My Scenic Companion

Using Scenic with Nerves to create
some fun automation for everyday use

Jason Axelson (@bostonvaulter)
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About me

- Developing in Elixir professionally since 2016
- ElixirLS Core Team member since 2019
- Also help maintain a few other projects

@axelson on GitHub

@bostonvaulter on Twitter

Professional Yak Shaver

About me

Senior Software Engineer at Felt

We're hiring Elixir Developers!

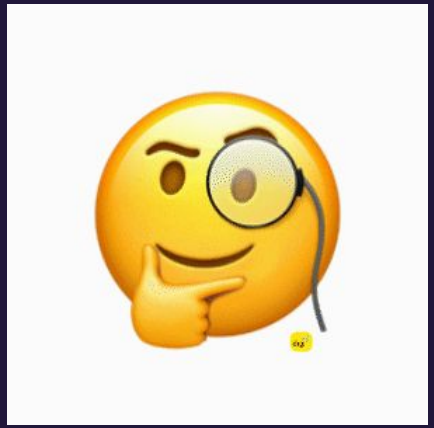
felt.com

@felt on Twitter

ElixirConf 2018

- My first ElixirConf!
- Lots of great talks
- Met people from the community
- Attended an awesome Nerves training
  - Received Raspberry PI 3B+ and a touch screen
- Witnessed the release of Scenic
  - A Graphical Framework for Elixir

The Possibilities



When I got home I kept thinking about what I was going to build with my RPi?

So I started thinking of “problems” to solve

But first,
a confession

Problem 1:
It’s hard to pause my music

- I use pianobar — a command line client for Pandora.com
- I also use multiple computers with a single keyboard and mouse

