

## PRESIDENT'S CORNER

by Bruce Horrocks

It seems like the time is just starting to fly by this year. Here it is June, school is out, and family vacations have begun. I do enjoy the cool spring days and this part of summer. Those hot dry days in July and August are never fun for me. It also seems like the last few years of drought have caused wildfires that make enough smoke to thwart any astronomer. I do hope that we can get some rain and avoid the smoke-filled skies this summer.



*Shannon Horrocks*

We have met as an executive committee, and we have several summer activities coming up. Please notice the calendar items that have been listed out and make note of them in your personal calendar. We have had various libraries request some star parties, and also solar parties. This should work great during these long summer days when it does not get dark until 10:00 p.m. or so. These star parties will run during the afternoon or evening and end with an astronomy presentation in the library itself. There is a significant amount of solar activity going on this year, and so if you want to just come observe or help out with these solar star parties, we hope to see you there. There are also many community events going on during the day where our club will be doing some solar observations and viewing. Please stop by and visit if you are around at these—or even better, come join with us and lend a helping hand.

This could be an exciting summer with the James Webb Telescope coming online and providing us with some outstanding new images and information about

*cont'd on p. 2*

## UPCOMING EVENTS

Star Party Season Has Begun!



*PikPng*

We Want YOU to Come Help at  
Summer Club Events!

- June 8 (Wed.): Beaver Mountain Star Party for Bonnie's ward YW camp. 9:00 p.m.–10:30 p.m., with presentation 9:00–9:30 p.m.
- June 18 (Sat.): Nibley Heritage Days Fair Solar Party/Demonstration. 10:00 a.m.–2:00 p.m.
- June 29 (Wed.): Richmond Library Solar Party. 5:00 p.m.–7:00 p.m., with presentation 6:30–7:00 p.m.
- July 9 (Sat.): Mendon Library Solar Party: 1:00 p.m. – 4:00 p.m., with presentation 3:30–4:00 p.m.

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**President's Corner, cont'd from p. 1**

the early stages of the universe. If you are not following this, I hope you will, and we might all learn a few new things. I personally am expecting this new telescope to create many more new questions than simply provide answers to our questions about space and the universe. We are planning a summer social in July; I have been receiving some information from NASA about the James Webb Telescope that we will share at that meeting. We will have more information about our social in the July newsletter, but please plan on July 29 for our club summer social and a JST update. Hope to see you all there.

I would like again to encourage you all to join on the CVAS Facebook page. There are some great pictures posted there to look at, and some interesting articles to read. Also, this is a great place to post your own images and photos if you want. I saw many images of the recent lunar eclipse that we had last month, and congratulations to those of you who were able to get out and avoid the clouds. The best picture I saw of this lunar eclipse was taken by one of our newer and younger club members, Dean L. He posted a couple of images of the lunar eclipse that were fantastic! So, if you have not looked at them, I hope you will. We would also like you to send your images to Tom Westre to put on the website if you want to do that as well. So, here is a great shout out to Dean and his excellent work. Hope you can keep it up, Dean!

My last comment for this month is a bit on the negative side, but have you seen the price of telescopes lately? I am in a bit of shock to see how much

**cont'd on p. 7**

**Upcoming Events, cont'd from p. 1**

- July 14 (Thurs.): City of the Rock Star Party for Tom's ward YM camp. 9:00 p.m.–10:30 p.m. (City of the Rock is in Idaho, and it is a two-hour drive from Cache Valley. That said, we could really use a couple more volunteers for this one!)
- July 25 (Mon.): Pioneer Day Solar Party at Elk Ridge Park <https://northlogancity.org/elk-ridge-park/> in North Logan. Set up at 9:00 a.m. Party starts at 11:00 a.m. after the parade.
- July 29 (Fri.): CVAS Summer Social and James Webb Telescope First Light <https://blogs.nasa.gov/webb/2022/02/11/photons-received-webb-sees-its-first-star-18-times/presentation-at-Virgil-Gibbons-Heritage-Park-in-Nibley>. 7:00 p.m. We will have pizza and potluck dishes at the pavilion. We will then move across the street and slightly north to Clear Creek Park for the Star Party.

Keep up to date by visiting our website:



PikPng

**Challenges from Our President**

- Come and help out at a solar or star party! We need all the help we can get! Please look at our upcoming events and let the Executive Committee know where you can help.
- Do you know of a group or community that would like us to host a star or solar party? Please let the Executive Committee know!
- You are also welcome to just come and participate! We'd love to see you there!
- Join the CVAS Facebook page!
- Spring-clean your astronomy collection. It might be a good time to sell that old scope.



Super Nova in NGC4647  
 5/17/2022 10:30 to 11:30 PM MDT  
 Canon T3i ISO1600 11 Images Staked  
 240 Sec Exposure each.  
 Celestron 11" SCT w/AG  
 Distance 63 million LY

*Dell Vance*

## SUPERNOVAE: AN ASTRONOMER'S TREAT

by Dell Vance

On April 16, 2022, Koichi Itagaki, an amateur astronomer in Japan, discovered a supernova in a galaxy that is 63 million light-years away. The galaxy is NGC 4647, which is visually very close to Messier object M60, an elliptical galaxy in the constellation Virgo. It was at a magnitude 15 and brightened over the next few weeks to a magnitude 12. When I observed it on May 17, it was a magnitude 13. It was so bright that it was brighter than the galaxy it is in. Its designation is SN2022hrs: SN (for Supernova), 2022 (for the year), hrs (assigned sequentially, once it is confirmed).

Last year 21,425 supernovae were observed. As of June 3, 2022, year to date, 8,078 supernovae have been observed, of which 742 have been confirmed.

Supernovae occur when a star explodes. The star becomes brighter than the galaxy it exists in. SN2022hrs is a Type Ia. This means it was a white dwarf that experienced a "thermal runaway." These

white stars often were a giant red star with a companion star. The giant red star uses up its energy and collapses down to a white dwarf. The white dwarf draws energy or mass from the companion star and the core temperature rises. Eventually, the temperature is high enough to ignite carbon fusion. It then undergoes runaway fusion. It will collapse and typically form a neutron star.

Supernovae may be common, but to observe or image one is a real treat for any astronomer.

