

# **PRoboT: The Pasadena High School Robotic Telescope Project**

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**Caltech**

Image credit: Pasadena High School Astronomy Club



PRoboT

# First light



Trust me, I'm a professional.

Sure you are...

# PRoboT: the making



Stellarium 0.15.1

Capella  
α Aur - 13 Aur - HIP 24608 - SAO 40186 - HD 34029 - HR 1708 - WDS J05167+4600Aa,A

Type: double star  
Magnitude: 0.05 (after extinction: 0.32)  
Absolute Magnitude: -0.54  
Color index (B-V): 0.79  
RA/Dec (J2000.0): 5h16m41.595s/+45°59'45.1"  
RA/Dec (on date): 5h17m59.02s/+46°00'42.2"  
Hour angle (on date): 5h28m20.76s/+46°01'20.1" (apparent)  
Az/Alt: +308°22'22.67"/+28°39'40.7" (apparent)  
Ecliptic longitude/latitude (J2000.0): +81°51'30.47"/+22°51'43.6"  
Ecliptic longitude/latitude (on date): +82°00'07.07"/+22°51'44.1"  
Ecliptic obliquity (on date): +23°26'13.3"  
Galactic longitude/latitude: +162°35'26.27"/-49°13'56.7"  
Supergalactic longitude/latitude: -7°56'46.27"/24°23'08.8"  
IAU Constellation: Aur  
Mean Sidereal Time: 10h46m30.1s  
Apparent Sidereal Time: 10h46m33.6s  
Distance: 42.80 ly  
Spectral Type: G1III + K0III  
Parallax: 0.074209  
Year of last satisfactory observation: 2005  
Position angle: 328.00°  
Separation: 0.046"

BackyardEOS 3.1.8 - Premium Edition (70D)

22:06:43

Camera Information Center

TV 30 ISO 160

Dial M White Mirror off error is at +26c

Quality AS! Battery

ASCOM Focuser

Zoom 67%

Zoom position

Double Click

Enhance live view images with Star HD

Focus 60.6 FWHM HFD StdDev Backlash Minimum 2.4

Place a single star reasonably centered in the smaller zoom box image (bottom right).

Full Width Half Maximum is the width of a star's image at half its peak. Focus is achieved when you get the lowest value for the

Shutter Duration ISO Pause

30 1 160 0

Snap Image Loop Live View

The screenshot shows the Stellarium 0.15.1 software interface displaying the Capella star system. The interface includes a detailed information panel for the star system, a zoomed-in view of the moon, and the BackyardEOS 3.1.8 software interface. The BackyardEOS interface shows camera settings (TV 30, ISO 160, Dial M, White Mirror off, error is at +26c), quality (AS!), battery status, and zoom controls (Zoom 67%). The zoomed-in view of the moon shows a small red arrow pointing to a feature labeled "plane". The BackyardEOS interface also includes a Weather Center, Zoom Box Center, and a Focus control panel with a focus value of 60.6 and a minimum of 2.4.

# Preliminary observations: *getting the hang of it*





Image credit: Pasadena High School Astronomy Club



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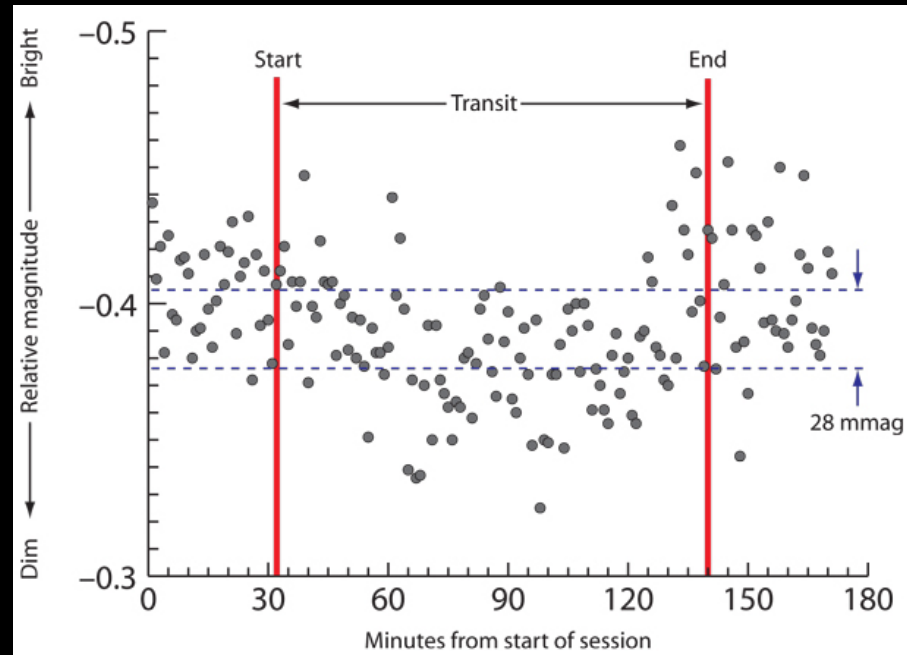