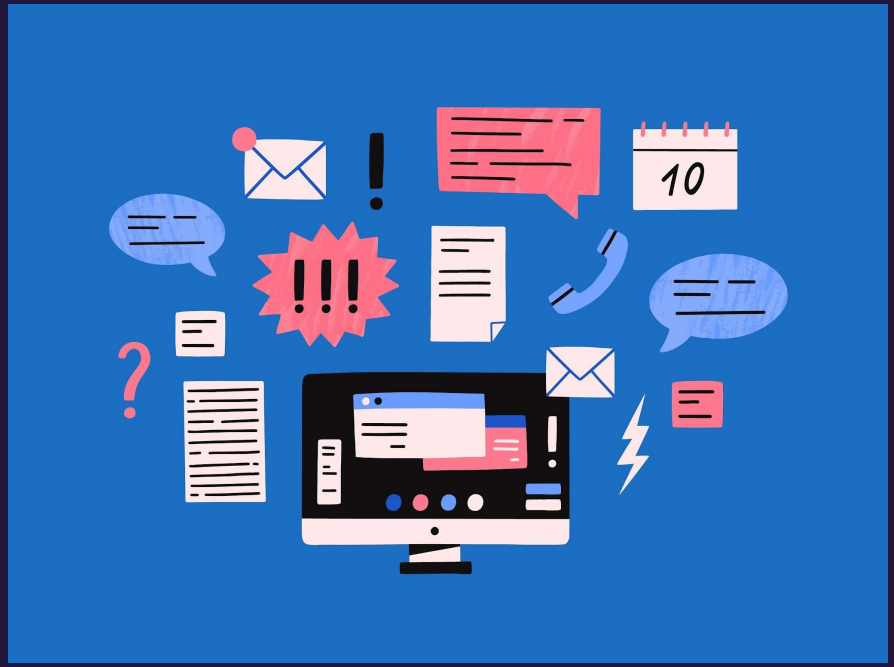
Problem 1:
It's hard to pause my music

My desktop is often a mess

=

Hard to pause command line music player

Problem 2:
My day is not structured enough



Problem 2:
My day is not structured enough

I like the Pomodoro Technique

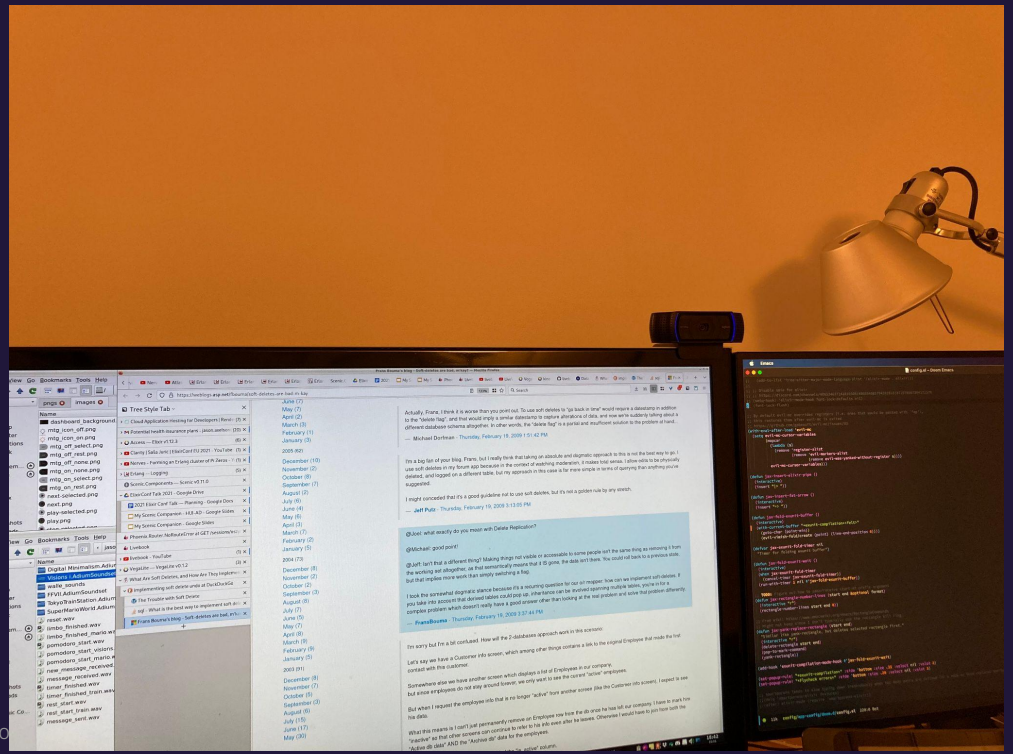
Problem 2:
My day is not structured enough

But I don’t like any Pomodoro Timers

Problem 3:
My “coworker” doesn't know when I’m in a meeting

Problem 3:
My “coworker” doesn’t know when I’m in a meeting

Can *you* tell if my camera is on?



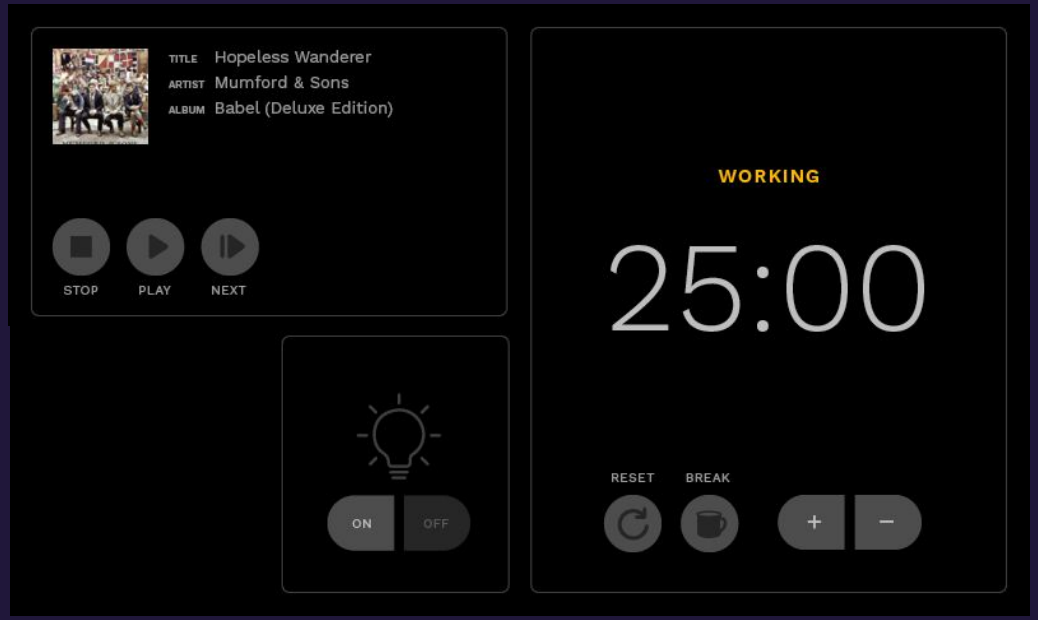
Solution: Build My Scenic Companion

Solutions:

