PocketQube, The Next Little Thing by Comes

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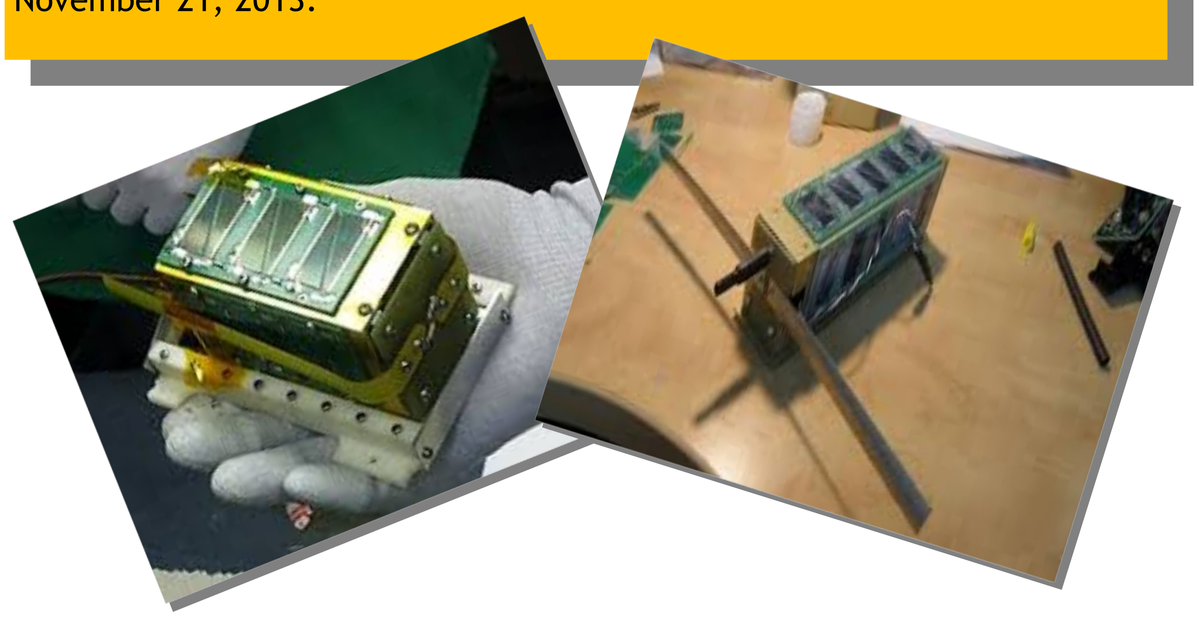
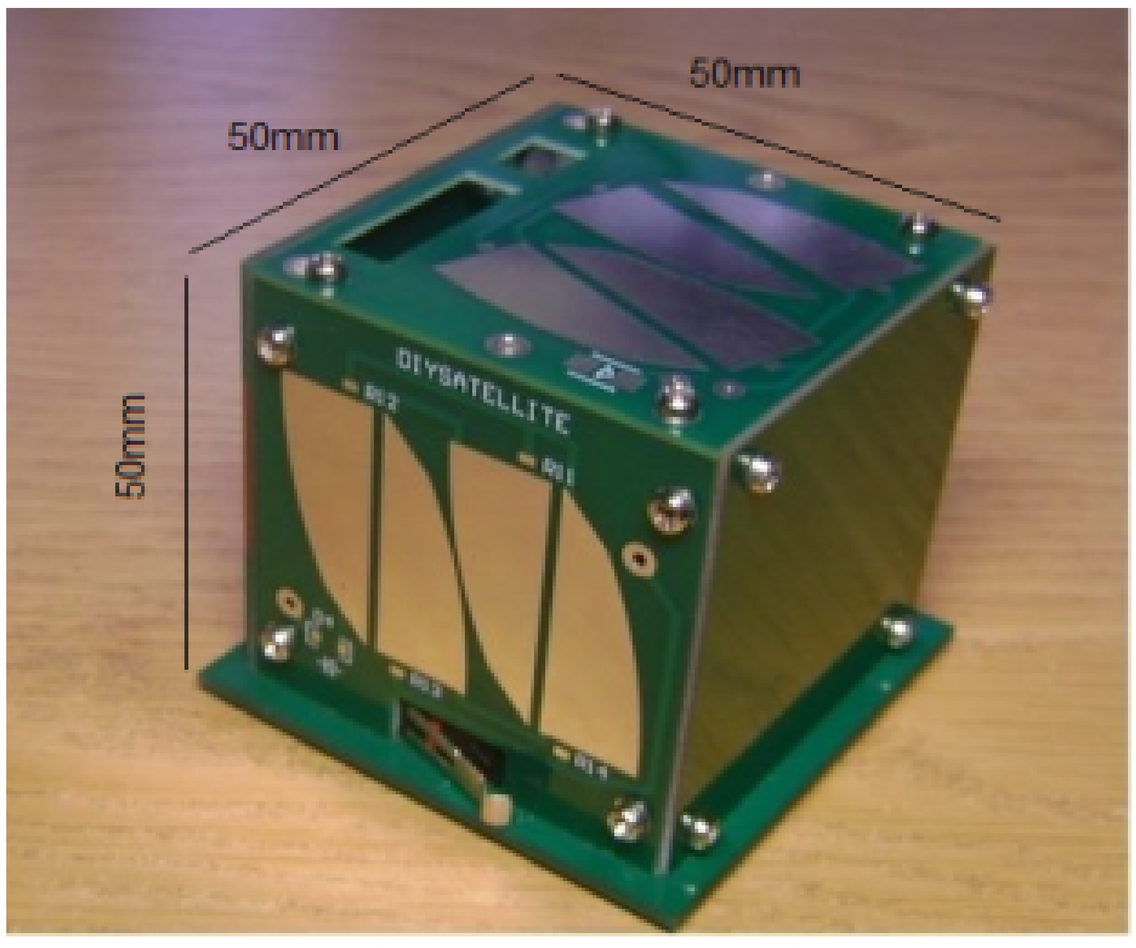
Introduction