Image credit: Pasadena High School Astronomy Club



# Current challenge: *detect an exoplanet transit*

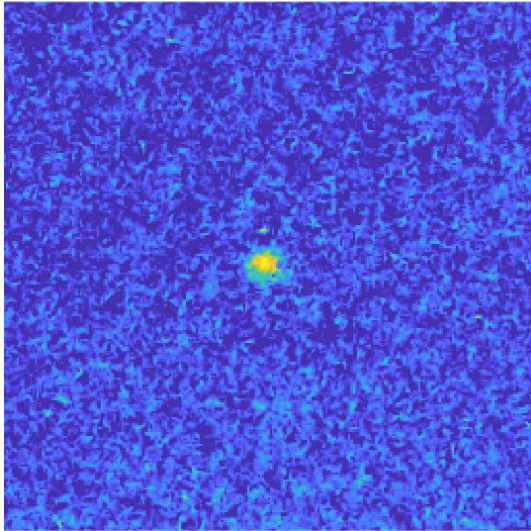
Demo by David Schneider, IEEE



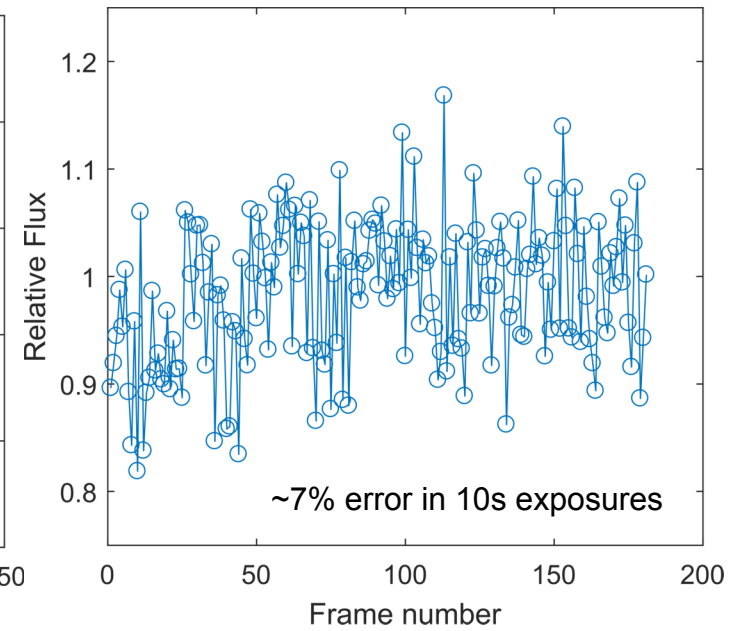
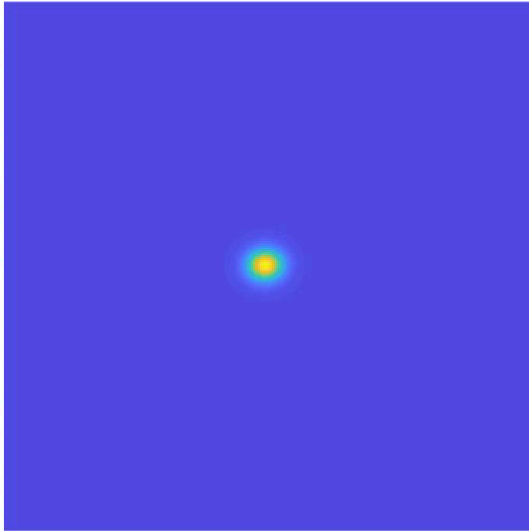
Credit: David Schneider, IEEE

# Work in progress: *Characterizing the photometric precision*

Image 1 of 221



Fit to Gaussian model



Goal: <1% error in 30 min.

Get involved. It's fun!



# What is PRoboT?

- 8" Schmidt-Cassegrain telescope.
- Assembled and operated by Pasadena High School students.
- Housed at Caltech Rooftop Observatory (CRO).
- May be remotely controlled and programmed.
- Emphasis on long-term student projects in astronomy.

PRoboT



# Goals of the ProboT project

- Generate opportunities for scientifically meaningful, technology-based learning.
- **Foster self-efficacy in STEM** fields through mastery and vicarious experience.
- Build leadership, organizational, and teamwork skills.
- Inspire students to get excited about our universe!



# Organizing the workforce