1. Pianobar Interface

2. Pomodoro Timer

3. Meeting Indicator Light



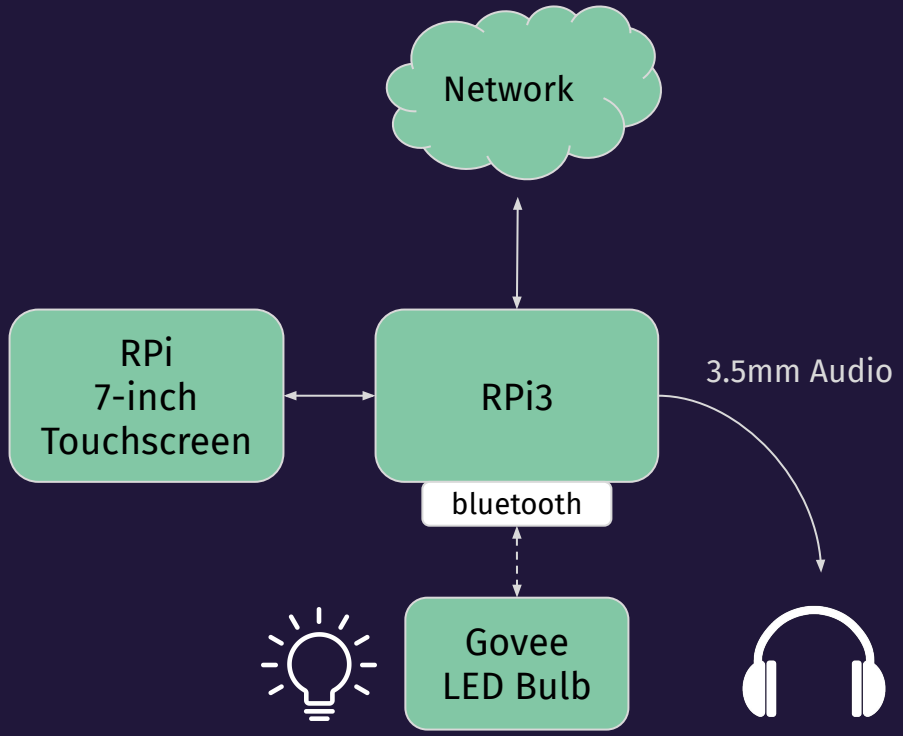
So what? Why build this?

- It’s empowering to build software for yourself
- Less context switching
- Elixir is a good platform for home automation
- I had the hardware so may as well do something with it