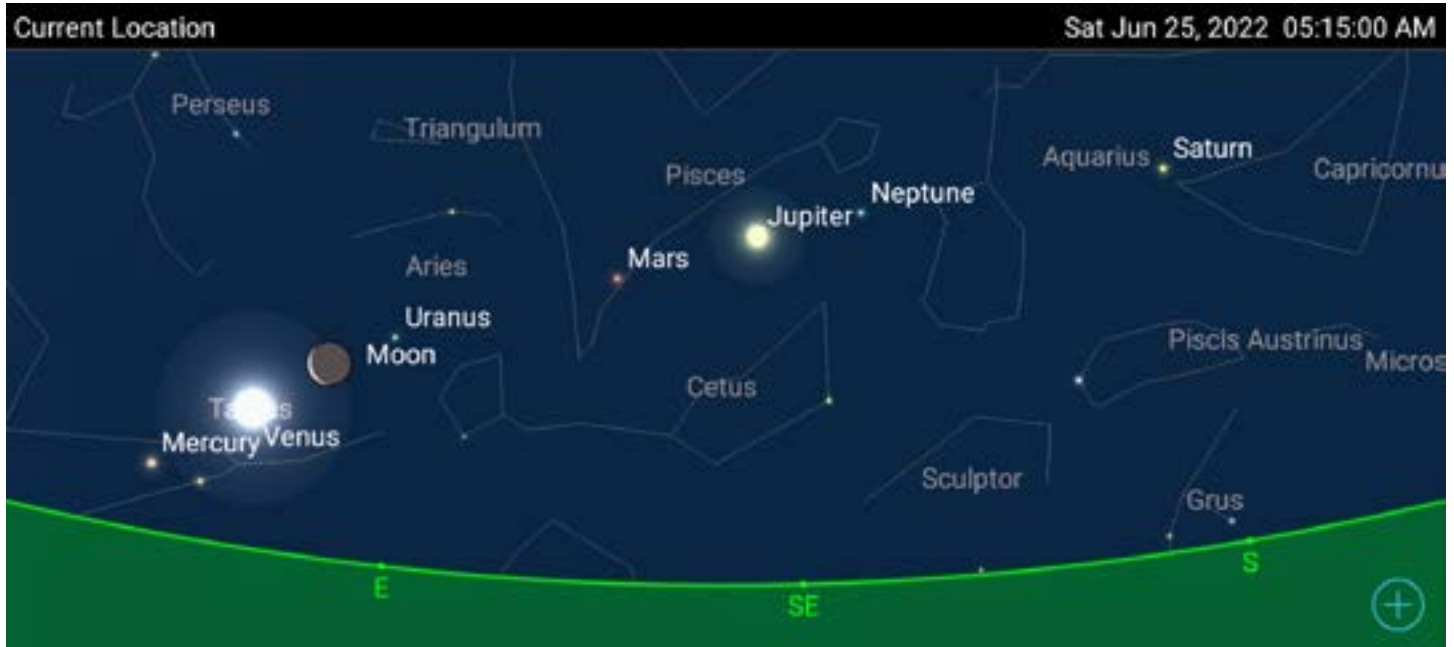
### Supernovae Stats

**21,425 in 2021**

**8,078 in 2022 to date**

# SUMMER CELESTIAL WONDERS

by Blaine Dickey



*Arc of planets in the morning sky.*

Let's look ahead to the summer which begins on Thursday June 21, 2022. What celestial wonders will be visible this summer?

No fewer than seven planets and the moon will form an arc in the morning sky on June 25, 2022, at 5:15 am. It would be possible to observe each of these planets and the moon that morning in one big fell swoop. Most of them will be visible with the unaided eye, and some with binoculars or a small telescope.

The sun is moving toward an expected sunspot maximum in July 2025. Now is a good time to begin watching the sunspots move across the face of the sun, only to disappear over one edge of the sun, while others take their place as they move into view from the other edge.

On the morning of Friday, August 12, at about 4:00 a.m., we will be treated to a celestial show of fireworks known as the Perseid shower. You can expect up to 100 meteors per hour on a normal year, but the full moon will interfere that morning, greatly reducing the number of meteors you will likely see. But there should be enough bright meteors to make it worth your while. The meteors will be seen coming from the direction of constellation Perseus.

Saturn reaches opposition on the evening of Sunday, August 14, 2022. As you watch the rings of Sat-



*Sunspots galore!*

urn through your telescope over the next several years, you will notice that their inclination will decrease gradually until we can only see them edgewise. They will appear to disappear on March 23, 2025.

*All of the illustrations are from SkySafari 6 Pro Android app, except for the image of the sun, which was taken by the author.*

**cont'd on p. 5**

*Summer Wonders, cont'd from p. 4*



*Perseid meteor shower.*



*Saturn at opposition.*

**Free Online Course: Introduction to Amateur Astronomy**



Clipart Library

We advertised this course in our January issue and in our club e-mails. Kalamazoo (Michigan) Astronomical Society has been giving a free introductory astronomy class online. Students who attend all five sessions even receive a nifty certificate!

It's too late to formally join the class. But CVAS has been given special permission to post the YouTube videos of the lectures! So, if you'd like to brush up on your introductory astronomy, here are links to the lessons!

They have a gift shop full of cool stuff and offer many free online lectures, besides the introductory class. You can check out their main website at <https://www.kasonline.org>.

**Introductory Astronomy Lessons**

[Part 1: Our Place Among the Infinities](#)

[Part 2: Discovering the Night Sky](#)

[Part 3: Binocular Basics](#)

[Part 4: Telescope Tutorial](#)

[Part 5: The Art of Astrophotography](#)



iStock

## PERMANENTLY WRITTEN ON MY SOUL

### My Astronomy Origin Story

by James Somers

Growing up, I do not ever remember stopping and observing the heavens above. Perhaps because I was supposed to be in bed, couldn't stay up late, etc. Occasionally, I would go backpacking or camping with our local Scout group, and a couple of my leaders were knowledgeable about some of the constellations and could name a few stars here and there. These experiences were always interesting, but it never seemed to stick, and I didn't pursue it further.

Years later while working at Northrop Grumman, we would design and build custom collimators used in radiometric calibration equipment. A collimator is more or less a backward telescope. Rather than using a telescope to observe collimated light produced from point sources (stars) light years away, we would use a point source and project a collimated beam of energy. Little did I know or understand that many of the specifications for the systems we would build, such as aperture, focal length, and field of view are also used for telescopes and stargazing.

As I learned more about such optical systems at work, I was naturally curious and interested in understanding telescopes and their uses. In my research, I learned about the Cache Valley Astronomical Society (CVAS), and I wanted to go experience and see

for myself. My timing was perfect! Not long after I learned about the CVAS, they were having a star party up Logan Canyon near Beaver Mountain. This would end up being my first time viewing the night sky using instruments—binoculars and telescopes—to aid the naked eye. The night sky could not have been any better. Several CVAS club members were very generous and willing to share their knowledge of the night sky and let me use their equipment. We observed a few planets, galaxies, nebulae, double stars, and constellations. It was all so amazing! This experience is permanently written on my soul and has changed my life.

Over the past few years with the COVID-19 pandemic, being busy with work, family, and life in general, I have unfortunately been unable to spend as much time with the hobby as I would like to. As I have heard and learned from other members in the club, astronomy is one of those hobbies that you can enjoy time and time again throughout your life. Even though you may not always have time or resources on your side, you can always pick up where you left off and continue to enjoy the heavens above. One thing that I do understand is this: There is more information out there that I don't know, than I do. There will always be lessons to learn, knowledge to share, and communication with others about the remarkable world around us.


**President's Corner, cont'd from p. 1**

the price of a new mount or telescope has gone up. I recently decided to sell one of my telescopes that I have had for about five years and was able to sell it for just what it cost me. With the inflation in the economy and shipping shortage issues, the cost of most telescopes has almost doubled in the past couple of years. If you have anything that you are not using and want to sell it, maybe now would be a good time to dust that old telescope off and let someone get some better use out of it. I am not a fan of inflation so I do hope this trend can turn around soon, but it may be a good time to unload some of that extra equipment you have lying

around the house.

