Project 3
Moon Phase Calendar

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Statement of Problem

I like astronomy, but I always forget which phase the moon is in

I wanted to create another desktop widget (like the Pomodoro timer), that uses the current date to fetch astronomy information with an API.

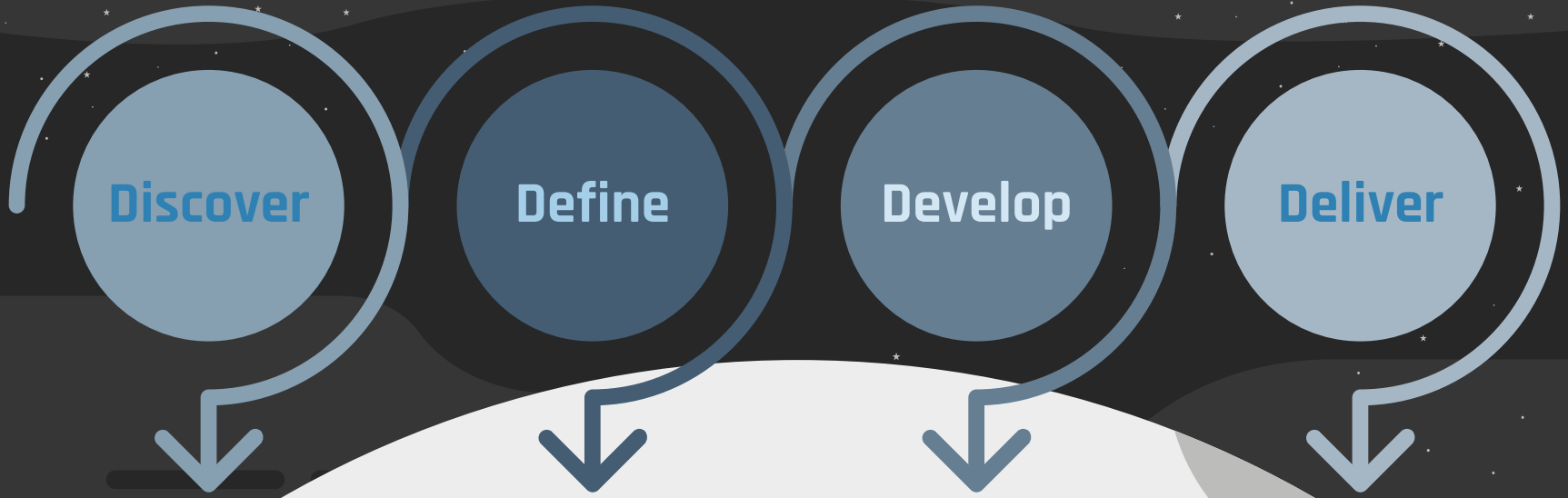
Why?

- I don't have to go look up the info online
- It's neat
- Would like a desktop calendar as well
- I always forget the names of the moon at that time

02

Design Process

Design Process: Double Diamond-ish



Always forgetting what day it is/what the moon phase is

How do I remember the phases of the moon?

Use an API to retrieve information

Desktop widget with rotary encoder to look at different days, side benefit as a desk calendar