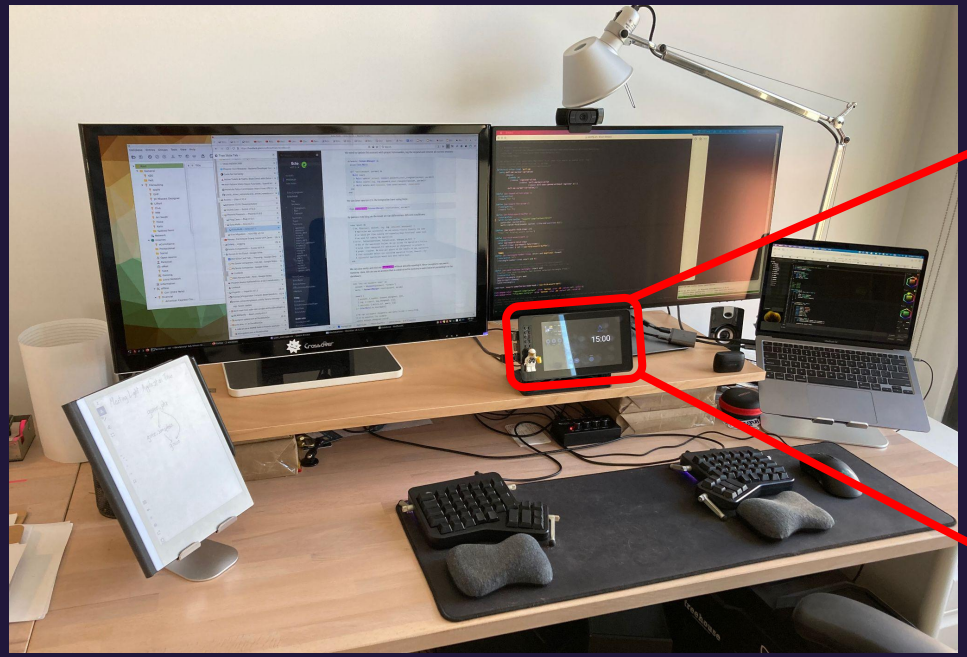
Hardware Diagram

Hardware:

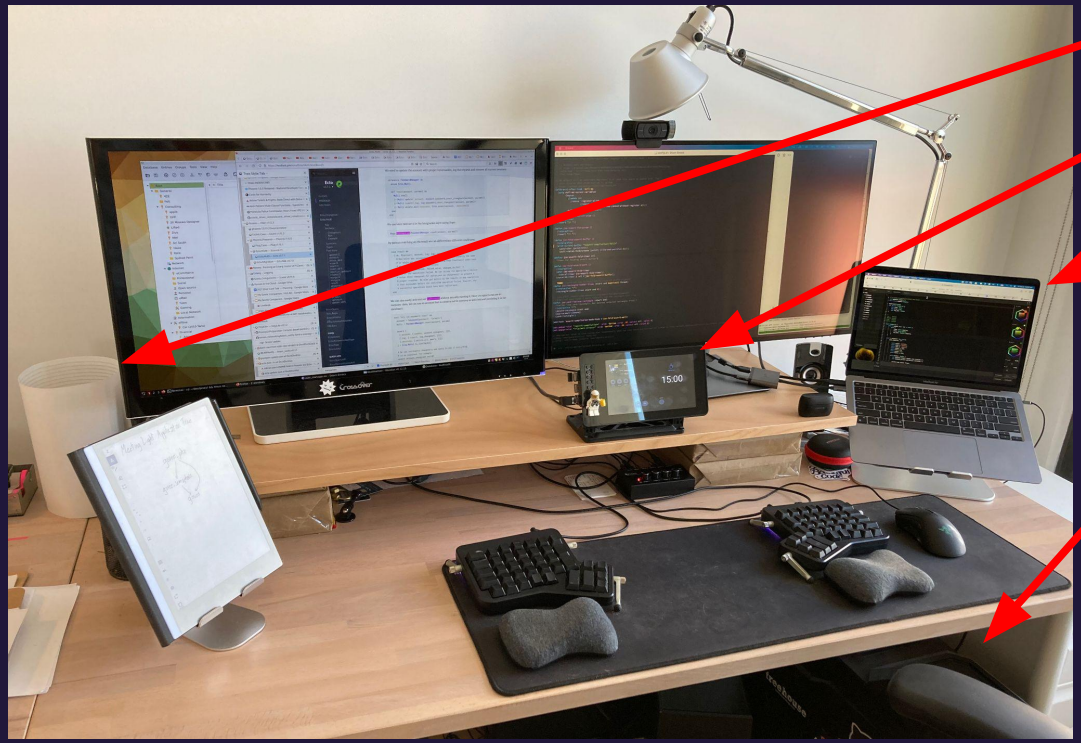
- RPi 3B+
  - Built-in bluetooth module
  - Govee LED Bulb
- Official RPi 7-inch touchscreen



Where does it live?