Please refer to our calendar of events coming up for June and July, and if you are able to help, please let one of the Executive Committee members know. Also, if you know of any other group or community that would like us to help them with a star party, please let us know that, as well. We would love to help them out. We hope that all of you will have a safe and enjoyable summer with your friends and family. Remember the sunscreen if you get out to the beach, and we hope to see you around at our star parties!

Clear Skies,  
Bruce Horrocks



### Other Astronomy Clubs in Utah

Utah has a robust astronomy club scene. It's great to live in a state where it's easy to find like-minded people! Starred (\*) clubs belong to the NASA Night Sky Network, like CVAS.

- [BYU Astronomical Society](#) (student club in Provo)
- [Castle Valley Star Gazers](#) (aka Carbon County Star Parties, in Price)
- [Dark Sky Observers](#) (Helper)
- [Ogden Astronomical Society](#)\*
- [Salt Lake Astronomical Society](#)\*
- [Southern Utah Space Foundation](#) (Cedar City)
- [St. George Astronomy Group](#)\*
- [Utah Valley Astronomy Club](#)\* (Orem)
- [Utah Women Astronomical Society](#) (Salt Lake City)



### Hey, Astronomy Hero! What's Your Origin Story?

CVAS members are astronomy superheroes who share their love of astronomy with the galaxy! (Or, at least with the people of Earth!)

What piqued your interest in astronomy? Please tell us! Send your article to Bonnie at [bschenkdar@gmail.com](mailto:bschenkdar@gmail.com)!

*pngset*

# ASTROPHOTOGRAPHY GALLERY

## Recent Images by Club Members



**Lunar Eclipse (Above)**  
**Blaine Dickey**

Here are three images that I took of the total eclipse of the moon that occurred on the evening of May 15. Two of the images were after totality in the partial phase of the eclipse.

**The Sun (p. 9)**  
**Bruce Horrocks**

These solar photos were all taken using my Sky-Watcher 100mm aperture telescope and a Daystar QUARK chromosphere filter. My camera is a ZWO 174 monochrome and the exposure is around 17 milliseconds. I track the sun with my Celestron AVX mount, which does a good job. I take the photo by recording a short video of 1,000 frames. Then, using AutoStakkert! software, I select the best 100 frames to stack into a single image. Then I use PixInsight to add some color, so that it looks a bit more like how we are used to seeing the sun.

*cont'd on p. 9*

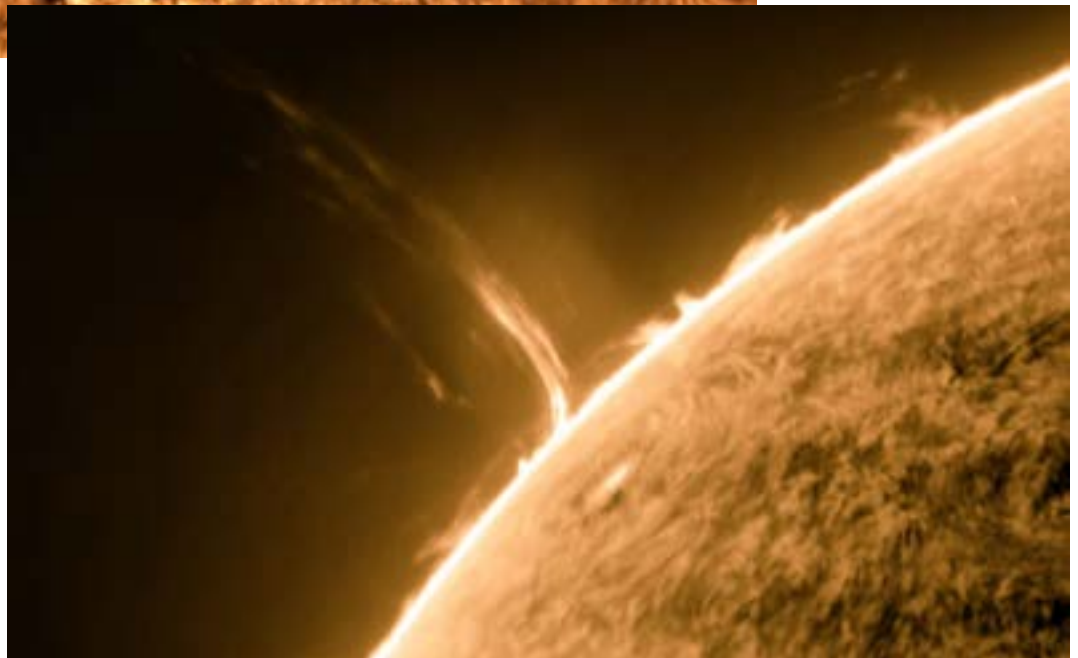
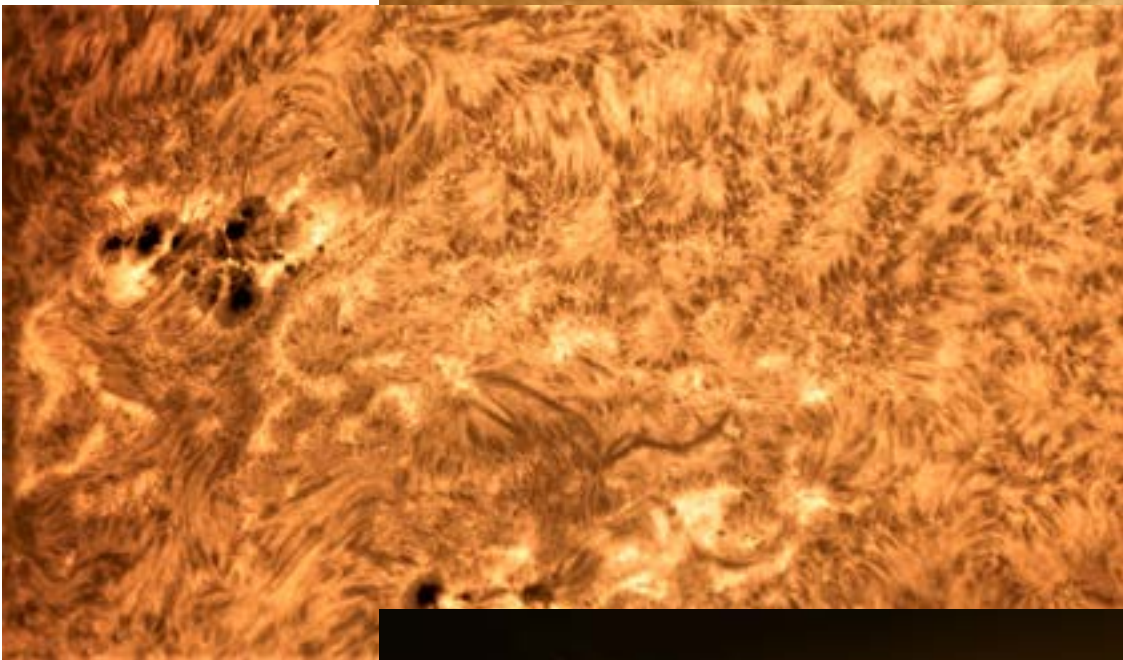
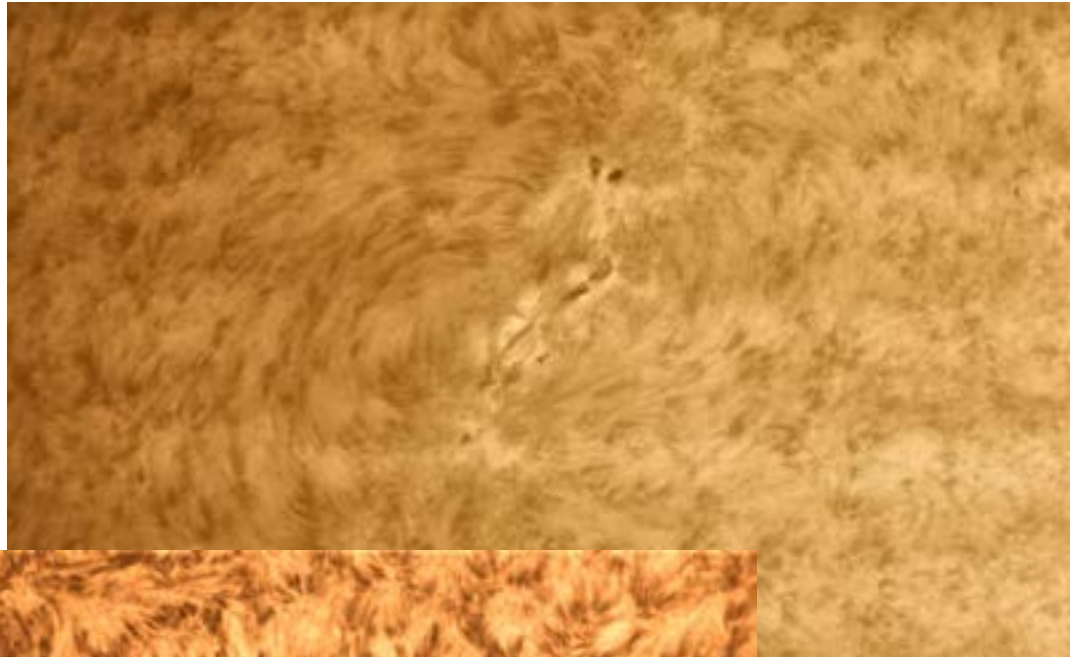


