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MARTA: A LOW-COST ASTRONOMICAL ROBOTIC FACILITY

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RESUMEN

Marta (Maciarol Robotic Telescopes Array) está planeado como una instalación que permite a sus componentes trabajar conjuntamente o de forma individual en tareas astronómicas utilizando telescopios de aperturas modestas y CCDs y otros dispositivos comerciales ajustados a un presupuesto de bajo coste. Con este equipo, somos capaces de obtener datos científicos operando remotamente, tanto en modo robótico como automático.

ABSTRACT

Marta (Maciarol Robotic Telescopes Array) is planned as a facility that allows its components work together or individually in astronomical tasks using telescopes with modest apertures and CCDs and other commercial devices fitting in a low-cost budget. With this equipment, we are able to obtain scientific data while operating remotely, in robotic or automatic mode.

Key Words: instrumentation: miscellaneous — surveys — telescopes

1. GENERAL DESCRIPTION

Marta (Maciarol Robotic Telescopes Array) is a set of four remotely controlled telescopes used for working in astrometry and photometry, as a main task. They are also used for spreading of astronomy purposes. The idea was conceived thinking about the possibility to work coordinately with the two observatories Cal Maciarol modules 2 and 8. In that moment both telescopes were working independently in astrometry and photometry, primarily of comets and minor planets and reporting to MPC (Minor Planet Center). When modules 5 and 7 were remotely accessible, then MaRTA was officialy born.The acronym is related with Marta Roigé, daughter of the owners of Cal Maciarol resort.

The telescopes are part of the 8 semi-detached observing modules of Cal Maciarol observatory (0º 44' 38.3" E, +42º 01' 05", 745 m.) placed at Masia Cal Maciarol resort in the PAM ("Parc Astronòmic del Montsec in catalan or Montsec Astronomical Park).

PAM is located in Ager (Lleida) into the Montsec Natural Park, a zone of special protection against the light pollution that received certification from Starlight Foundation in April 2013because of the darkness of its night sky and the big percent of clear nights for observations. The sky glow measured at zenith states a really good 21 mag/sqr arcsec.

The Cal Maciarol Observatory was built between 1998 and 1999. The works to gain remote access were started in 2004 and the "first remote light" of module 8 was taken in October 2006. Since then, modules 2, 5 and 7 had been added one by one.

2. EQUIPMENT

Each telescope is placed in a housing covered with a practicable inclined roof. The roof has two covers (north and south) that can be opened each one independently. All observatories have GSM modules installed for communication security and ftp servers allocated in Raspberry microcomputers.

Telescope and camera control Software: TheSky 6 + MaxIm DL 5 + FocusMax Scheduler: CCD-Commander Data reduction software: Astrometrica (astrometry); FoCAs and FotoDif (photometry).

The list of observatories is set as follows, ordered by date of remote access:

Module 8 (MPC A02): Owned by Josep-Lluis Salto. Equipment: 10" LX200 S/C telescope f/10.5 + ST9XE KAF 0261E CCD (resolution 1.52"/pix) + AO8 Adaptive Optics + CFW-10 filter wheel with BVRI+Cl J-C filter set + Robofocus focuser.

Module 2 (MPC A01): Owned by Francesc Baldris. Equipment: 8" Newtonian telescope f/5 + Orion Atlas EQ-G german mount + SX MX916 CCD (res. 2.31"/pix) + Orion AccuFocus focuser + BVRI J-C filter set + Lunatico 60mm and QHY6 CCD guiding set.

Module 5: Owned by Albert Capell. Equipment: 10" S/C LX200 f/6 telescope + QHY8 CCD (1.1"/pix) + Orion adaptive optics + BVRI+Cl J-C filter set + Robofocus focuser.

Module 7: Owned by Ramon Espax . Equipment: 10" Newtonian telescope f/5 + Canon 110D

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DSLR for wide-field imaging purposes (expected astronomical and photometrical filters soon in 2014) + Robofocus focuser.

3. SHARED TOOLS

The Cal Maciarol observatories uses information generated by an AAG CloudWatcher detector and Oregon Scientific meteorological station.

Also there are installed two all-sky cameras: CaTCel 1 (Camera Tot-Cel 1 or all-sky camera 1 in catalan language), a Watek 120N CCD camera with a 2.8mm. lens with a 100x90º field of view, and CaT-Cel 2, a color camera with a fish-eye lens covering the real all sky visible from the observatories.

A reduced information is public accessible at the url http://www.sigmascorpii.com/oacmm (in catalan language, spanish and english translation is planned and in progress).

4. FUTURE PLANS

The goal in near future is to achieve real standardization of methods for all observatories.

We will continue our task taking photometrical measures of comets, minor planets, supernovae and galactic novae, trying to exploit as much as possible the power of Julio Castellano's software tool FotoDif to detect new short-period variable stars and to refine light curves of extrasolar transit events.

Whe are testing new Winscan technique to detect occultations.

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