The PocketQubes are a new design of pico satellite, which reduces the cost of manufacture and launch to universities or research institutes. The PocketQube is designed to provide a test bed of components of different types of technologies and specific experiments at low cost and fast make. The minimum PocketQube, with a form factor of 5x5x5 cm has been proposed as the next class of spacecraft to benefit from miniaturization. PocketQubes could better fit certain niches where high spatial or temporal resolutions are required instead of full resolution.The first four pocketqubes were launched aboard the UNISAT-5 satellite that was deployed in orbit from a special launcher inside on November 21, 2013.



ArduiQube

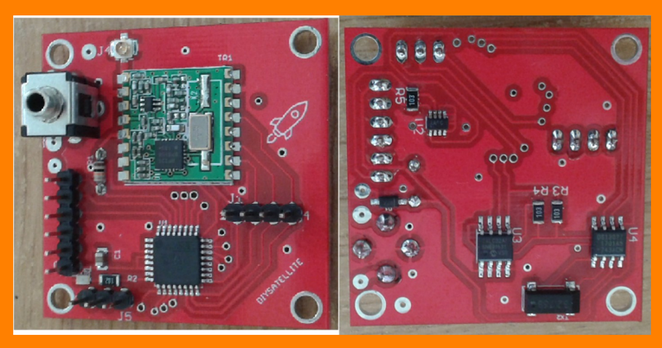
The cost benefits of pocketqube and the advancements in component miniaturization are enabling pocket spacecraft that are equivalent in functionality to larger satellite. For our purpose was selected an open source platform called **Arduino**, based on a simple board designed for easy use in multidisciplinary projects.To support this objetive, this processor was selected and the name the project Arduiqube.
ArduiQube to be launch in Q1 of 2020 aboard of the UNISAT-7 satellite.
Details about the Arduino Onboard Housekeeping Computer , Electrical Power System , Maximun Power Point Tracker, Solar Panels, transceiver module mission are show.
The main mission is educational, and promote STEM areas in Latin American countries for its low cost make and launch do very attractive.



Ardui-Qube-Sat, One Unit Pocketqube.

Sub Systems

The power, ease of programming and design simplicity of AVR micro controller using Arduino allow the development of small units for the control and communication of pocketqube. An ATmega328P, PicoPower processor-encapsulated 32TQFP,operating with an internal clock of 8 MHz, fed with 3.3 V is used.

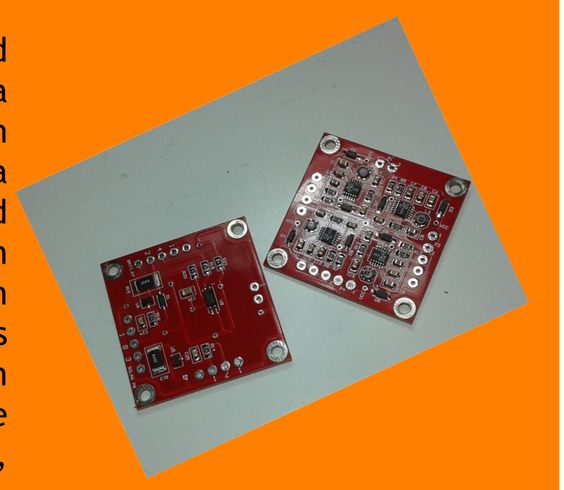


OBC and Comunication Module circuit board

The Arduino is based on the C ++ language and supports the functions of the standard language although it is a simplified and equally powerful,ideal for student's version. The software coordinates all operations, data capture , **monitoring power system, real time clock setting and communication with the transceiver**. The system manages the reception of commands and data transmission frames at 250 bps GMSK, the generation of Morse code and RTTY sentences.

The communication module consists of a dropdown dipole antenna made of carpenter's tape and a low-power ISM transceiver that operates in the 437 MHz band and is the main communication channel.

With limited volume, mass and surface area available in a pocketqube any supplying system can only provide power for a limited time.The energy is stored in a commercial battery of Li-Ion 500 mAh. The power generation system consists of solar cells commercially available gallium arsenide with 27% efficiency. The pocketqube have four panels on z, -z, x, -x faces. Each panel have four solar cells given 6 V, 30 mAh.



EPS / MPPT circuit board.

Converting thiE solar energy into electrical energy is easily done using a boost converter with Maximum Power Point Control per solar panel.

For be very simple, passive magnetic stabilization system was selected. Consisting of a cylindrical Neodymium magnet, with a diameter of 6 mm and a length of 10 mm with a magnetic moment of about 0.25 A * m ^ 2. It 's epoxied to one side of the structure aligned with the x-axis.

The pocketqube is placed in orbit within a mother ship that contains a special deployer called MR-FOD (Morehead, Rome-Femtosat Orbital Deployer).

Using components easily getting for space used, along with tools more flexible programming and possibility of launching satellites type pocket at low cost make such experiences possible.
We hope that this poster as stimulus for many and in future this multiply experience.It will also be used as an educational tool for real world satellite operations training. And remember, the unavoidable price of reliability is simplicity.