

SAC Technology Offers and Opportunities for Industry



Technology Transfer and Industry Interface Division
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About Space Applications Centre

SAC a major R&D centre of ISRO has core competence in development of spaceborne and airborne payloads and their applications for national development and societal benefits. These applications primarily meet the communication, navigation, remote sensing, scientific and planetary missions of ISRO. The communication transponders developed at SAC for INSAT and GSAT series of satellites are used by government and private sector for VSAT, DTH, internet, broadcasting etc.

The navigation payloads of the country - Indian Regional Navigation Satellite System (IRNSS) NAVIC and GPS Aided GAGAN are being developed by SAC.

This centre also designs and develops the optical and microwave sensors for the satellites, signal and image processing software, GIS software and applications for Earth Observation (EO) programme which are in diverse areas of Geosciences, Agriculture, Environment, Oceanography, Atmosphere, Cryosphere, Hydrosphere etc. The facilities at SAC includes highly sophisticated payload integration labs, electronic and mechanical fabrication facilities, environmental test facilities, systems reliability/assurance group, image processing facilities. SAC has an active collaboration with industry, academia institutes for R&D.

The Centre also conducts nine month PG diploma course for students from the Asia-Pacific region under the aegis of the Centre for Space Science and Technology Education (CSSTEAP) in satellite meteorology and communication.



Apple



Bhaskara



About Technology Transfer and Industry Interface Division

In accordance with ISRO policy of increased involvement of industry, SAC puts emphasis on practicing outsourcing, indigenous development of technology and vendors through technology transfer.

This division of SAC is dedicated for interacting and facilitating participation with industries. SAC interfaces, collaborates, co-operates with industry for many aspects including but not limited to:

- Outsourcing of products and services
- Capacity Building
- Transfer of technology and know-how
- Consultancy services
- Hi-Rel certification including product line and manpower certification
- Support indigenisation of imported products

SAC industry portal elaborates on various technology offers and business opportunities. The overall objective is to contribute towards development of Indian space industry. Industry Portal can be accessed through following link for more details.

Web: www.sac.gov.in/SAC_Industry_Portal

Indigenisation

SAC has been pursuing the indigenisation of strategic and critical components / materials with industry participation to reduce the dependence on imports. The indigenous development of space materials and components to maximise the self-reliance is a continuous process. Efforts in this direction has led to the indigenisation of some subsystems/parts indigenised through Indian industries like

- Crystal Filters
- Oven Controlled Crystal Oscillator (OCXO)
- Temperature Compensated Crystal Oscillator (TCXO)
- Resistors network (DIL and Flat pack)
- SFT header
- Pre Select Filters
- Nylon Cable Ties and Mounts
- Helical Band Pass Filter
- Glass encapsulated Thermistor

SAC is looking for interested partners who can contribute towards increasing indigenisation.



Pre Select Filter



OCXO



Crystal Filter

NavIC Messaging Receiver

SAC has designed and developed a NavIC Messaging and Positioning Receiver. This receiver is used for broadcasting of short messages which is related to alerts, forecast and directives on the occurrence of natural disasters like floods, earthquake, tsunami, cyclones, landslides etc. and dangers for the safety of life in areas with poor or no communication infrastructure.

NavIC module can be procured from ANTRIX Corporation, a commercial arm of ISRO. In addition to the NavIC chipset, it uses ATMega328P microcontroller and HC-05 Bluetooth (BT) module. The controller provides configuration for chipset and BT module. It is designed to draw power from battery or power bank. The power consumption of the receiver is around 100 mA @ 5V. The receiver can work for about 4 days using a 10000mAh power bank.

The receiver has been developed, tested, demonstrated and delivered to many users. An Android application is also developed to display the messages on Mobile phone/tablet. Messages broadcasted by INCOIS can be received using this application.

Interested vendors have to fabricate the receiver PCB and design packaging including all the three components. The package has to be IP 67 compliant. The option of using power bank or some rechargeable battery is left to vendor.

