

Using Automation to Improve Telescope Accessibility

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Overview

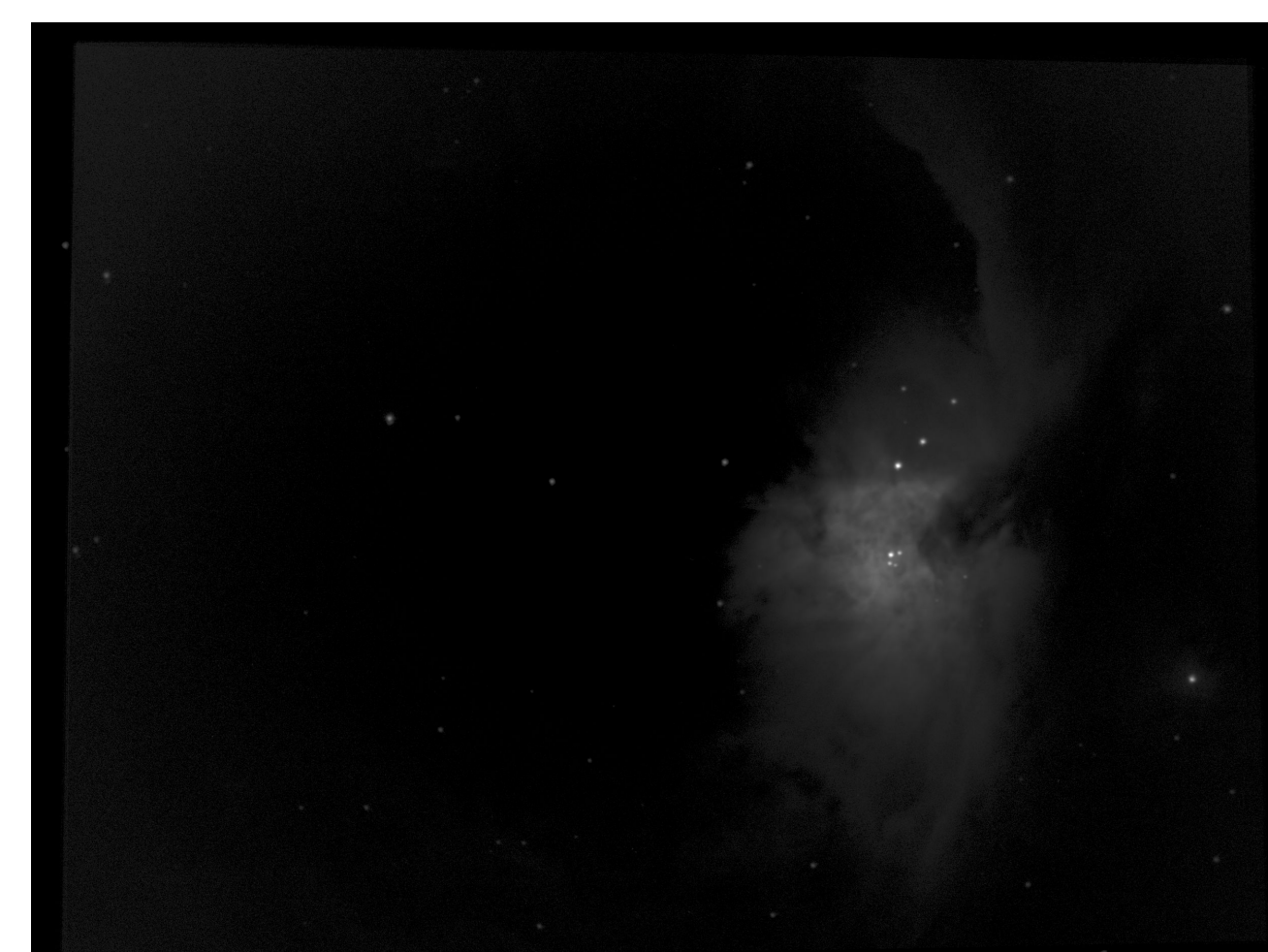
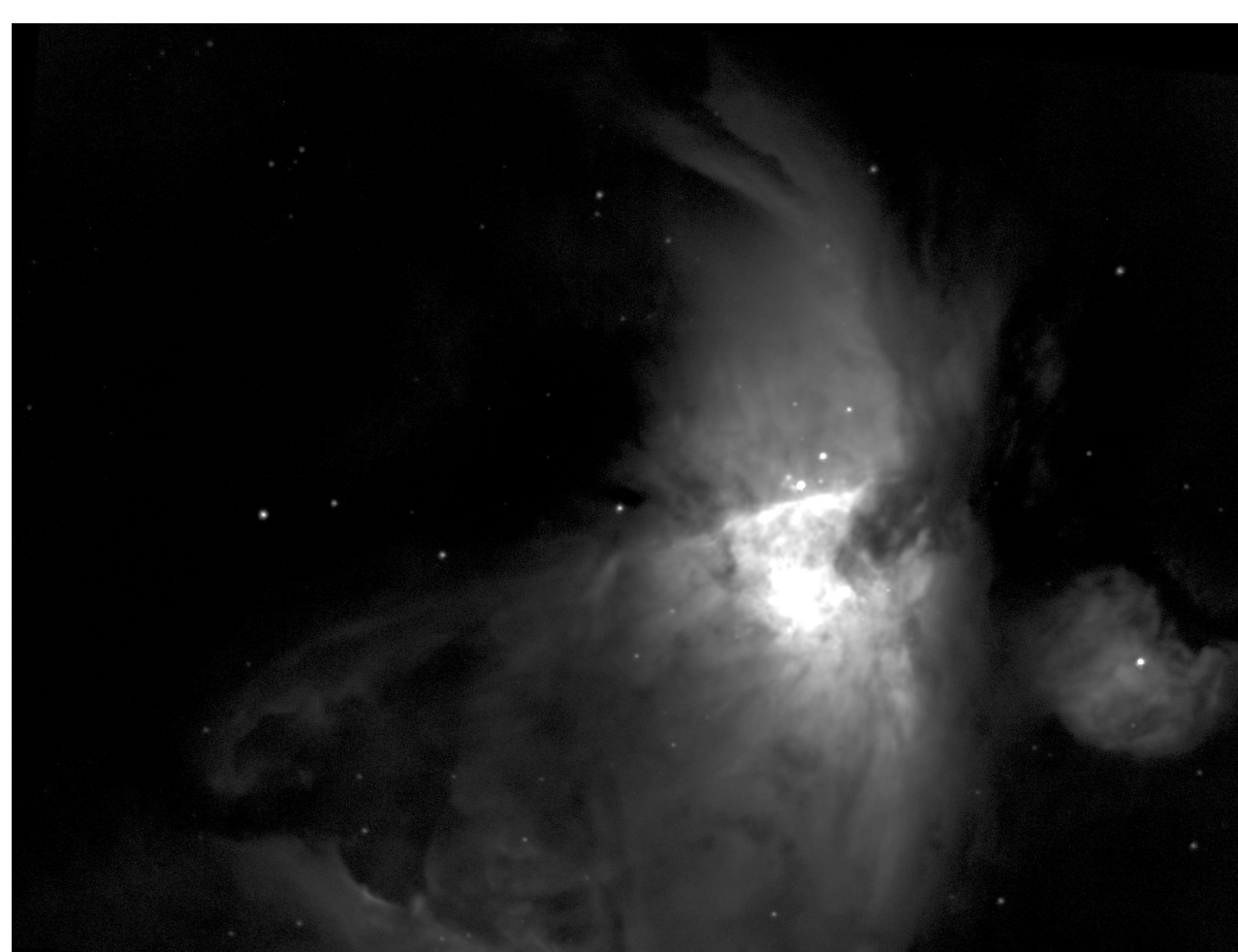
The UAH Astronomy Club has made great strides in our observations, taking images of objects including the Great Orion Nebula. Through software written by members of the club, we have greatly increased the accessibility of our telescopes. Now, instead of grappling with the telescope's obtuse controls, club members can take as many images as they need with one button press.

