

Notes from SEEC 2025 by [Wes Fryer](https://space.wesfryer.com) - space.wesfryer.com

These are my notes from the [Feb 6-8, 2025 SEEC \(Space Exploration Educators Conference\)](#) at the Johnson Space Center. I'm attending virtually. *My thoughts and comments are in italics.*

All notes are in reverse-chronological order

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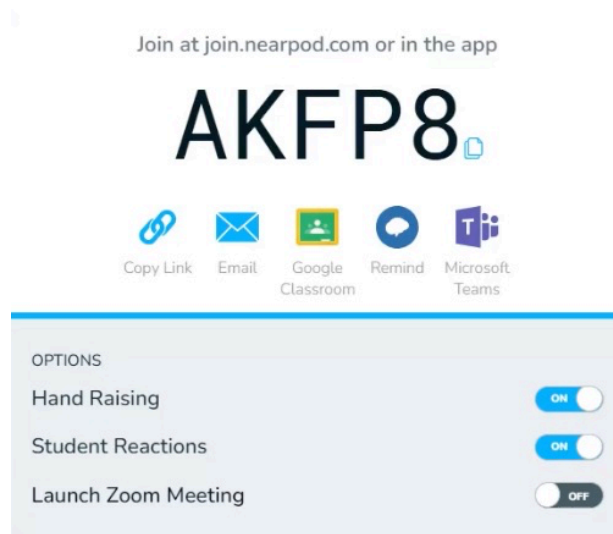
[Friday Keynote- Lessons from Astronaut School \(Virtual Viewing only\) - February 7, 2025, 8:00 AM CST \(1 hour\)](#)

Bringing Space to Life: Space Colonization Units Implemented in the STEM Classroom

By Annamarie Vandrevalla

<https://www.linkedin.com/in/annavandrevalla/>

Started working on these in 2014, first group to ever see ALL the units



<https://app.nearpod.com/presentation?pin=AKFP8>

A poster with a blue background on the left and a starry space image on the right. The text on the left reads: "MAKE Space Come Alive Resources" in large white letters. Below that, in smaller white text: "By: Anna Vandrevalla, MEd STEM Teacher & PhD Student annamarie.vandrevalla@gmail.com". Then: "Wakelet Resource Link" followed by the URL "bit.ly/MAKESpaceComeAlive". At the bottom left, it says "OR QR Code" next to a QR code.

I combine all my resources in this Wakelet!

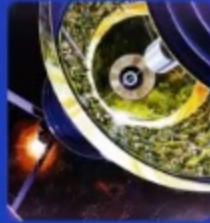
https://wakelet.com/wake/G9z5tdRdo_pbbrBGvgvHs

3 units that all fit together, but you can change order:

Overview of Space Colonization Units



Unit 1 (or 2):
Traveling to
Space &
Beyond
(Today)



Unit 2 (or 1):
Colonizing
Solar System
(Twenty
Years in the
Future)



Unit 3: Colonizing
Alpha Centauri Solar
System (One
Hundred to Two
Hundred Years in the
Future)

I am a big science fiction nerd... So very fun to build these different parts

Each unit about 2 weeks long, using 45 minute class periods

My shares in session chat:

I'm a middle school STEM teacher in Charlotte, NC, and have been using a Mars Colonization / "Coding Mars" unit with my students for the past 3 years too.

The "Moonrise" podcast from the Washington Post really highlights how important the science fiction writers were to the original Moonshot!

<https://www.washingtonpost.com/podcasts/moonrise/introducing-moonrise/>

Presentation slides:

https://docs.google.com/presentation/d/1UpyVIVEY3dNBx-yxSPKID4FowBzYxs7GlopbUYN_wog/edit#slide=id.g32e8d582829_2_0

Activity: Create a timeline of Rocket history

- when
- who was involved
- what was happening

We did this in the session in NearPod

Comparing timelines can help students focus beyond themselves, define for themselves what they think is important, can lead to compare and contrast debate

- can do this on big white post-it notes

Used this link in activity:

https://www.grc.nasa.gov/www/k-12/TRC/Rockets/history_of_rockets.html#:~:text=The%20date%20reporting%20the%20fir

Next moving into design features of rockets, variables for space rockets

I discourage students from using Quora or Answers.com as sources

- vetting process for resources
- use NASA.gov, sometimes Space.com

Students pick a rocket to base their design on

She uses “check ins” of drawings and ideas students are sharing

Students favorite unit: The Application of Traveling to Space and Beyond

- can buddy up younger students with older students to help with the calculations