## EXECUTIVE COMMITTEE

- President: Bruce Horrocks; [bruceh@gembuildings.com](mailto:bruceh@gembuildings.com)
- Vice President: James Somers; [james.m.somers@aggiemail.edu.usu](mailto:james.m.somers@aggiemail.edu.usu)
- Secretary/Treasurer: Bonnie Schenk-Darrington; [bschenkdarr@gmail.com](mailto:bschenkdarr@gmail.com)
- Night Sky Network Coordinator: Garrett Smith; [GarrettGillSmith@gmail.com](mailto:GarrettGillSmith@gmail.com)
- Past President: Dell Vance; [avteam.dell@gmail.com](mailto:avteam.dell@gmail.com)
- Public Relations: Lyle Johnson; [lyledj@aol.com](mailto:lyledj@aol.com)
- Webmaster/Librarian: Tom Westre; [twestre45@aol.com](mailto:twestre45@aol.com)



*Astrophotography, cont'd from p. 8*



# A DO-IT-YOURSELF ALL-SKY CAMERA

by Dale Hooper

All-sky cameras can image a large portion of the sky several times per minute. They are really helpful for tracking sky conditions (such as clouds) while astrophotography. They can also be used for tracking meteor trails, satellites, auroras—and they are just plain fun to use.

Over the past several months, I've noticed advertisements for some of the lower-end planetary cameras from QHY and ZWO that indicate that they come with a fish-eye lens that can be used for an all-sky camera. This has really intrigued me because a number of years ago, I purchased an all-sky camera from MallinCam, which gave a display on a composite video monitor in my observatory. This was really helpful for imaging because I could see when clouds were starting to roll in. But over the past couple of years, the acrylic dome over the camera has become corroded and there is no way to get a replacement. So it is no longer usable.

After I started using N.I.N.A. astrophotography software, I subscribed to a YouTube channel from a guy that goes by Patriot Astro. He has a lot of really good videos about using different features of the N.I.N.A. software. But when I went to his website, I noticed a link to one of his [pages about building your own all-sky camera!](#) When I watched the [linked video](#), I got really excited because it seemed pretty straightforward to create my own all-sky camera.

The all-sky camera that he discusses, and which I built, is in fact based on a ZWO planetary camera using a fish-eye lens controlled by a Raspberry Pi 4 (a small single-board computer). The Raspberry Pi uses the open-source AllSky software created by Thomas Jacquin. The Patriot Astro video is very complete, so you should definitely watch it if you plan to make one of these. My hope is to add a few details that might be helpful to someone like me, who is a first-time user of a Raspberry Pi.

Patriot Astro details use of a Raspberry Pi 4 kit from [Labists](#), which is what I was able to use. These kits are great because they include everything you need to get going with a Raspberry Pi single-board computer, including the case, power supply (with a switch), fan and heat sinks, an SD card reader, micro HDMI to HDMI cables, and the Raspberry Pi oper-

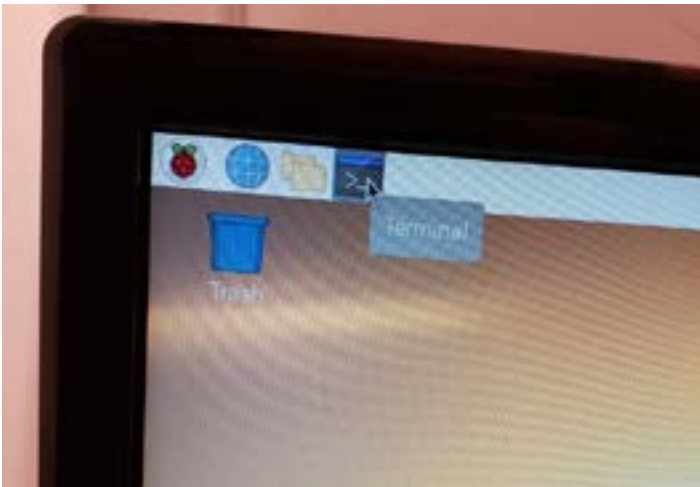


*Figure 1: Completed all-sky camera.*



*Figure 2: Raspberry Pi connected to monitor, keyboard, and mouse.*

*cont'd on p. 11*

*All-Sky Camera, cont'd from p. 10*

**Figure 3: How to start a terminal (command prompt) window.**

ating system already loaded on the microSD card. Unfortunately, all of the complete Raspberry Pi kits from Labists are now currently out of stock. However, I noticed on Amazon that there is a complete kit from [CanaKit](#), which should work equally well. There are probably others that you could also find.