Equipment

CCD: SBIG STF 8300M
Telescope: Meade LX200R 8"
Schmidt-Cassegrain
Data Collection Software: CCDOps 5
Image Processing Software: Nebulosity 4

Automation

One of the main obstacles facing our team at first was the fact that the club's main telescope does not natively support automation. To circumvent this, our team developed a system of macros using AutoHotkey to control the data collection program CCDOps. The user specifies the amount of images needed, exposure time, and which filters are to be used. Once this is input, the macros simulate the specific sequence of keystrokes needed to take and download the images, while also labelling each file for easy organization.



Images of M42, the Great Orion Nebula, taken with our telescope system and processed in Nebulosity 4. Left: Red-Blue composite image (H- α filter: red, OIII filter: blue), Center: H- α composite component (20 x 30\" exposures) Right: OIII composite component (20 x 30\" exposures)

Processing

Astrophotographic image processing takes several steps, starting with pre-processing of the images with bias, dark, and flat frames, then post-processing of those results to improve image quality and ease interpretation. We are exploring the creation of a system to accompany our automated data collection that would automatically pre-process the images when they are taken, the more straightforward of the two steps. We are looking into the possibility of using macros as we have previously used to automate data collection, or potentially utilizing the Python programming language and the Astropy package for a more elegant and more widely-applicable solution.

Impact

We hope to use this experience to further automate our telescope system, leading to our ultimate goal of complete remote control. Additionally, the improved system will vastly improve the ability of club members to observe and process astronomical data with ease. Moving forward, we anticipate the experience we have gained will aid in the Astronomy Club's budding efforts to restore the Optics Building's rooftop observatory in conjunction with the Center for Applied Optics.

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