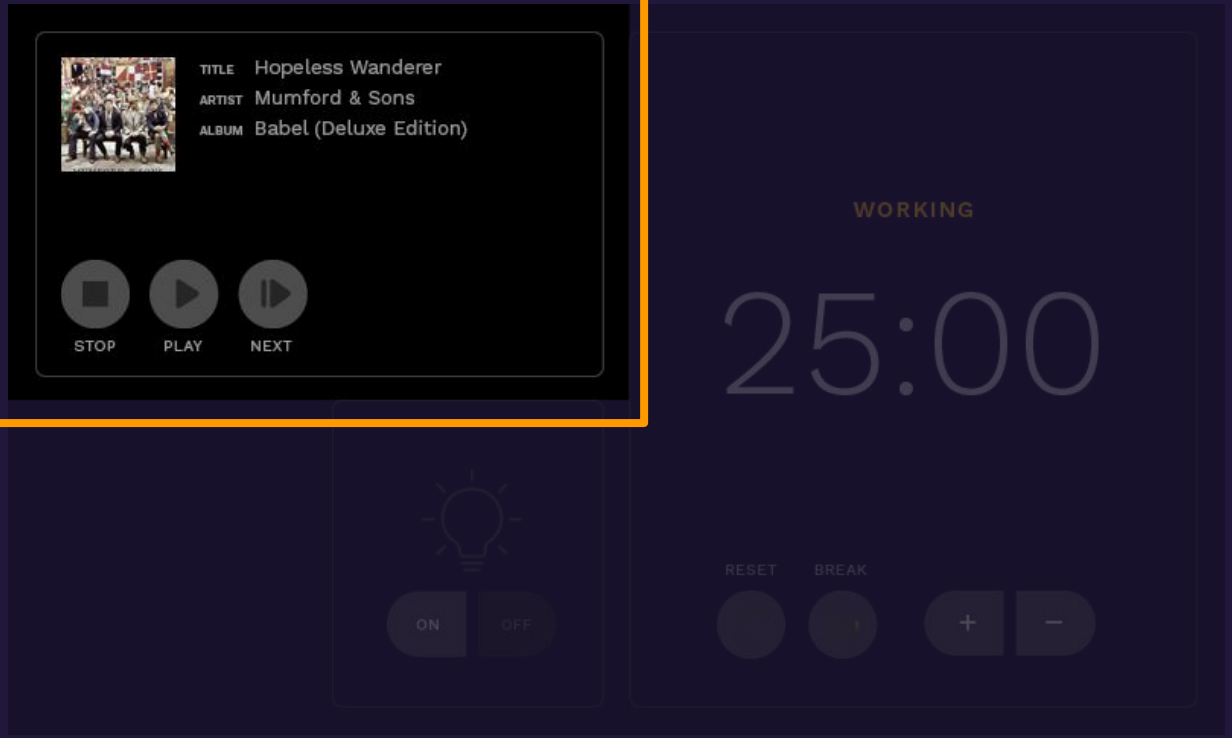
How does this fit into my overall home office?