Assembling the Raspberry Pi is pretty straightforward. The most important thing is to make sure you get the heat sink pads/heat sinks placed on the three correct components: the processor, DDR4 memory, and the USB controller chip. A two-minute [YouTube video](#) shows how to correctly place the heat sinks. The Patriot Astro video spends several minutes showing how to complete assembly of the Raspberry Pi.

Initial configuration of the Raspberry Pi requires attaching an HDMI monitor, a keyboard, and a mouse as shown in [Figure 2](#). When the Raspberry Pi is later used with the camera, these won't be required because it will be running in what is known as "headless" mode, i.e., without a monitor. The Labists Raspberry Pi kit I purchased already had Raspberry OS installed on the microSD card. Other kits like the CanaKit come with NOOBS (new-out-of-box software) installed on the microSD. If NOOBS is installed on the microSD, when you first power on, you will be presented with a NOOBS installer box. Click on the Raspberry Pi OS checkbox and then on the install option located at the top right corner of the installer window. Raspberry Pi OS will then be installed, which will require about 15 to 20 minutes.

In [Figure 2](#), the Raspberry Pi is shown to the upper left of the mouse and is just somewhat bigger than the mouse. When you first boot Raspberry Pi OS, you will need to set a few configuration items. Select "United States" for the country, "American English" for the language, and "Denver" for the time zone. Then select the "Use English language" and "Use US keyboard" checkboxes. Next, you will set and confirm a password for the "Pi" user. After this, it will look for your wireless network. Select your Wi-Fi network and then enter the password.

After completing this, it will attempt to update the operating system. When I tried this, it didn't work correctly, but this can also be completed from the command line, which is shown in the video, and which I'll detail below. You will then select the option to reboot the Raspberry Pi.

After the reboot, it is important to find the IP address to be used for the Raspberry Pi. As shown in [Figure 3](#), you can open a command line window by clicking on the terminal window icon found on the taskbar in the upper left of the screen. After opening a terminal window (i.e., command prompt) enter the following command:

```
ifconfig
```

From the output of the `ifconfig` command, locate the information for `wlan0`. The IP address for the Raspberry Pi will be listed to the right of `inet` in the second line of the `wlan0` information. As can be seen in [Figure 4](#), the IP address for my Raspberry Pi is 192.168.0.127.

After that, we can now update the Raspberry Pi OS from the command line. First, enter the following command:

```
sudo apt update
```

This command updates the "package" list for the Raspberry Pi. Next, we can do the full update, which failed for me during the initial install, but should now work from the command line. Enter the command:

```
sudo apt full-upgrade
```

After this, we are finally ready to install the open-source AllSky software. We can find information about

***cont'd on p. 12***

*All-Sky Camera, cont'd from p. 11*

```

pi@CMHooperMemObsAllSky ~
File Edit Tabs Help
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
inet 127.0.0.1 netmask 255.0.0.0
inet6 ::1 prefixlen 128 scopeid 0x10<host>
loop txqueuelen 1000 (Local Loopback)
RX packets 20 bytes 2226 (2.1 KiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 20 bytes 2226 (2.1 KiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 192.168.0.127 netmask 255.255.255.0 broadcast 192.168.0.255
inet6 fe80::d754:7221:7205:de4d prefixlen 64 scopeid 0x20<link>
ether e4:5f:01:00:3b:20 txqueuelen 1000 (Ethernet)
RX packets 3681 bytes 522005 (509.7 KiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 154 bytes 18156 (17.7 KiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

pi@CMHooperMemObsAllSky:~$

```

*Figure 4: Finding the wlan0 IP address.*

the AllSky software by starting the web browser on the Raspberry Pi. Click on the blue world icon shown to the right of the raspberry icon in [Figure 3](#). In the web browser address bar, enter:

```
https://github.com/thomasjacquin/allsky
```

This will bring up the home page for the open-source AllSky software. Scroll down to the heading “Software Installation—1st time only” and click on the “Click here” drop-down. This will display all of the needed information for installing the AllSky software.

The Git software is used for configuration management of the AllSky software and for accessing it on the web. We need to make sure that Git is installed on the Raspberry Pi. To do this, enter the following command in the terminal window:

```
sudo apt-get install git
```

It is probably already installed, but if it isn’t, this command will install it.

Next we need to copy the AllSky software from the internet onto our Raspberry Pi. This is done with the following command:

```
git clone --recursive https://github.com/thomasjacquin/allsky.git
```

Next, move in to the AllSky directory by entering the command in the command window:

```
cd allsky
```

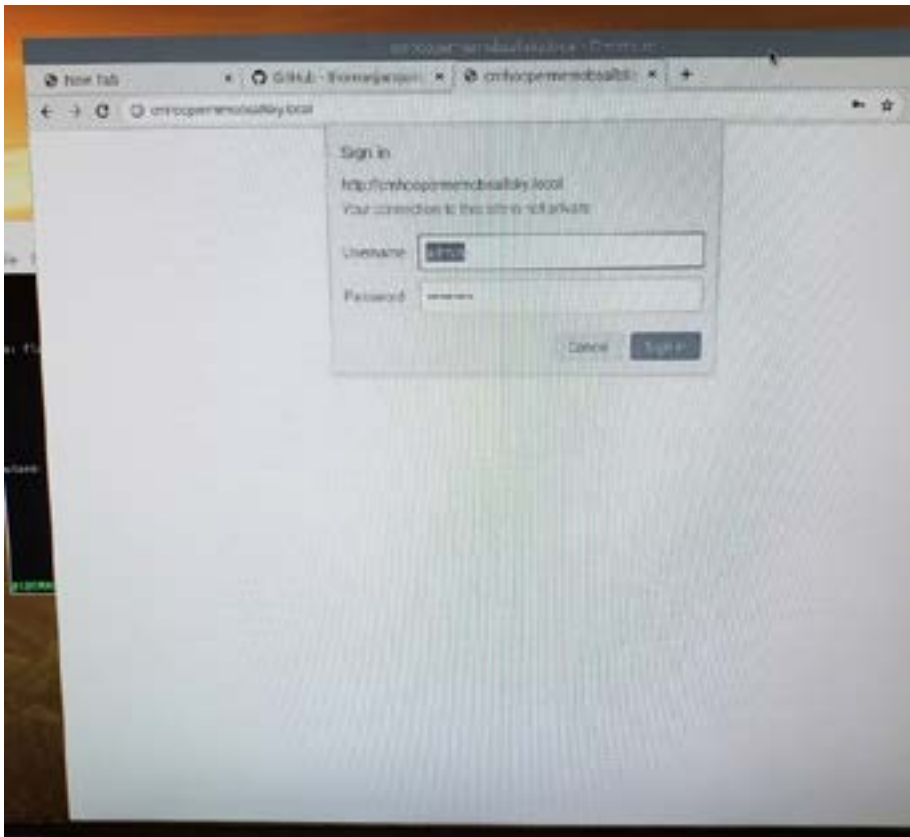
After this, the software can be installed by executing the command:

```
./install.sh
```

This will take a while to complete because a lot of packages are being installed. After it is completed, it will ask if you want to reboot. Enter a “Y” and complete the reboot.