03

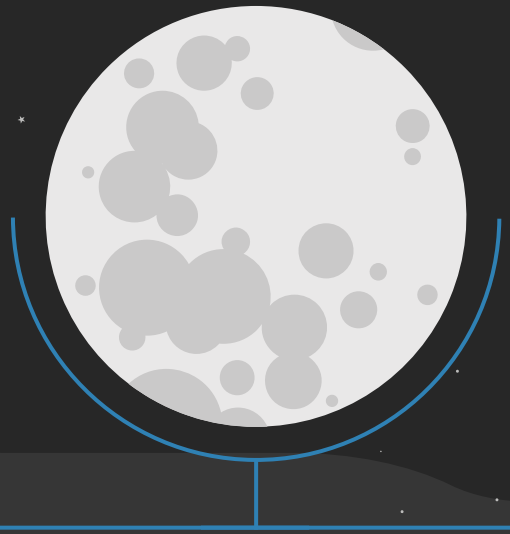
Design Result

Libraries Used

ArduinoJSON
For parsing JSON, did most of the heavy lifting

AiESP32RotaryEncoder
Removing debouncing, array range features

WiFiClientSecure
Used to secure connection to API

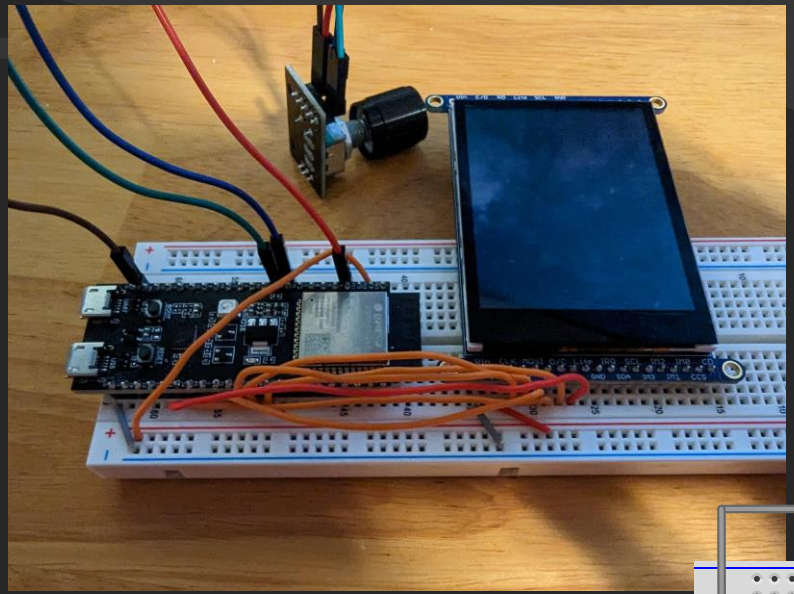


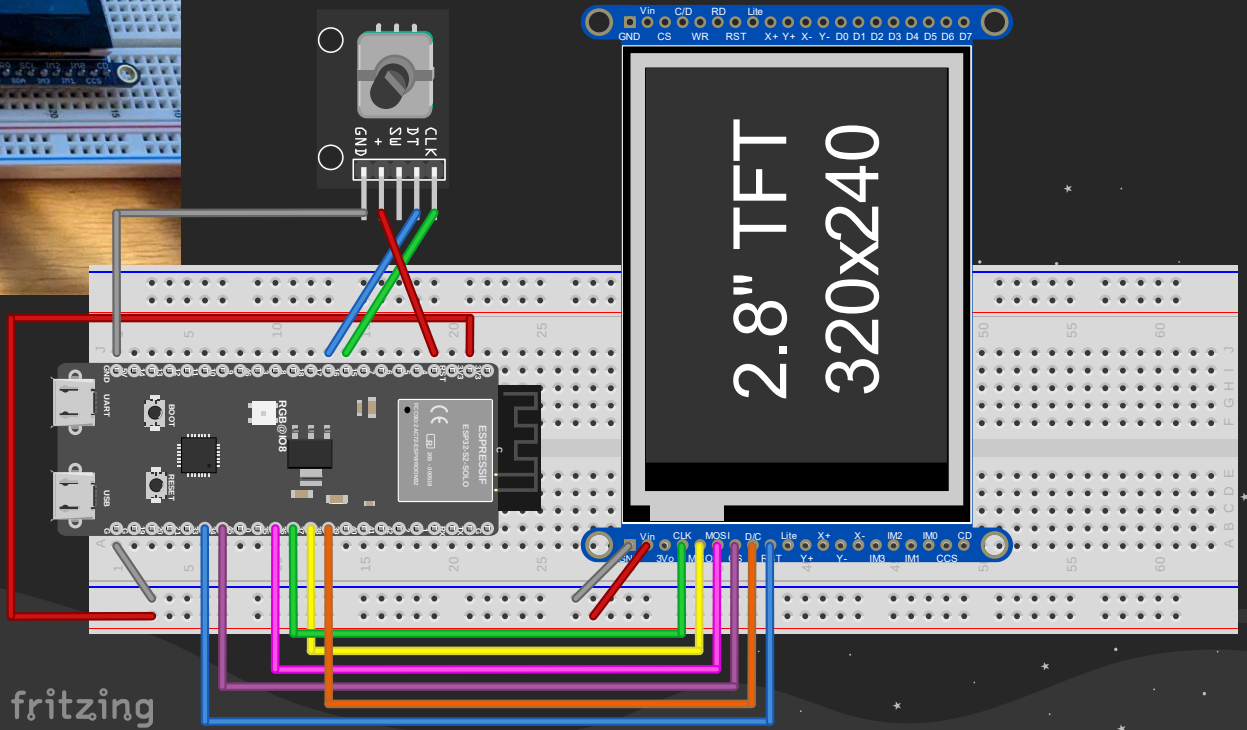
ctime.h
Converting from Unix Epoch time to a readable date format