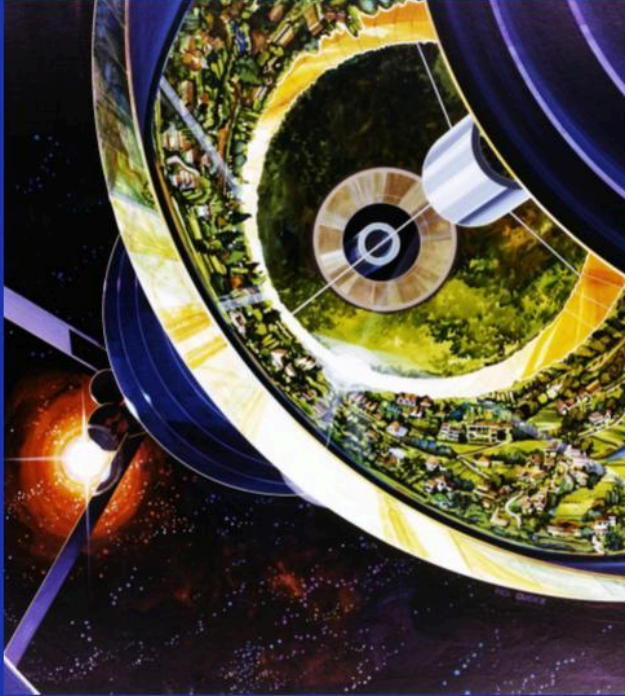
Built our own launch systems when I was working at / with Purdue Univ

Unit 2 is Colonizing the Solar System

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Unit 2 Summary: Colonizing the Solar System(SS)

- Eight days to two weeks long based on 45 minute class period
- Introduce premise that planet or moon colonization was achieved 20 years ago for colony
- Students investigate in small groups and then present on planet and moon facts, possible problems and resources for life, and develop colony culture



Students favorite part is developing their own CULTURE for their colony

Students are in groups and assigned a colony, have specific resources and issues, have to come up with group artifacts for their colony

- a possible extension is to go into intercolony trade, discuss relationships created between colonies

Great website: NASA's "About the Planets"

<https://science.nasa.gov/solar-system/planets/>

She includes an 'artifact requirement'

- something about their actual colony
- something about the culture: can be game pieces, crowns, food items, etc.
- students get to decide who they are in the colony

Next students have to come up with their BUDGET

- avoid getting bogged down with facts from research about their selected planet / location

Example worksheet to help students:

https://cf.nearpod.com/neareducation/new/assets/4b5b99cf-dae0-4ef7-b70d-6459e7cd13a8/reference_media.pdf?AWSAccessKeyId=AKIA5LQSO4AXLNJOYW5K&Expires=2147483646&Signature=0Bcl%2FcA4SgmcvyJ1scKoNHLxYDU%3D

Fantastic NASA resource website to use:

<https://science.nasa.gov/planetary-science/programs/mars-exploration/>

Mars is the only planet we know of inhabited entirely by robots.

From Robots to Humans

Recorded observations of Mars date back more than 4,000 years. Led by our curiosity of the cosmos, NASA has sent a carefully selected international fleet of robotic orbiters, landers and rovers to keep a continuous flow of scientific information and discovery from Mars. The science and technology developed through Mars Exploration missions will enable humans to one day explore the Red Planet in person.

Artist's concept depicts astronauts and human habitats on Mars.



Artist's concept depicts astronauts and human habitats on Mars.
NASA/JPL-Caltech/MSSS

Also great to study these NASA Mars exploration goals:

<https://science.nasa.gov/planetary-science/programs/mars-exploration/science-goals/>

Mars Exploration Science Goals

The key to understanding the past, present or future potential for life on Mars can be found in NASA's four broad, overarching goals for Mars Exploration.

Measurement and Units come up a lot...

Lots of different differentiation options, so many cross-curricular options and ideas

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Unit 2 Application: Colonizing the Solar System(SS)

Cross Curricular Applications

- **Space and earth science using**
 - Solar system, planet and moon details
 - Space objects and systems
 - Natural resources and life supports
- **History and social studies**
 - What forms cultures and governments
 - Economics with trading and interplanetary relationships
- **Music**
 - Gustav Holst - The Planets
- **English Language Arts**
 - Problems-solutions essay