After the reboot completes, it is time to install the

***cont'd on p. 13***

*All-Sky Camera, cont'd from p. 12*

**Figure 5: Setting up the AllSky web interface.**

graphical user interface (GUI) for the AllSky software. Start the command terminal again and enter the following command:

```
cd allsky
```

When we install the GUI software, it is also helpful to change the name of our Raspberry Pi system. This is accomplished by entering it as an option to the GUI install command. I named mine after my observatory, so I used “CMHooperMemObsAllSky,” but you can name it anything you want, or not change it. Using the name I selected (as an example), you would now enter the following command:

```
sudo gui/install.sh CMHooperMemObsAllSky
```

The AllSky software will set up a web server on the Raspberry Pi, so the name you enter is what you will use to access your all-sky camera from the web browser on your PC. After the above command completes, you will reboot again by entering “Y.”

After you reboot, you can access the website for

the all-sky camera. From the Raspberry Pi, you append “.local” to the name that you chose. Note that the name isn’t really case sensitive; you can enter everything in lower case.

In **Figure 5**, you can see that I have entered the following URL name in the web browser address field from the Raspberry Pi to get to the AllSky website:

```
http://cmhoopermemobsallsky.local
```

The GUI uses a username of “admin” and initially the password is “secret.” You will want to change this to a different password. When you sign in, since the camera isn’t connected, you will get an error as shown in **Figure 6**, stating that no camera was found. However, this doesn’t prevent you from updating the configuration. Probably the best thing to do first is to update the password. This is the password associated with the web server admin account, not the Pi account

that we set up during the initial install. To update the password, click on “Change password,” found on the left side of the webpage. You will then see the screen as shown in **Figure 7**.

Remember that the initial password for admin is “secret,” and then change it to any other password of your choosing. After updating the password, other settings can also be updated. Select “Camera Settings” from the left side of the website, and then you will be able to update settings such as your latitude and longitude, whether to show the time and sensor temperature in the image, etc., as shown in **Figure 8**.

After you update the camera settings, scroll down to the bottom of the page and make sure that “Restart AllSky after saving changes?” is selected. Click “Save changes” and the AllSky software will restart. After making all the changes you want, now select the “System” screen. On this page, you will then select “Shut down Raspberry Pi.” You can then turn off the power to the Raspberry Pi. From this point on, you can disconnect the keyboard, monitor, and mouse because

**cont'd on p. 14**

### All-Sky Camera, cont'd from p. 13

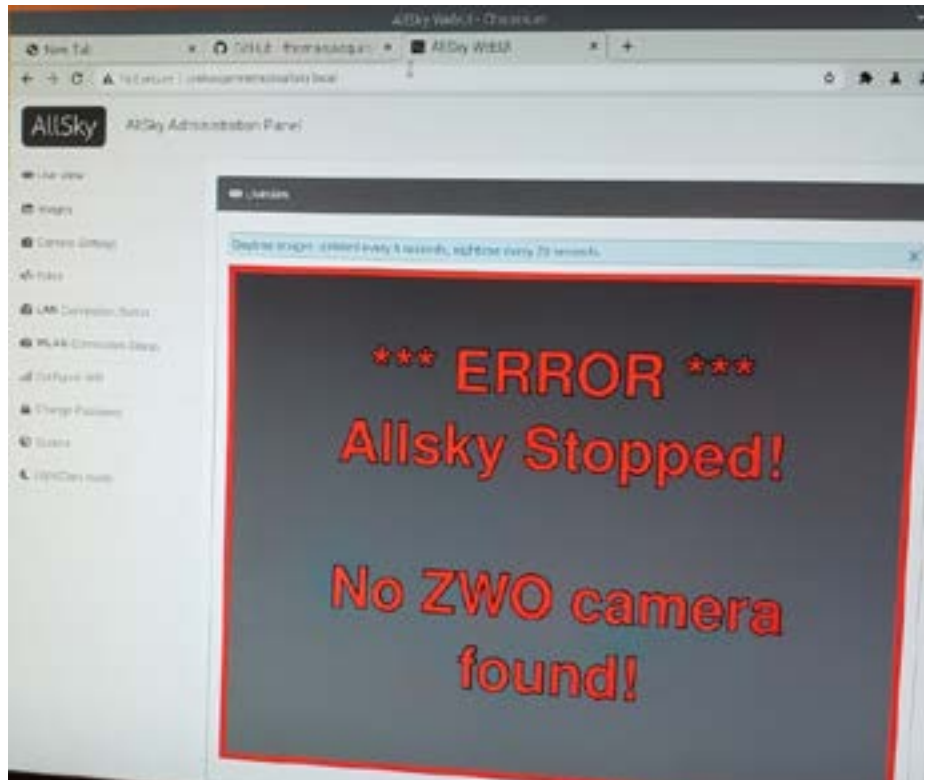
everything else can be done from the browser on your computer.

It's now time to connect your camera to the Raspberry Pi USB 3.0 port. As suggested on the Patriot Astro website, I purchased the ZWO ASI224MC camera, which comes with a 150 degree fish-eye lens. These are currently selling for \$199. There are other camera options, such as the ASI178MC, which has higher resolution and a 170-degree fish-eye lens for \$299. There is no requirement to use the Raspberry Pi 4 to control the all-sky camera. Other options, such as the Raspberry Pi 2 or 3, or even Pi 0, will work but the speed may be slower. Also, there are cheaper camera options that can be used, such as the Raspberry Pi HQ camera (see the [Patriot Astro YouTube video](#)).

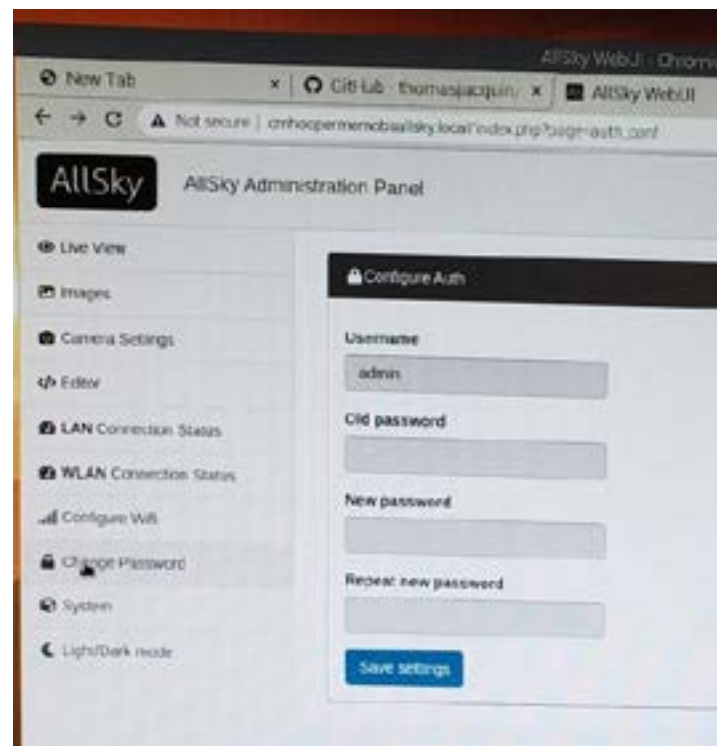
Thomas Jacquin, who created the AllSky software, used a four-inch ABS pipe setup to store his all-sky camera. I had a spare project box, so I drilled a hole in the top using a 1 3/8" hole saw. I then purchased an acrylic dome from Amazon and secured it to the project box using a bead of window silicone. I then placed everything in the project box as shown in [Figure 9](#).

