SOUTHERN AFRICAN AMATEUR RADIO SATELLITE ASSOCIATION (SA AMSAT)

Registered as a non-profit organisation by the South African Department of Social Development
Registration number No 55-363

SA AMSAT
P O Box 90438
Garsfontein 0042
South Africa
Tel: 012 991 4662
Fax: 012 991 5651
Email:
saamsat@intekom.co.za

ARISSat-1

Listen to Dave Long

ZS5FR's Satellite Report on Amateur Radio Mirror
Sponsored by Sentech
Sundays 10:00 CAT
17 570kHz
7 205 kHz
7 082 kHz

Mondays 21:05 CAT
3215 kHz

Podcast:
www.zs6ro.co.za/podcast

SAiSAT a journey into tomorrow

The Southern Africa Amateur Radio Satellite Association (SA AMSAT) has launched an innovative satellite project and is inviting the participation of South African Universities and Universities of Technology in the development and construction of a completely South African Amateur Radio experimental satellite. The objective of this satellite is to demonstrate South Africa's ability to engineer a satellite, employing the latest technology, and new innovations. In addition there are some feasibility projects for future commercial use.

The name SAiSAT has been taken from the name imagination satellite, which was an earlier project to promote the concept of a South African Amateur Radio Satellite. This initiative resulted in two satellite projects, a basic CubeSat called "Kletskous", the Afrikaans for chatterbox and SAiSAT. Kletskous is a shorter term project aimed for launch in 2012/3 while SAiSAT is a very involved project testing the limits of ingenuity and technology.

SAiSAT is based on the CubeSat satellite. The original CubeSat concept came about through a partnership between the California Polytechnique University in San Luis Obispo and Stanford University in Palo Alto, USA. Engineers at the two universities set out to develop a standardised space platform for academic satellite projects. It has since grown to become an international partnership of over 40 institutes that are developing Pico satellites containing scientific and amateur radio communication payloads.

With many institutions participating in the CubeSat programme, the educational benefits are extensive. Students, through hands-on work, are given the opportunity to develop the necessary skills and experience needed to succeed in industry after graduation. The CubeSat programme also benefits private firms and government by providing a low-cost way of flying payloads in space all while creating important educational opportunities for future leaders of industry. This concept was clearly illustrated by the University of Stellenbosch SunSat success story that

PAYLOAD PROJECTS

A number of interesting payloads are proposed which would be ideal projects for Master and PhD students. A full list of projects is included in a detailed document downloadable here.

SAiSAT project leader: John Willescroft ZS6EF

The proposed payloads include a LED light source to study the phenomena of Photon Coincidence providing a platform to study photon coincidence by impressing data on the led light sources and its application in error free communication over long distances. This also will allow investigation into the emission and colour required for learners around the country to see the satellite as it passes overhead.

Another interesting project is a Digital Radio Repeater to produce a single frequency high speed store and forward system radio (Parrot) that has no discernable delay in use. The system on the satellite should interface with normal FM radio on the ground so that the maximum number of people can utilise the system with no equipment change. Other forms of

SHOP
Get an SA AMSAT BADGE

JOIN SA AMSAT

LEARN MORE ABOUT SA AMSAT

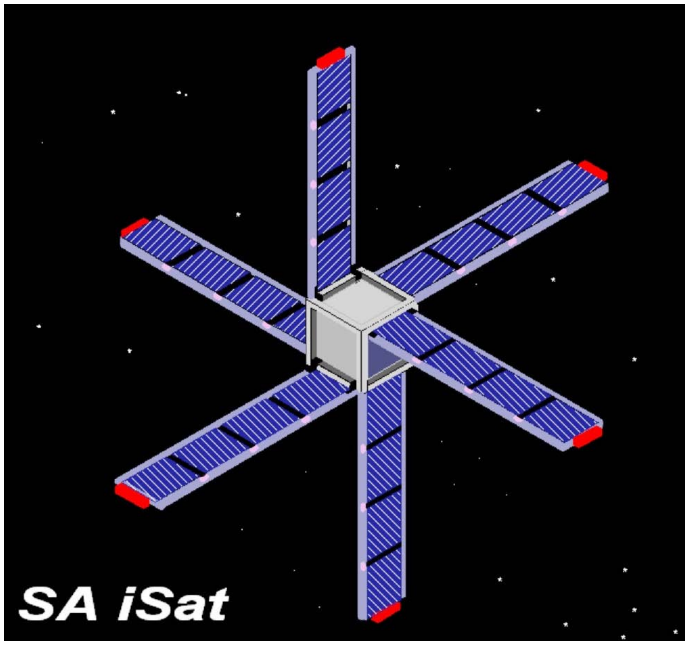
SA AMSAT CONSTITUTION

qualified Engineers who were snapped up by Industry and resulted in the formation of the company SunSpace.

The late Prof Garth Milne and one of his students who worked on SunSat, South Africa's first satellite

A standard CubeSat is a 10 cm cube with a mass of up to 1 kg. In recent times larger Pico satellites have been developed which are 2 or 3 CubeSat stacked on top of each other, referred as 2U and 3U CubeSats.

The reason for the decision to go the CubeSat route has only one dimension - financial. Launch opportunities are available at reasonable cost. However going the CubeSat route has restrictions including a very low power budget, very little space ~ 100mm square inside the cube, low mass specification, and the lack of opportunity for a platform stabilisation system.



SAiSAT overcomes these problems while still complying with the mechanical specification of the CubeSat taking advantage of available launch opportunities and still support many projects on board.

SAiSAT will use fold out panels, a total of 24 in all, that support solar panel steering in order to capture the maximum energy available from the sun. The rear of the solar panels is free for project use. Potentially 24 projects depending on size can be accommodated. In addition the centre core of the Cube is still available for a large battery component. The power budget is to be evaluated but seems to indicate that a 12V DC 16 Ah supply can be accommodated which is very considerable for a small satellite.

modulation could be considered. Another payload requirement is the Magnetic System Control system. This must be designed to use the coils situated around the solar panels, 24 in total. Detection of spin and the algorithms for spin techniques must be developed and a torque method must be evaluated and designed to stabilise the satellite or maintain a required spin rate.

SA AMSAT has issued an open invitation to tertiary institutions and individuals to participate in the project. A project meeting is scheduled on Friday 25 March ahead of the annual Space Symposium which will take place the next day.

Download the full document here

It is further proposed that the outer rim of each panel is fitted with PCB tracks in the form of a coil. The fitted coils will have 4 main functions.

1. To generate additional power from the Earth's magnetic field.

2. To torque stabilise the satellite against the Earths magnetic field.

3. To give orientation data to resolve the attitude of the satellite.

4. Take additional unused power from the batteries and elevate the satellite into an every increasing orbit thus extending its usefulness and life.