Warrawal Quarterly Report – BLUEsat

## Executive Summary

Quarter 1 of 2012 saw the freezing of BLUEsat electrical and mechanical design. Completion of the integration rig and the first thermal model of BLUEsat allowed the electronics hardware and the structural and thermal design to be finalized. The testing and integration platform has been completed, driving system design to be finalized. An initial thermal model of the satellite confirms that no changes to the mechanical design are necessary. Successful RF data links have been established between Groundstation and on-board satellite software.

Futher work required includes the full implementation of on-board satellite software, a final simulation and analysis of satellite thermal model and design of mobile groundstation antennae.

## Groundstation Supportbrb

The International Amateur Radio Union has been contacted and has stipulated that BLUEsat does not need to file an Amateur Satellite Frequency Co-ordination Request. BLUEsat is currently liaising with the Wireless Institute of Australia to determine further legal requirements for the Balloon Flight.

Options regarding the logistics in obtaining a vehicle and mountable antennae for a mobile Groundstaiton are being investigated. Existing data-processing infra-structure has been deemed sufficient for the Balloon Flight. Six BLUEsat members are currently undergoing the Advanced Amateur Radio User’s training course in order to obtain an Advanced Amateur Radio license. Upon completion of the course, development of a full mobile Groundstation system will commence.

## Integration Rig

The FLATsat integration rig commenced development in November 2011 and was completed in March 2012. The aim of the rig is to provide a platform on which all functional components of BLUEsat’s electrical support systems can be tested and satellite bus functionality can be tested reliably.

Completion of the Integration Rig also marks the freezing of BLUEsat system and hardware level design. System design has now been finalized, with the integration rig allowing for integration and testing to take place on a more sophisticated level.

The rig is currently being manufactured and will be ready for use in late April 2012.

## Environmental Analysis and In-Flight Modeling

A thermal model has been created using ANSYS finite element analysis software. This model has been made to the current mechanical structural specifications, approximating the electrical systems as boards constructed from fiberglass and silicon.

Climate and environmental data for the balloon flight have been researched and are well understood. A preliminary transient thermal simulation of the balloon flight has been made using this data and the FEA model of the Satellite. This model indicates that the satellite would function well in its current thermal design without requiring any mechanical re-design necessary.

Further analysis is required in order to create final and more accurate thermal situations. Data pertaining to component heat dissipation and atmospheric effects at high altitudes need to be aggregated and put into the simulation.

## Functional Development

On-board satellite Software has been re-structured and is in the process of being implemented and tested. This process is expected to be completed by early August 2012.

A reliable RF Groundstation data link was established in Mid-March 2012.

Variable Battery Charge regulation has been achieved. Smart algorithms still need to be developed and integrated with central on-board satellite software.