I started off by placing it outside and powering it on during the day to try to get rough focus. Even though there is an infinity focus symbol on the fish-eye lens ( $\infty$ ), I found that focus was achieved several turns away from the end of travel. It actually makes sense to figure out the orientation of the camera image before you cut holes in whatever you will use to house your all-sky camera. For me, it is actually 180 degrees off of what I expected. Also, I have noticed that if I have everything completely sealed, that I can have difficulty receiving the Wi-Fi signal from the all-sky camera. Since I will only be using my all-sky camera while I am observing, it isn't necessary to have everything completely sealed. If you intend to run yours during all weather conditions, it may be useful to consult [Thomas Jacquin's all-sky camera development page](#).

[Figure 10](#) is an image from a recent night observ-

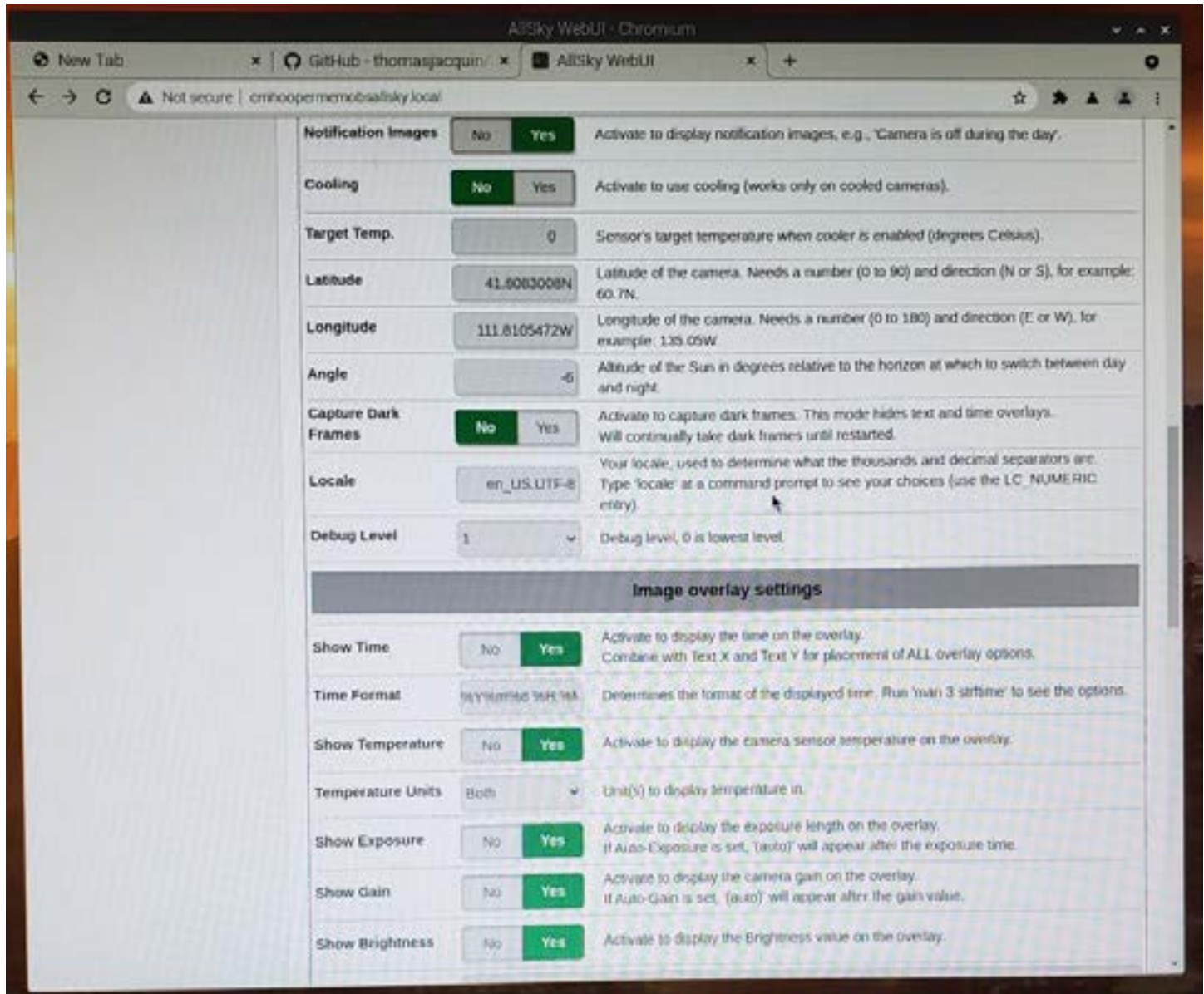


*Figure 6: There is no camera yet but we can still update the configuration.*



*Figure 7: Update the admin password for the AllSky web server.*

*cont'd on p. 15*

*All-Sky Camera, cont'd from p. 14**Figure 8: Update the camera settings.*

ing. This was actually taken during the recent total lunar eclipse. However, the moon was completely clouded out during this time and too far south to be observed in the image. The fish-eye lens on the ASI224MC is a 150-degree lens. However, the CMOS sensor used in the ASI224MC isn't square. So, for the long dimension, I am able to image 150 degrees. However, for the shorter dimension, I am only able to image about 95 degrees. I have oriented my all-sky camera so that the long dimension displays east-to-west (with east on the left) and the short dimension displays north-to-south (with north up). However, this is just a personal preference.

Even though the image for [Figure 10](#) was taken

when it was relatively cloudy, it is still easy to pick out Polaris in the middle near the top, Vega under the 2 next to "Exposure," Arcturus to the right of the tree, Leo lower right, Castor and Pollux on the upper right edge, and of course the Big Dipper in the "sucker hole" (i.e., clear area).

I really love the fact that I can pull up the current all-sky camera image from any browser on my local network. This really makes it easy to check how things are going. This includes the web browser on my phone, which I think is really cool. You can see a screen capture of this in [Figure 11](#).

*cont'd on p. 16*

**All-Sky Camera, cont'd from p. 15**

I really had a lot of fun creating my all-sky camera. There are a lot of things that this can do, including daily time-lapse videos. Consult [Thomas Jacquin's GitHub page](#) to get a good idea of what other things the all-sky camera is capable of doing. I was able to get all of the basics running in about a day. But, there is obviously a lot to explore!

Clear skies! (And this will help you know if you have them.)