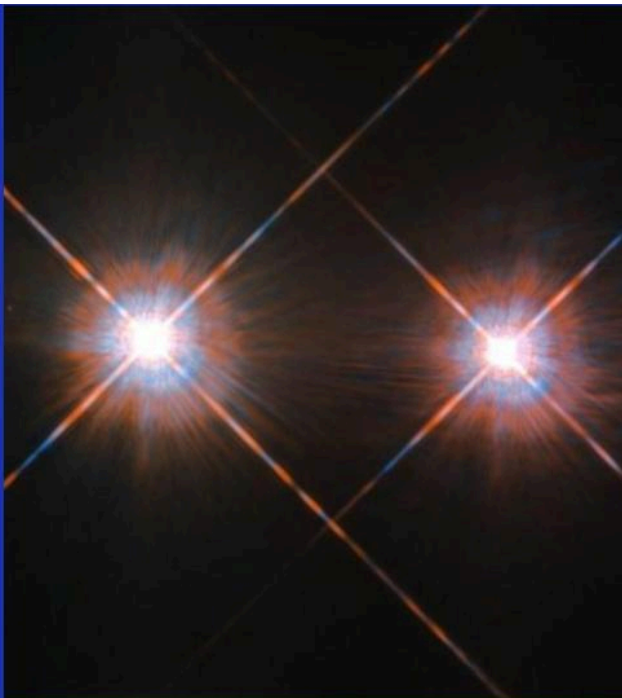
Now final Unit 3: Colonizing Alpha Centauri

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Unit 3 Summary: Colonizing Alpha Centauri SS

Summary

- Two week long based on 45 minute class period
- Students map our SS and Alpha Centauri SS on coordinate plane
- Analyze samples from several planets around Alpha Centauri to learn about natural resources
- Decide which samples to gather and ultimately decide which planet to colonize in system



Mission Cognition: A Mission to Mars

A presentation by Dr Ron Rinehart and Dr Ben Olson at #SEEC2025 on 8 Feb 2025

[Schedule link](#)

[Session resources](#) (Google Drive folder)

SEEC - 2025 ▾



1 selected

◆ Summarize this file



Name

Last m...



Mission to Mars SEEC 2025 👤

8:05 AM



Worksheet 8 - Rover Challenge Recording ... 👤

7:52 AM



Worksheet 7 - Rover Challenge 👤

7:52 AM



Worksheet 6 - Let's Pick a Landing Site on ... 👤

7:52 AM



Rinehart Olsen Freese Kuhn 2021 Mission C... 👤

11:01 PM



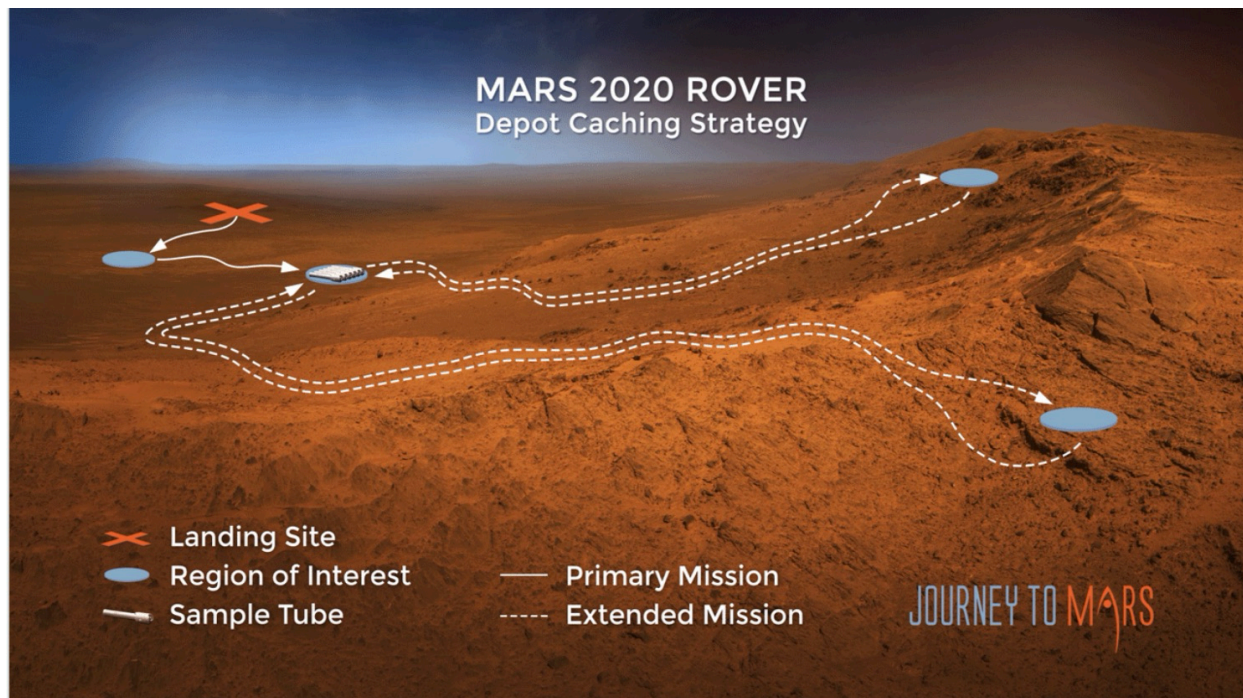
Worksheet 5 - Let's Pick a Landing Site on ... 👤

10:55 PM

[Slideshow](#)

“Depot Caching Strategy” is key for how NASA rovers operate on Mars

1. [Scientific Rationale for Depot Caching on Mars 2020](#)



ChatGPT explanation for a 6th grader: ([archived conversation](#))

"Imagine you're on a big scavenger hunt in your neighborhood, looking for cool rocks to bring back home. But instead of carrying all the rocks with you the whole time (which would get really heavy and risky if you dropped them), you decide to leave small piles of rocks at safe spots along the way. These safe spots are called "depots."

