SPIN-OFFS FROM INDIAN SPACE PROGRAMME

Applying space based technologies for the benefit of common man…

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Ms. U Sreerekha
Associate Director, International Cooperation
Indian Space Research Organization
Government of India
ISRO’s Application of Space based technology

- Governance support to Ministries
- Decentralized planning
- Telemedicine
- Climate change studies
- Search & Rescue
- Tele education
- Cartography
- Communication support
- People centric
- Ensuring Security
- Safety
- Quality

- Banking
- Disaster Management
- Water resource Management
- Ocean & Meteorology
- Geology & Mineral resources
- Communication support

People centric

Ensuring

Security

Quality

Safety
Spin off objectives

• Maximize transfer of technologies
• Nurture industries
• Enable Technology Spin offs in diverse areas (Health, Medicine, Communication, Transport... )
RECENT SPIN OFFS - COMMUNICATION
Low cost UHF satellite transmitter for emergency communication

- Floatable
- Suitable for marine environment
- Inbuilt GPS
- Battery Operated
- Omni Directional Antenna
- Transmission Protocol - Random Aloha Mode

- On activation of emergency transmits its position, time, ID and type of emergency through satellite
- Rescue operation through Indian Coast Guard
NavIC Messing Receiver

- NavIC based 3D Positioning on GIS map
- NavIC Messaging Service application
- Alerts for fisherman on crossing International boundaries
- Weather Alerts like rough sea, cyclone, tsunami, etc
- Potential Fishing Zones advisories
- Bluetooth connectivity
- Mobile apps supporting audio/visual alerts for fisherman in 13 different regional languages
- Field trials by Fisheries Department of 3 state Government
MSS-Type C reporting terminal

- Automatic Train Tracking System (ATTS) for Indian Railways (in Chennai)
- Satellite for Control Office Automation (COA) on Real-time basis and dissemination of accurate train status required by passengers/users of Indian Railways.
RECENT SPIN OFFS – DEVICES
TRISP
Do away with SMPS and UPS!!

- Smart power for PCs
  - Affordable
  - Reliable
  - Safe
  - New opportunities for powering IT industries

- Utilizes one of the three power sources including non-conventional power ie, solar power, mains power and battery power

- Power saving of 58 to 65% when used with PCs
- Enhanced power saving when connected with solar panel
Automatic weather station

• Senses the ambient temperature, atmospheric pressure, relative humidity, wind direction and speed, etc.
• Automatically records, updates at regular intervals and transmits data to satellite.
• Satellites carrying Data Relay Transponders, receives data and retransmit to Earth Station.
• Nearly 1600 AWS are installed
• Technology Transferred to Industry
RECENT SPIN OFFS – SOFTWARE TOOLS
• Indigenous Geographic and Image Processing Software package (IGiS)
• Capable of processing satellite imageries acquired by Optical, Radar remote sensing Satellites and weather satellite data processing
• Nearly 500 software licenses have been sold and supported for GIS and Image processing work, mainly in Research and Academic institutions in India and abroad.
• QPAD Software for hand-held GIS data collection is integrated with IGiS packages
Solar energy modelling

- Real-time instantaneous and daily solar energy estimated at half-an-hour interval
- Cloud cover dynamics are considered
- Satellite-derived surface, cloud-top reflectivity, ozone, precipitable water, aerosol optical depth are used
- Spectrally integrated clear-sky and cloudy-sky models are used.
- End use: Solar power and crop forecasting

Solar Insolation (VHRR data of Kalpana-1, INSAT-3D/3DR)

Roof-top Photo Voltaic (PV) potential
RECENT SPIN OFFS – MEDICAL
Endoscopic Catheter Mounted Impedance Probe to Assess Mucosal Health.

• The mucosal impedance (MI) is an early marker of mucosal disease
• The probe is used for identification and detection of inflammation/malignancy in gut mucosa
• Cost effective and faster way for diagnosis compared to traditional biopsies
Capacitive Sensor to detect malignancy in Leukocytes

- A non-clinical method for the detection of cancerous cells in a given sample of leukocytes using MEMS capacitive sensor on the basis of dielectric permittivity.
Low-cost indigenous limb for amputees

ISRO Smart Limb

Hydraulics

Composites

Sensors

Mechanisms

Electronics

Software

Microprocessor controlled knee

Multi-axial foot

Actuator control electronics

Engine Gimbal Control of LV

Composite motor case

Spinoffs from technologies developed for.....
Left Ventricle Assist Device (LVAD)

- Spinoffs from technologies developed for.....

- Technologies:
  - Magnetic Levitation
  - Materials
  - Bio compatible coatings
  - Pump design
  - NIH constraints
  - Size, Power etc.

- 3rd generation heart pump
- Magnetically levitated impeller
- Centrifugal pump
Cerebral Aneurism is a bulge or balloon like dilation/swelling of the walls of a blood vessel in the brain.

Developed methodology for generating three-dimensional patient-specific geometry of intracranial aneurysms

Analysis of blood flow through the aneurysms using Computational Fluid Dynamics

Benefits:
- CFD tools will be helpful for the patient-specific real time hemodynamic simulations.
- Grading intracranial aneurysm based on hemodynamics and prediction of rupture
RECENT SPIN OFFS – CHEMICAL
Water based, ready-to-coat, easy-to-use Flame Retardant Coating

- Flame retardant, waterproofing and thermal control properties to substrates ranging from masonry surfaces, textiles, paper, thatched leaves, wood etc. to advanced materials like polyurethane and phenolic based thermal insulation foam pads.
Hydrophobic Silica Aerogel

Silica aerogels are exotic materials with a unique combination of properties.

- Extremely low thermal conductivity - ‘super-insulator’.
- Superior sound insulators, very low refractive index and an excellent dielectric medium.

Composite sheets can be made from Silica aerogel

Applications
- Fillers in concrete, cement, paints, adhesives, foams, ablatives, rubber, coatings etc.
- Foot- insoles, boot / jacket insulation or as winter / Arctic apparel at areas having extremely cold climate
- In window glazing as insulator
- Carrier for drug delivery
- Vibration/acoustic damping materials
- Wrap around insulation for use in pipelines/ feed-lines
- Cryogenic thermal insulation

Sole insert Aerogel insulation
THANK YOU