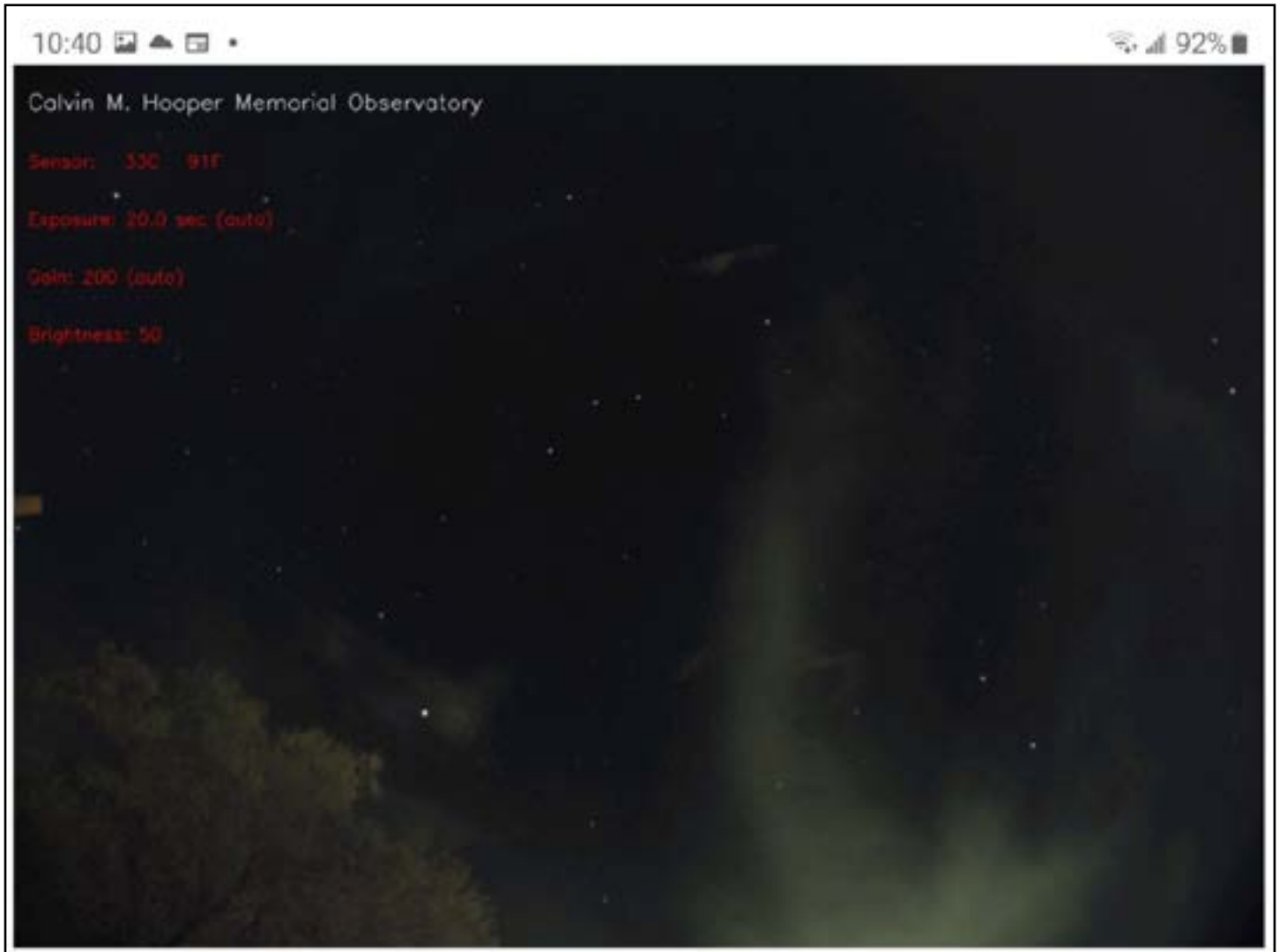
*Figure 9: Raspberry Pi 4 and ASI2244MC in the project box..*



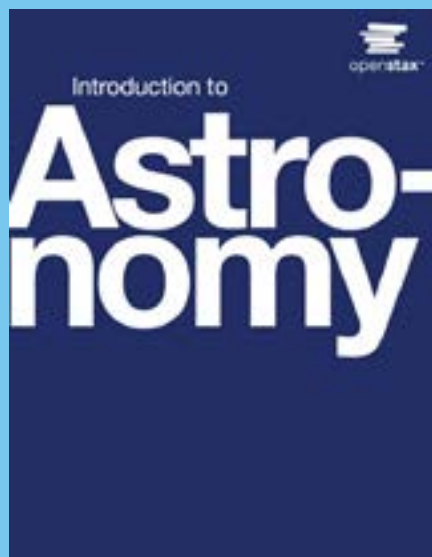
*Figure 10: All-sky camera image during some rather cloudy skies.*

**cont'd on p. 17**



*All-Sky Camera, cont'd from p. 16*

*Figure 11: Phone screen capture from my Samsung Galaxy Chrome browser.*



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# UPCOMING ASTRONOMY EVENTS AND ANNIVERSARIES

by Bonnie Schenk-Darrington



FavPNG

- June 2: Surveyor 1 landed on the moon in 1966.
- June 3: Ed White became the first American to walk in space in 1965.
- June 4: Saturn commences retrograde motion.
- June 4: The first reliable record of a total solar eclipse was recorded in 780 BCE in China.
- June 6: Mikhail Lomonosov discovered Venus's atmosphere in 1761.
- June 6: Godefroy Wendelin was born in 1580. He was a Roman Catholic priest who observed the moons of Jupiter, endeavored to calculate the distance between Earth and the moon, and wrote extensively on mathematics and astronomy. The moon crater Vendelinus is named after him.
- June 8: Giovanni Cassini was born in 1625. He was an astronomer, expert in hydraulics, and engineer. He helped found the Paris Observatory under King Louis XIV. He studied the parallax with colleague Jean Richter, was the first to observe four of Saturn's moons, and was the first person to successfully measure longitude on Earth.
- June 11: Google Earth released in 2001.



Pixabay

- June 14: Full moon.
- June 14: Charles Messier discovered Lexell's Comet (D/1770 L1) in 1770.
- June 18–27: [Alignment of Mercury, Venus, Uranus, Mars, Jupiter,](#)

[and Saturn.](#)

- June 21: Summer solstice occurs at 3:13 a.m. MDT.
- June 22: [Royal Greenwich Observatory founded](#) by England's King Charles II in 1675.
- June 24: William Huggins made the first photographic spectrum of a comet (1181 III) in 1881.
- June 26: Discovery of Saturn's moons Surtur, Jarnsaxa, Greip, and Loge in 2006.
- June 26: Charles Messier born in 1730. He published a catalogue of nebulae and star clusters.
- June 27: Bootid meteor shower peaks.
- June 28: Neptune commences retrograde motion.
- June 28: Discovery of Pluto's moon Kerberos in 2011.
- June 28: New moon.
- June 30: International Asteroid Day. This holiday was declared by the United Nations, and occurs on the anniversary of the Tunguska event in 1908, in which an asteroid struck Siberia, leveling over 800 square miles of Siberian forest. The holiday raises awareness about protecting Earth from asteroid threats.



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Check out our past radio shows [here](#).

## A LITTLE ASTRONOMY HUMOR

My kidnappers returning me back  
after listening to me talk about  
astronomy for 2 hours



*Bored Panda*

When an astronomer gets the munchies



*Memebase*