Linearizing the Clio Detector

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Abstract:

Clio is the infrared camera of the Magellan Telescope’s Adaptive Optics instrument. The Clio detector records light levels, but as those increase, the camera response isn’t linear. I measured the nonlinear response of the Clio detector and determined how to correct this. I obtained Clio images where the exposure time was gradually increased. I read in every image’s exposure and brightness count, and devised a way to correct the images by linearization through an equation. With the coefficients generated, I calibrated other data as well. My accomplishments revolved around learning Python and seeing how coding was applied in a scientific setting. I also learned about the process of data collecting and how that relates to work beyond my undergraduate career. Since the data set is now calibrated, we can fix more data from Clio, and use that to accurately measure the brightness of other stars and exoplanets found.

Presentation Preparation:

SLIDE OUTLINE

* Slide 1: Project Name and My Name 30 sec
* Slide 2: Adaptive Optics Introduction and what I did 45 sec
* Slide 3: Picture of Magellan AO system/hands on work 30 sec
* Slide 4: What was I doing this year? 1 min
* Slide 5: Defining words 1 min
* Slide 6: explaining the coding process to audience 1 min
* Slide 7: Results of my coding, 30 sec
* Slide 8: Pictures 30 sec
* Slide 9: Impact on extrasolar planets 1 min
* Slide 10: Thank yous to my mentor and the program 15 sec
* Slide 11: Extraneous information

Presentation Slide Specific Notes:

**Slide 1:** Introductory Slide, introduce myself, my mentor, my project, sum up the presentation

Start off with: My name is, my mentor’s name is, my project is

To cover: In this presentation, I will speak about my project’s background, what I did, how I did that, and the importance of my research

Transition to next slide: After introduction, just flip to next slide

**Slide 2:** What’s the big idea? Define adaptive optics and what I generally did

Start off with: Generally speaking…

To cover: Go off slide

Transition to next slide: I wasn’t there for the image taking, as they was taken….

**Slide 3:** Picture of Las Campagnas and picture of me doing science: Where the instrument is located, and what hands on work looked like

Start off with: in Chile at the Las Campagnas Observatory

To cover: Both pictures

Transition to next slide: Still got to do hands on work, along with coding. Specifically…..

**Slide 4:** What did I do this year

Start off with: I calibrated images by….

To cover: Go off slide, expand upon points

Transition to next slide: Before I explain the calibration process, I should mention…

**Slide 5:** Define relevant terms for the project

Start off with: A few terms that are important to my project…

To cover: Slide, A linear detector will record 2x the counts with a star 2x as bright or when you integrate for 2x as long, speak about graph

Transition to next slide: Now, to speak about the calibration process itself…

**Slide 6:** Explain the coding process that I took

Start off with: I had to write some very in-depth code, but for the sake of time, I will generalize it all.

To cover: Go off slide

Transition to next slide: Now, the error plots were instrumental is helping me figure out which fit to use, and they lead me to…

**Slide 7:** What did I spend 4 months doing? How did I apply those results to other pictures?

Start off with: the results of my project.

To cover: Go off slide

Transition to next slide: Now, for a visualization of my data…

**Slide 8:** Show how the data was corrected, mark that it wasn’t much of a change, so why was it necessary?

Start off with: These are some interesting graphics.

To cover: What both plots mean, why there isn’t much of a difference between the correct image and regular image

Transition to next slide: It may not look like much, but these plots were very important

**Slide 9:** Proceed to lay the smack down on why this stuff is necessary to adaptive optics as a whole

Start off with: But why exactly? Why is all of this so important?

To cover: Go off slide

Transition to next slide: Pause because it’s the end

**Slide 10:** Thank everybody everywhere, take questions

**Slide 11:** Leftover information that may be helpful with questions

Common Questions and their answers:

Other Information:

* No index cards during presentation, but signed copies of my more in depth report that I wrote (make a joke about this at the end)
* Come off as personable: not condescending towards audience when talking about more scientific topics
* For presentation (business casual): Tan chinos, light blue or white shirt, dark blue tie with tie clip, maybe a grey cardigan, dark brown belt and dark brown shoes with argyle or light brown socks
* For dinner (business dress): black FITTED slacks, dark blue shirt, black tie, maybe suit jacket
* 7 minutes of slide time: PRACTICE
* 1-2 minutes of questions, practice fielding questions from Katie, Kara, and parents for 3 diff. levels
* Don’t try too hard with the jokes.
* Strong beginning: MAKE AN IMPRESSION- What do I want my audience to think about me/ my presentation?
* Strong ending: WHY IS THIS IMPORTANT? -Extra solar planet discovery, adaptive optics is one of the most important components for modern telescopes
* Transitions between slides: what do I want to say in order to move onto the next topic?
* **DON’T READ THE TITLE OF THE SLIDE AS YOUR INTRODUCTION TO IT LITERALLY THE WORST THING**
* Titles should be about 3-5 words in length.
* No more than 3-4 bullet points per slide, or 2-3 bullet points on one half of the slide and a picture on the other part
* Connect dewar filling to how infrared detectors need to be kept cool: Answer why was my hands-on work (besides coding) important to the project as a whole?

How long and how many slides?

Presentations at the Space Grant Symposium are 7 minutes long with 1-2 minutes for questions afterwards. How many slides depends on your pace, etc., but a general rule of thumb is one minute per slide. In the Symposium, your presentation will last 7 minutes, so start out targeting no more than 7 slides. (You might have more slides if you have images which illustrate something well, but do not require much air time.) Avoid prolonged discussion on any one slide. Timed practice runs will help you fine tune your presentation length and number of slides.

* 10 slides, 7 minutes

Questions not covered in my main presentation slides?

If you have something technical or complicated that you feel is too detailed for the main presentation, but which might come up in questions, it is ok to have prepared an extra slide that you place after your "thank you" slide (in other words, a slide kept in reserve, just in case).

* What common questions will pop up?
* What info do I put on my extraneous slide?

How Best to Present?

The answer to this comes from practice. When you practice alone – something recommended as you form the presentation -- make sure to speak out loud (full voice) and, in at least one run through, watch yourself in a mirror. Next, do a practice run with people who you know well (comfort is important at this stage, as is an audience which is not versed in the specific topic you are presenting as they will catch jargon and technical terms that need to be defined). Finally, do a practice run with your colleagues where you work. In all practice runs, it is very important to pretend that each run is a live presentation. Before starting, ask your audience to do the same, and ask them to note any suggestions which you can discuss afterwards. Remember to time each practice run so that you eventually are able to consistently complete in 7 minutes.