Two Channel Digital Monopulse Tracking Receiver

The two-channel digital monopulse tracking receiver for earth station is a 70-MHz tracking receiver. The monopulse tracking receiver is one of the sub-systems of antenna tracking system in large earth stations. It generates DC error signals proportional to antenna off-pointing by processing the input IF signals in digital domain. These output error signals are used to drive the antenna in appropriate direction to correct the off-pointing error.

Salient Features

- Wide Tracking Range : 70MHz \pm 250KHz
- Wide dynamic range: 80 dB
- Selectable loop BW: 300Hz, 1 KHz and 3 KHz
- Low input C/No threshold : 36dBHz
- Selectable Tracking Range: 50 KHz, 150KHz & 250KHz
- User friendly monitoring & control for local and remote operation
- Save/ Recall configuration for different satellite
- DC Error signals output : Analog and Digital
- Low cost, flexible, easier production



Solid State Recorder

SAC has designed and developed a Solid State Recorder (SSR) based on non-volatile flash memory for applications requiring high speed large volume data recording. Industry standard NAND Flash has been used to take advantage of their ever increasing density and cost reduction as technology advances. These SSRs make ideal data capture media for airborne imaging sensors as well as for other applications. These require high data ingest rate real-time capacity including ground testing and archival of data. The architecture has been specially optimized for imaging sensor applications and mass, volume and power parameters.

Salient Features

- Real-time recording
- ONFI Flash device based storage
- Scalable and flexible design
- Optimized for mass and power
- Host-based file management



Applications

- Imaging Data Recording
- High Speed Sensor Data Acquisition
- Airborne Applications
- Ground Testing and Data Archival

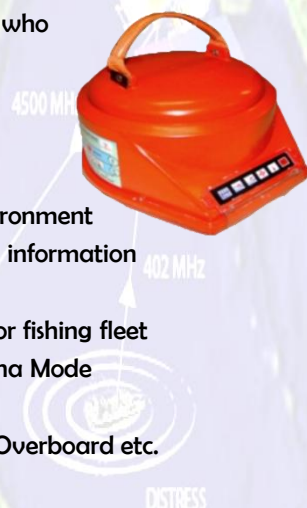
Distress Alert Transmitter

SAC has developed a low cost transmitter for emergency communication for alert messages from fishing boats. On activation of emergency, it transmits a short message containing its position, time, ID and type of emergency through satellite to a central receiving hub station.

It will repeat the message every minute for first five minutes and then every five minutes till it is switched off. On reception of alert message, rescue operation is done by Indian Coast Guard. It is very much useful in case of fishermen who usually go out in high seas.

System Features

- Low cost UHF satellite transmitter
- Floatable & Suitable for marine environment
- Inbuilt GPS to give position and time information
- Battery Operated
- Omni Directional Antenna suitable for fishing fleet
- Transmission Protocol - Random Aloha Mode
- Type of Distress
 - Fire, Medical, Boat Sinking, Man Overboard etc.



Ground Penetrating Radar

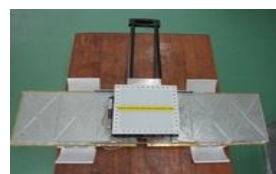
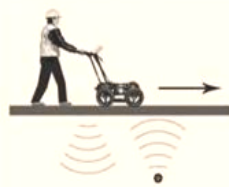
GPR is a high resolution imaging radar from SAC used for locating buried objects. It operates by transmitting high frequency signals into the ground via wideband antennas and detecting the reflected signals from targets buried beneath. It has been successfully tested in Antarctica for snow applications.

Applications

Environmental, engineering, archaeological, and other shallow investigations.

Salient Features

- Power required: 10W
- Depth Resolution better than 30 cm.
- Centre-frequency: 500MHz,
- Ultra-wideband
- Stepped-frequency continuous wave (SFCW) approach
- Integrated GPS for geo-tagging of the recorded data.
- Cost is 20 times lower compared to imported versions
- Total mass of the system is 10kg out of which 5kg is for electronics and antennas & the rest for the structure (can be further optimized).