Now, NASA's Mars rovers do something similar. When the rover finds interesting rocks on Mars, it drills out small samples, seals them in special tubes to keep them clean, and then instead of carrying all of them around, it leaves these tubes in certain spots on the ground. These spots are the "depots." Later, another robot might come to Mars, pick up those tubes from the depots, and bring them back to Earth for scientists to study.

This method is smart because:

The rover doesn't have to carry everything all the time, which means less chance of something going wrong.

Scientists on Earth can choose which samples are the most interesting to bring back.

If something happens to the rover, at least some of the samples are already safely on the ground, waiting to be picked up.

So, "Depot Caching" is like leaving your collected treasures in safe spots, so you can explore more without worrying about losing everything!"

Now the presenters are inviting in person participants to get out lego kits / prepared bags so they can build attachments for the Dash robot to make it into a rover: ([See slideshow starting at slide #95](#))



The “Mars Yard” portion of the presentation [starts at slide 94](#)

Ideas I’m thinking of:

- 1. It would be cool to replicate the “Depot Caching Strategy” game they shared in Minecraft Education*
- 2. I would also like to setup a lesson where students could select landing sites based on the types of data and criteria they shared in their slideshow*
- 3. I’m wondering what other teachers might have created Minecraft Education worlds we can use with students which are more “Mars realistic”*
- 4. SO much great information and background data / history / photos in their slideshow about our Mars rovers and Mars geology*

Blockly is the main coding app they use with the Dash Robot and use that at JSC
<https://www.makewonder.com/en/apps/blockly/>

Blocky Games is free and web-based, introduces many basic coding ideas:
<https://blockly.games/>

Fuse Little Bits is also free and web-based <https://fuse.littlebits.com/builder>

Social share:

This morning attending #SEEC2025 virtually I learned about “Depot Caching Strategy” and so much more in “Mission Cognition: A Mission to Mars” by Iowa educators Ben Olsen and Ronald Reinhart! Check out my notes with links to their GREAT resources: <https://wfryer.me/seec2025>

A graphic with a dark blue space background filled with small white stars. On the left is a circular image of the planet Mars. To its right, the text "Welcome to: Mission to Mars" is written in large, white, sans-serif font. Below this, in a smaller white font, is "Red planet or bust!". In the top right corner is a square QR code. In the bottom right, there is a light blue rounded rectangle containing the text "**While you wait, please download the Blockly App" and a small icon of the Blockly app. At the bottom of the graphic, a white URL is followed by an arrow and text: "http://bit.ly/3Q8vTG3 ← Access to resource folder, or use the QR".

**Welcome to:
Mission to Mars**

Red planet or bust!

****While you wait, please
download the
Blockly App**

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Coding & Electronic Sensors for Space Exploration by Nathan W Tubbs

Slides for this presentation:

https://docs.google.com/presentation/d/19eeTNmss9e4ENzDLZgCvz7au5PJl57N718F0MP_SzbA/edit?usp=sharing

Coding for Human Spaceflight:

Free Resources to Teach Entry-Level Coding Skills

Nathan W. Tubbs
Auburn University, AL

Wifi: SCH-Private
Password: schsaturn

aub.ie/seec-coding-2025



About me...



Middle School Science Teacher, 16 years

SEEC Crew Member, Unity

JPL Solar System Ambassador

Space Foundation Teacher Liaison

Husband, Father, Pastor, USAF Reserve Chaplain



(ted)

BLUF

That's an Air Force acronym for "Bottom Line, Up Front"

- We want to teach our students about coding. It's an **essential** language and skill today.
- Physical materials are **expensive**.
- Post-Covid regulations involving sanitizing supplies can make clean-up, prep, and sharing in the classroom difficult.
- Today, we will learn about **FREE online resources** to help you teach your students about the practical value of coding and microelectronics.
- Then, we can make connections to the life support sensors used in spacecraft and on the ISS.

Coding is so essential today!

