Dr. Sivanthi Aditanar College of Engineering, Tamilnadu, India*

ABSTRACT:

The space commission frames policy to develop technologies for the needs of the country. Based on that Indian Space programme concentrated on achieving self reliance and developing capability to build and launch communication satellites for television broadcast, telecommunications and meteorological applications; remote sensing satellites for management of natural resources. Some of these applications are discussed in this survey paper.

Key words: Climate change, Disaster management, Remote sensing, Satellite communication, Space Technology

INTRODUCTION

Space technology includes spacecraft, satellites, space stations, and support infrastructure, equipment, and procedures. Space is such a novel environment that attempting to work in it requires new tools and techniques. The objective of the Indian Space programme is the development of space technology and the application programmes for the developmental needs of the country. India finds the marvellous growth in the space technology field over the past few decades. The development of space technology plays an important role in various sectors such as agriculture, communication, monitoring the environment, national security, disaster management, remote sensing, medicine, and entertainment. The Indian Space Research Organisation (ISRO) has launched more than 70 satellites since 1969 and India's space programme now costs US\$1 billion a year [1-2].

EARTH OBSERVATION

In 1970, the first remote sensing satellite project was initiated by ISRO to identify the coconut root-wilt disease found in Kerala. This project led the way for the development of Indian Remote Sensing (IRS) satellites. These IRS satellites have been the workhorse for several applications - encompassing the various sectors such as agriculture, land and water resources, forestry, environment, natural disasters, urban planning and infrastructure development, rural development, and forecasting of potential fishing zones [3].

WEATHER OBSERVATION

ISRO has designed and developed indigenous systems for ground based observations of weather parameters [3]. It includes (i) Automatic Weather Station (AWS) to providing hourly information on critical weather parameters such as pressure, temperature, humidity, rainfall, wind and radiation from remote and inaccessible areas; (ii) Agro Metrological (AGROMET) Towers to measure soil temperature, soil moisture, soil heat and net radiation, wind speed, wind direction, pressure and humidity; (iii) Flux Tower for multi-level micrometeorological observation as well as subsurface observations on soil temperature and moisture over the vegetative surfaces; (iv) Doppler Weather Radar (DWR) to monitor severe weather events such as cyclone and heavy rainfall; (v) GPS Sonde and Boundary Layer LIDAR (BLL) for observing vertical profiles of atmospheric parameters[3].

DISASTER MANAGEMENT

Under the Disaster Management Support (DMS) programme, the services set up by ISRO, are optimally synthesized to provide data and information required for efficient management of natural disasters in the country [4]. The Geostationary satellites (Communication and Meteorological), Low Earth Orbiting Earth Observation satellites, aerial survey systems together with ground infrastructure form the core element of the observation Systems for disaster management[4].

Assessment of flood affected areas can be carried out using the data provided by the optical and microwave satellites. When a cyclone approaches to coast, a risk of serious loss or damage arises from severe winds, heavy rainfall, storm surges and river floods. Using appropriate models and satellite data, ISRO is supporting the efforts of India Meteorological Department to predict the tropical cyclone track, intensity and landfall. After the formation of cyclone, its future tracks are regularly monitored and predicted on an experimental basis using a mathematical model, developed at Space Application Centre, ISRO [3]. Similarly, the effect of landslides, forest fire, agricultural drought and earth quakes can be studied using the data provided the satellites.

SATELLITE COMMUNICATION

The communication satellite series, which started with the APPLE satellite, grew into a very large constellation of satellites in the INSAT and GSAT series [4]. These satellites revolutionized the technological and economic growth of the country [4]. The INSAT satellite system is one of the largest domestic communication satellite systems providing regular services in the areas of telecommunications, business & personal communication, broadcasting, and weather forecasting & meteorological services [4]. Today, newer initiatives have been taken to expand the INSAT applications to newer areas like Tele-education, Tele-medicine, Village Resource Centre (VRC), Disaster Management Support (DMS) etc., have enabled the space technology to reach the common man in India [4]. The INSAT system has extended the outreach to less accessible areas like North- East, other far-flung areas and islands[4].

Indian Space Research Organisation has made remarkable progress towards building the space infrastructure - as the community resource to leapfrog the developmental processes[4]. The launch of INSAT system has been the major catalyst in the rapid expansion of television

coverage in India apart from growing applications like DTH, Satellite News Gathering, VSATs, Internet services etc. Use of INSAT for e-governance and developmental communication applications is also fast expanding [4].

CONCLUSION

The examination spirit of humans is providing thrust to nations across the globe to plan and implement space missions. The successful conduct of these missions is only possible through new technologies enabling systems and humans to function in space and planetary surface environments. The applications of space technology are reviewed in this paper.

REFERENCES

- i. http://www.asean-india-tic.org/india_submenu
- ii. https://en.wikipedia.org/wiki/Outline_of_space_technology
- iii. <http://www.isro.gov.in/applications>
- iv. <http://www.isro.gov.in/applications/disaster-management-support-programme>