Ariel University Observatory

Vision statement

Definitions

- Observatory : A structure designed for astronomical observations for research purposes, equipped with telescope , mount , camera and usually dome. This facility requires an observer to operate the machinery while monitoring weather conditions.

- Robotic Observatory : An observatory that is able to operate itself without any human interaction. The facility will run astronomical imaging plans and sky observing while using a smart decision making algorithm for safe components operation considering weather conditions.

Project goals

The goal of the project is to design and develop an automated system which operates a robotic observatory which will be assimilated in the new observatory facility in Ariel University. The purpose of this facility is to give the university's researchers and students the ability to collect astronomical data and conduct astronomical imaging online with minimal human interaction.

Project scope

The system contain these components:

- Telescope - The component that enables us to observe into space, a tube like unit which is built from a combination of special lenses.
- Dome - Provides protection to the whole physical devices from weather conditions and any other exterior object which might defect the system. Also, the dome enables the maneuver of the telescope in the desirable direction.
- Mount - Mechanical structure which supports the telescope. designed to support the mass of the telescope and allow for accurate pointing of the instrument.
- Filter wheel - Allowing to change filters without removing the camera.
- Focuser - The focus motor of the telescope lens, which allows you to focus on a specific point in sharper quality of the imaging by reaching the focal point.
- Main camera - Special camera which is designed to take astronomical images.
- Guiding camera - Smaller camera which helps the telescope track stars as well as lock it to the target area .
- Lense Cover - Provide telescope lens protection.

Those physical components connected to the control software via ASCOM protocol. The system also contains FocusMax and MaxIm for astronomical imaging. Another important element is the weather data which plays a crucial role in the decision making.
Our product would work with those components in order to control, operate and make automated smart decisions considering the weather conditions and the imaging plan.

High-level features

This project has three main features:

- Planner - An algorithm that is able to define an astronomical experiment and break it into phases.
- Scheduler - Decision algorithm which runs an imaging plan and decides what step it can and should do according to the plan ,taking into account environment conditions.
- Automation of machinery operation - Automatic operation of the components in the observatory in synchronization with the planner and scheduler.

Major milestones and deliverable

Due to further research that has to be done, we yet to set a detailed plan for this project. The main milestones would be the following:

- Research - To understand the technologic and the architecture that this facility requires, we need to look into similar projects, learn about the observatory components and its drivers, go through relevant code examples and investigate the standard methodology.
- Planner development - Development of algorithm that create a set of steps for astronomical observing when requirements as targets, filters and etc are provided ,in order to make observing accessible and easy to operate.
- Scheduler development - Development of scheduling method that execute imaging plans in certain times and conditions as it executes the optimal step that it can operate. This feature will be open to further software extensions.