- some of the hardware (like Arduino) is EXPENSIVE to buy, sensors, computers, software, etc.
- can easily move into thousands of dollars

Nathan works for Auburn University, still with AF Reserve stationed at Cape Canaveral

Money and supplies are everything

So hard to get things done in the time restrictions of the classroom, so many restrictions

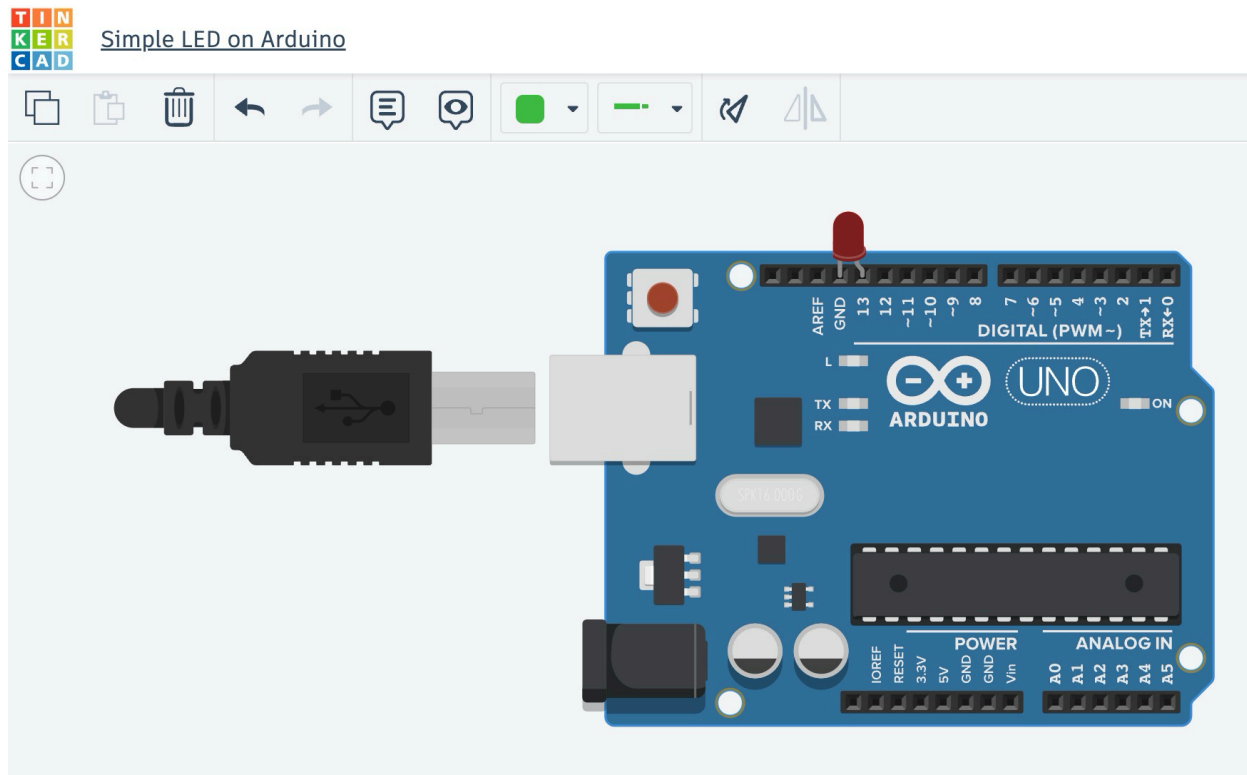
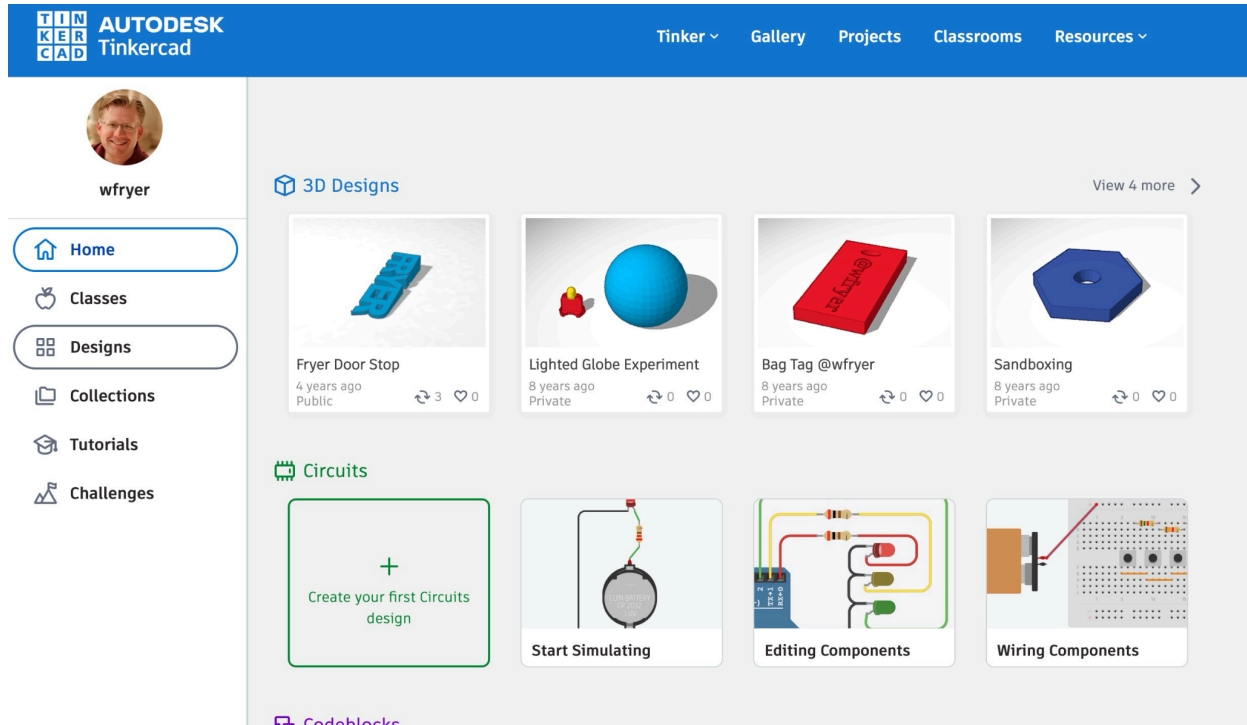
I want to share FREE online resources so you can build basic knowledge with your students