Optical Imaging System

Salient Features

- Useful under twilight and mid-day lighting conditions
- Sampling Resolution: 2cm at 5000m
- FOV: 0.46° x 0.46°
- 200mm RC Telescope, Weight: <10kg
- Operating Wavelength range: Vis-VNIR
- Frame rate: 30Hz (Rolling shutter)
- Programmable Exposure period
- Includes Focusing Mechanism
- Camera Head control, video data acquisition, NUC correction, and image visualization s/w with intra-scene dynamic range adjustment for 2kx2k Si based focal plane array



Potential Applications

- Imaging during day time and twilight condition
- Scientific Studies, Astronomy
- Applications requiring high intra-scene dynamic range up to 80dB

Possible Customizations

- Multi-band (with frequency selective beam splitter or filter wheel), including Infrared spectrum, target imaging using suitable focal plane array
- Frame rate enhancement up to 100 frames/s
- Temperature compensated automatic focus adjustment
- RGB color imagery with incorporation of color data processing pipe
- Night time imaging with external illuminator

Fire Retardant Coating

SAC has developed an omni-purpose thin coating that can be applied on any surface in terms of fire retardant.

Advantages:

- Provide two types of protections – fire resistance and flame retardant
- Has good adhesion to all surfaces
- Aesthetically appealing, can be mixed with any paint without loss of its fire retardant property.
- Suitable for both indoor & outdoor use.
- Superior fire, thermal protection benefits.



Special Features:

- Can be applied as thin coating on any surface
- Can be applied over existing surfaces after fire exposure
- No surface preparation required except cleaning of dust and oil
- Can protect from any mode of fire. Sustains high temperatures
- Saves substrates up to 50% after fire
- Reduces moisture absorption by 50%

Mode of Application: Can be applied like plaster by trowel.

Technical Specifications:

Total Solids: 40 –50%, Specific Gravity: 1.29 gm/cc

Mobile Satellite Services Terminal

SAC has conceptualised, designed, developed and established MSS network and terminal technology to support services using high power satellite. The following are the type of subsystems offered to industry for offering services to the society. These are Reporting terminal and Personnel Tracker, Satellite Mobile Radio and Satsleeve, Broadcast Receiver, Portable Multimedia Terminal with Wi-Fi.

Reporting Terminal and Personnel Tracker

(Terminal for Small Message and Position Reporting)



Salient Features:

- 0.5 Watt output power in S- band
- In-built GPS receiver with antenna
- Supports UART, USB 2.0, Bluetooth data Interfaces
- Transmission Protocol: TDMA or ALOHA
- 2x20 LCD display and alpha-numeric keypad
- Provides short message and position data transmission
- Light weight, battery operated terminal with battery charging option
- Personnel Tracker variant designed for strategic users



Satellite Mobile Radio and Satsleeve

(Low Bit Rate two way Voice Communication Terminal)



Salient Features:

- Provides voice communication between terminal and any other telecom network (PSTN & GSM network)
- 1.0 watt output power in S- band
- In-built GPS receiver with antenna
- Data interface support: Keypad, UART for SMR
- Transmission Protocol: DAMA & PAMA
- 4x20 LCD display and alpha-numeric keypad for SMR
- Light weight
- Battery operated terminal with battery charging option
- Satsleeve is used in conjunction with a mobile phone



Broadcast Receiver

(For multi-channel audio-video and data reception system)



Salient Features:

- Provides DVB-S based Multi-channel Audio, Video and data reception
- Reconfigurable receiver from 512 KSPS to 5.5 MSPS
- USB Powered display devices like tablets or smartphones
- Supports Windows and Android Operating Systems
- Suitable for moving vehicles
- Weight: 200 gm
- Power Consumption: < 1.8 W



Portable Multimedia Terminal with Wi-Fi

(For Video-conferencing and IP data transfer)



Salient Features:

- Provides Video conferencing, IP data transfer
- Wi-Fi access point for voice calls and SMS for smartphone users
- 4 Watt output power in S-band
- USB and Ethernet interface for connecting Laptop
- Signalling in ALOHA and communication in SCPC- DAMA mode
- In-built GPS receiver with antenna
- Light weight and battery operated terminal with battery charging option