time.h
Not to be confused with ctime.h, for retrieving local time

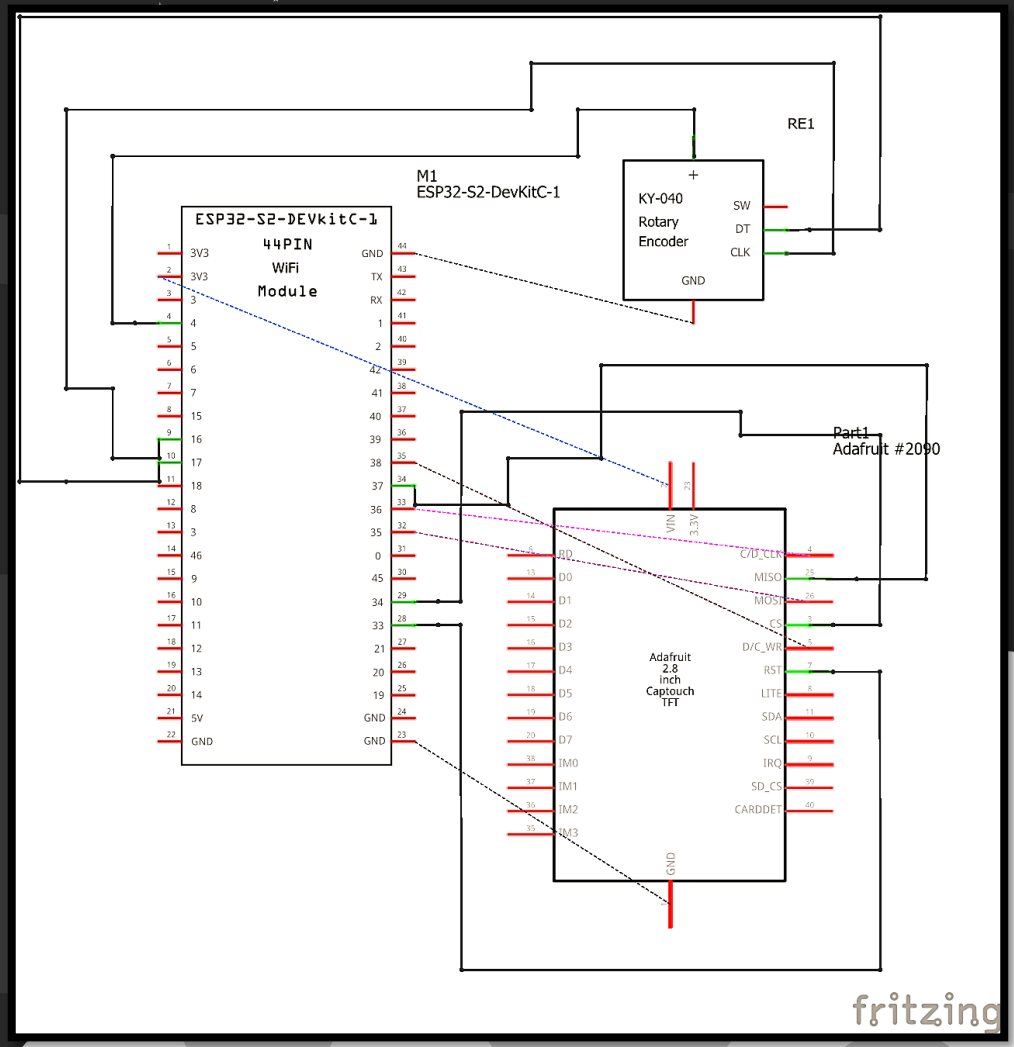
Arduino_GFX_Library
Graphics compatibility with the ESP32