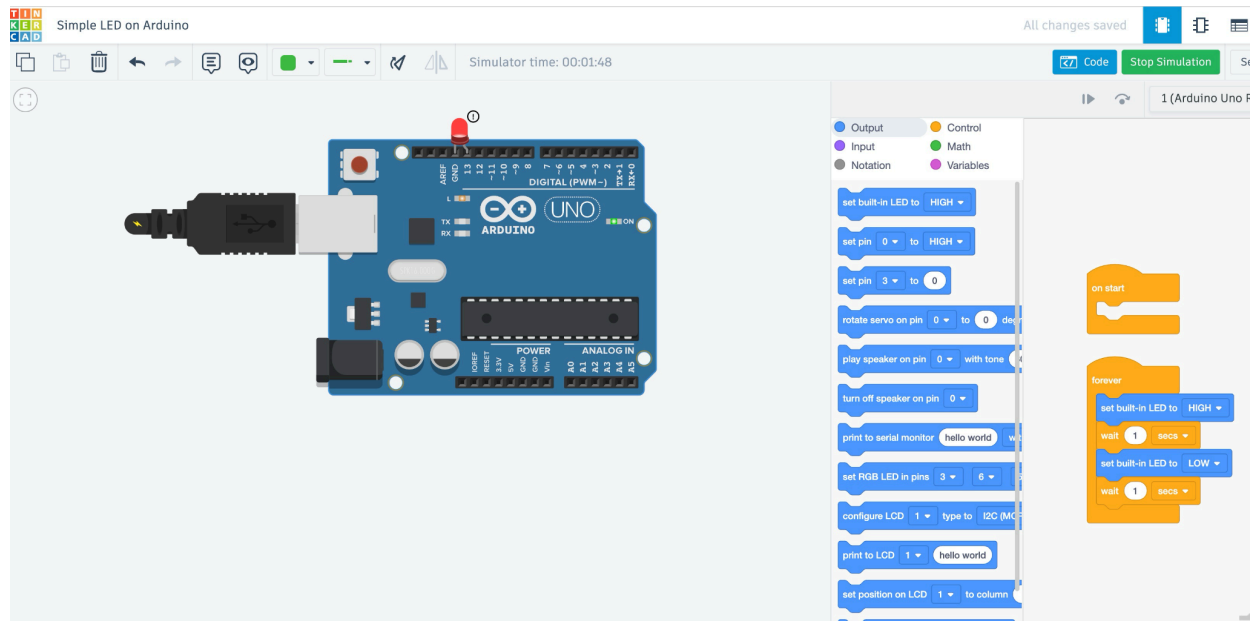
- have to get into Arduino to do high altitude balloons.... But where do you start?

Can you use different communicators where you can get realtime telemetry data from space, we won't get that deep today, but that is possible

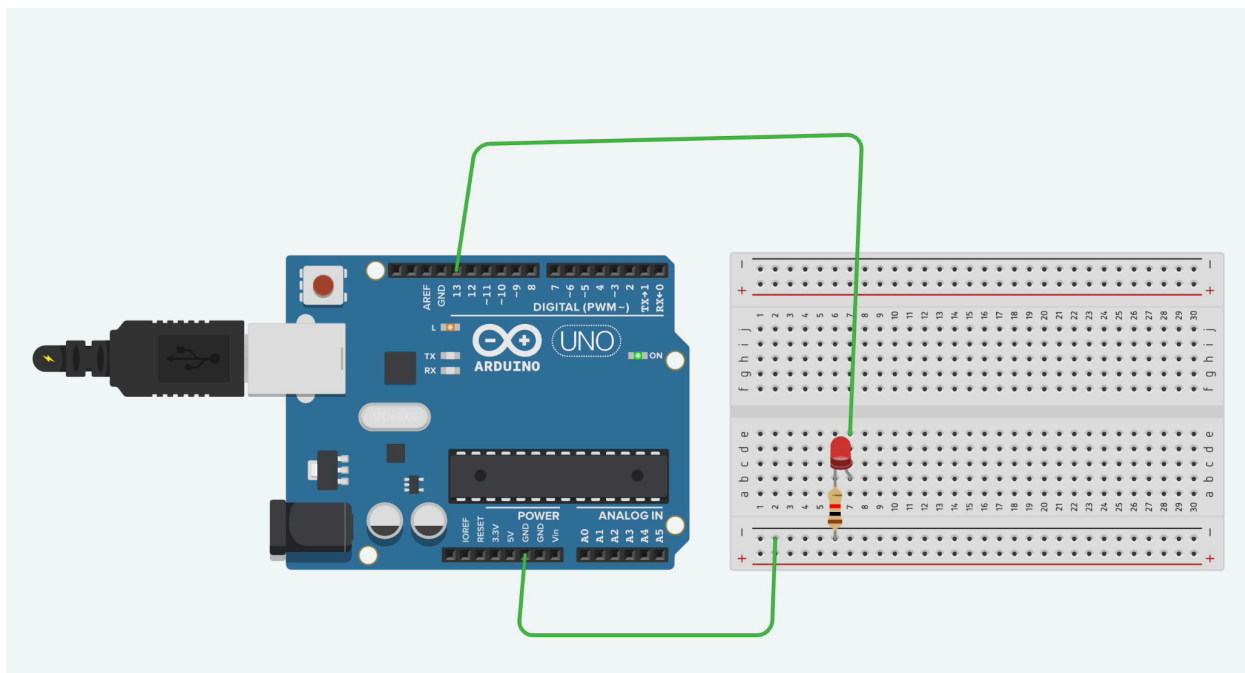
Start with TINKERCAD.com!

- personal accounts - sign in with GOOGLE! (don't click join)