Design Schematic

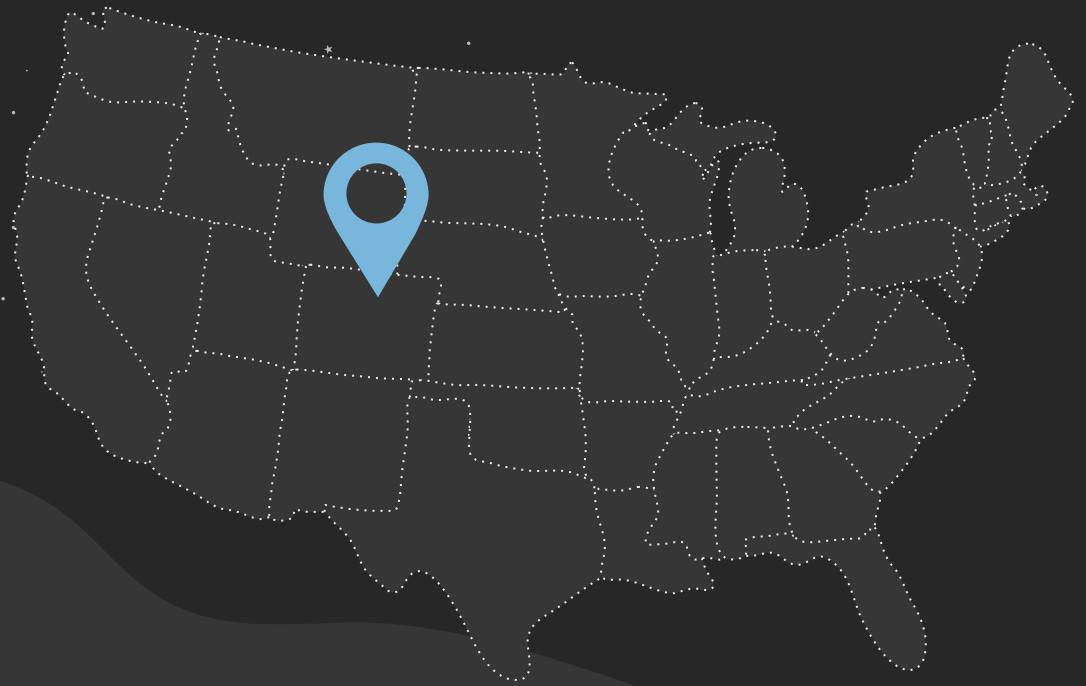




Circuit Diagram



Using the API



Farmsense.net API

Had exactly everything I needed

Uses Unix Epoch Time format

configTime uses time servers to calibrate time and returns the Epoch time to pass to API

Returns a whole bunch of headers

Used Index, Phase, and “Moon”

04

Demonstration

05

Hurdles and Accomplisments

HURDLES

Coming up with a problem to solve

Attempt to interface with AstronomyAPI

Kind of a disaster and spent far too much time on it

Pivot from AstronomyAPI to farmsense.net

Eventually had enough and went with an easier-to-use API

Figuring out ArduinoJSON

Almost gave up a couple times

Encoding Characters to Moon Phases

Used a font to represent moon phases

Accomplishments!

Displaying correct date on screen

The rotary encoder library helped here

ArduinoJSON

Finally getting it to work

Using an API with a microcontroller

Actually really fun and interesting

Using a font to represent moon phases

Figured that using a font would take up less room in storage than bitmaps

SOME FACTS ABOUT THE MOON

Moon Gravity

The Moon's gravity is about 1/6th the one here

384,400 Km

Is the distance from the Earth to the Moon

27.3 Days

Time it takes to complete one full orbit around the Earth

1,764,401 Km

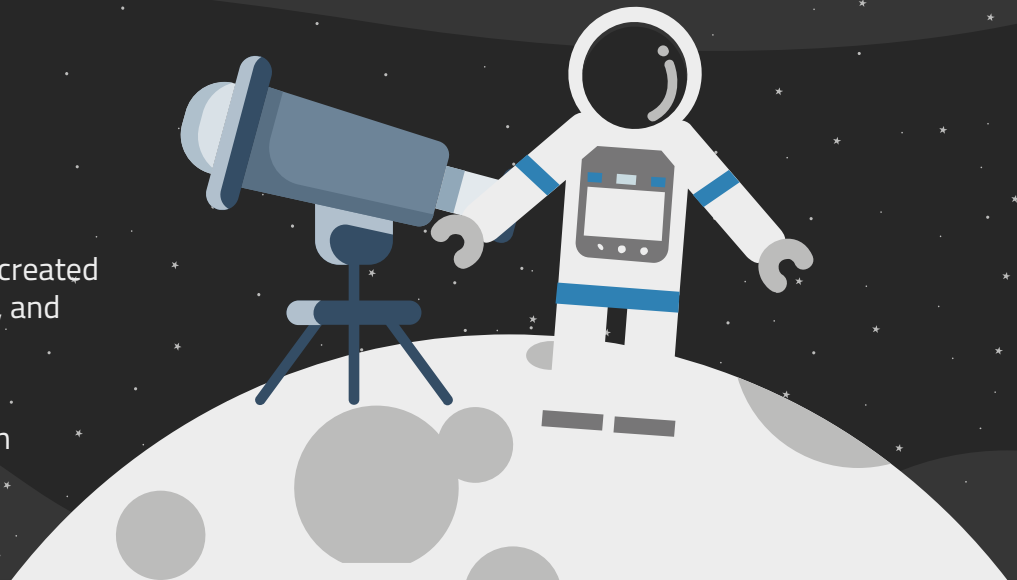
Is the total distance Apollo 11 traveled

1,022 Km/s

Is the Moon’s average orbital speed

THANKS!

Have any questions?



RESOURCES

Photos

- Galaxy night panorama
- Galaxy night view
- Portrait of female scientist in the lab
- Portrait of young man scientist

Vectors

- Great flat moon phases
- Coronavirus concept 2019-ncov and scientist
- Classic astronaut character with flat design
- Classic astronaut character with flat design II
- Classic astronaut character with flat design III
- Classic astronaut character with flat design IV
- Classic astronaut character with flat design V
- Colorful space badge collection with flat design

Icons

- Rocket Launch Icon
- Astronaut Icon
- Start-up Icon
- Space Capsule Icon
- Personal Space Icon
- Orbit Icon
- Planet Earth Icon
- Gravity
- Distance
- Shuttle
- Planet
- Jupiter
- Sun