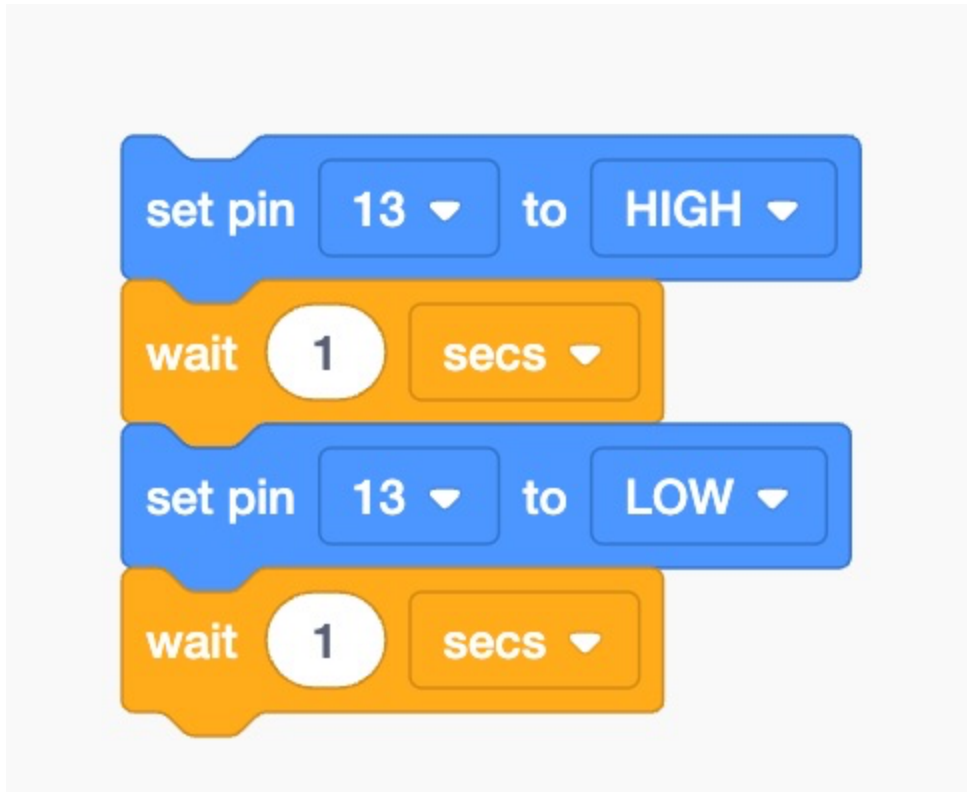




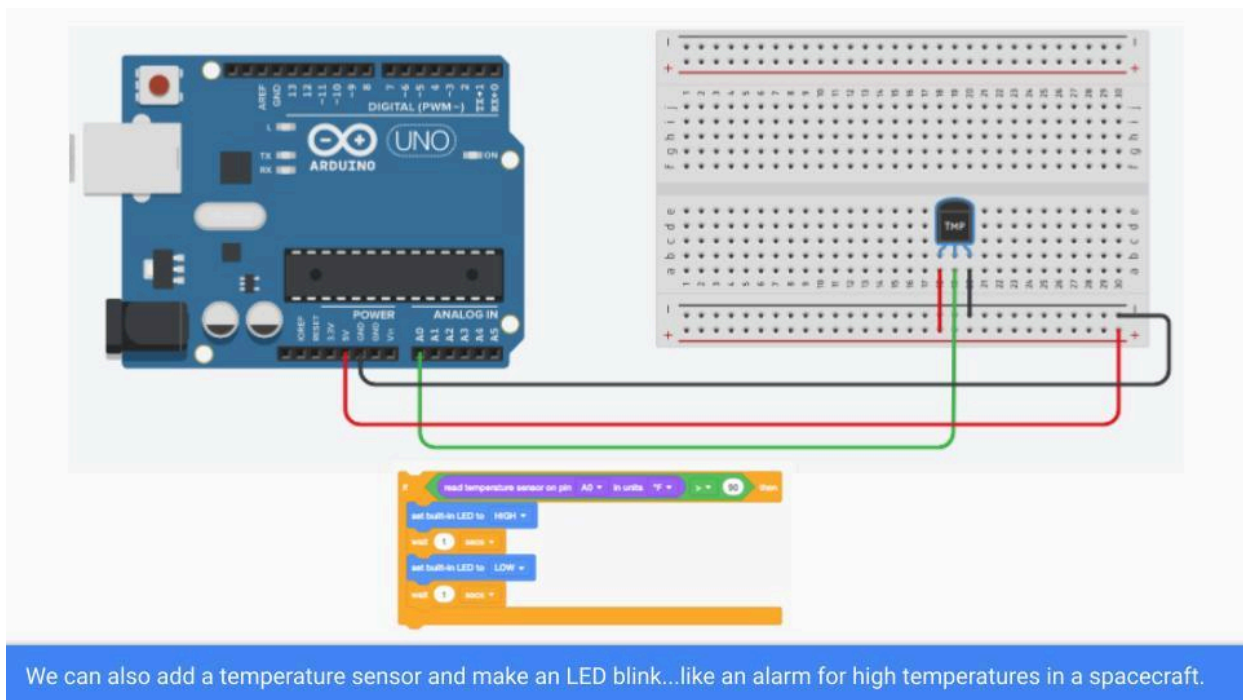
Drag a breadboard out.... Do the same connector via a resistor



I changed the code to match:



Next project: Making a temperature sensor:



We can also add a temperature sensor and make an LED blink...like an alarm for high temperatures in a spacecraft.

PocketLabs is GREAT but very expensive for K12 schools:

<https://www.thepocketlab.com/>

Contact info!

Connect with Me:

nathanwtubbs@gmail.com

Twitter/Instagram: @sciencenate





Friday Keynote- Lessons from Astronaut School
(Virtual Viewing only) - February 7, 2025, 8:00 AM
CST (1 hour)

Recording URL: <https://vimeo.com/event/4846413>

Powerful “teacher impact story” from astronaut Tony Antonelli

https://en.wikipedia.org/wiki/Dominic_A._Antonelli

“Individual teachers have HUGE impact”

Many people have chosen their career path because of a single teacher

Middle school is KEY to turn on students to STEM, especially science and math

Most important skills are all the things you learned in kindergarten

The job is really easy, being a good teammate and getting along, and Russian language! Those are key



Physics is so fun when you are in space!



“STEM-in-stations” on ISS

Wesley Fryer less than a minute ago



Can we ask questions to be shared? I'd like to hear them address what their experiences with a diverse crew aboard ISS were? How did having a diverse team change team dynamics?

(I asked this late in chat so it was not shared)