Not pictured: the huge mess of wires under my desk

SOLUTION 1

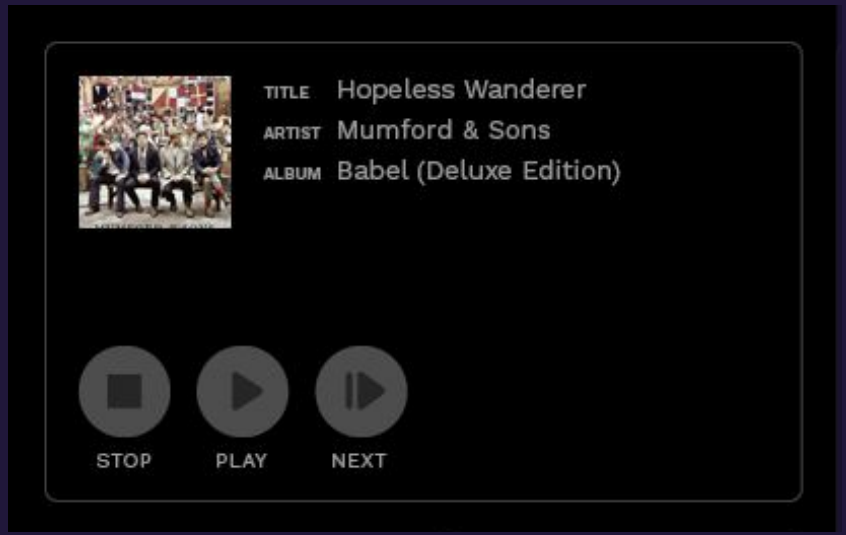
Pianobar Interface



SOLUTION 1

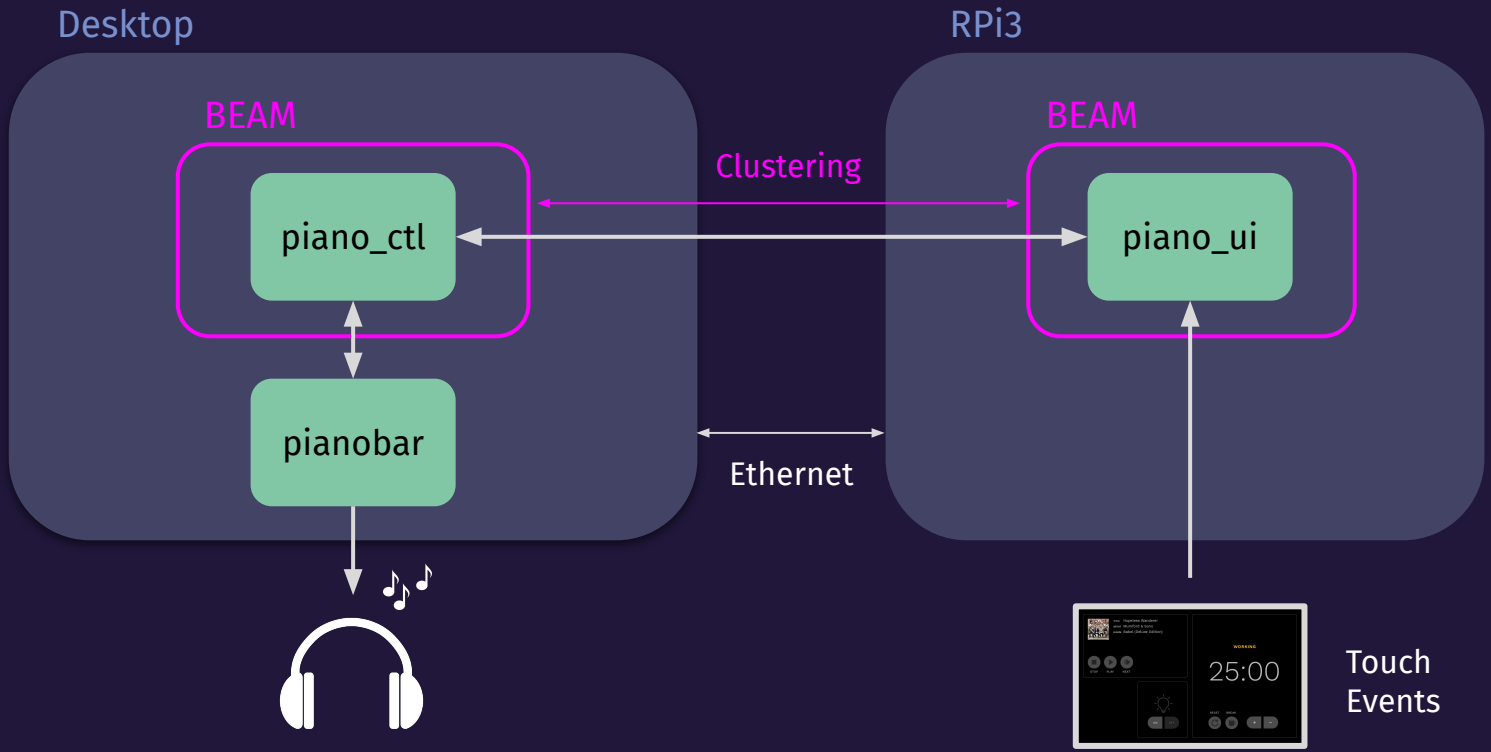
Pianobar Interface

- Controls
  - Stop, Play, Next
- Interfaces Pianobar command line client



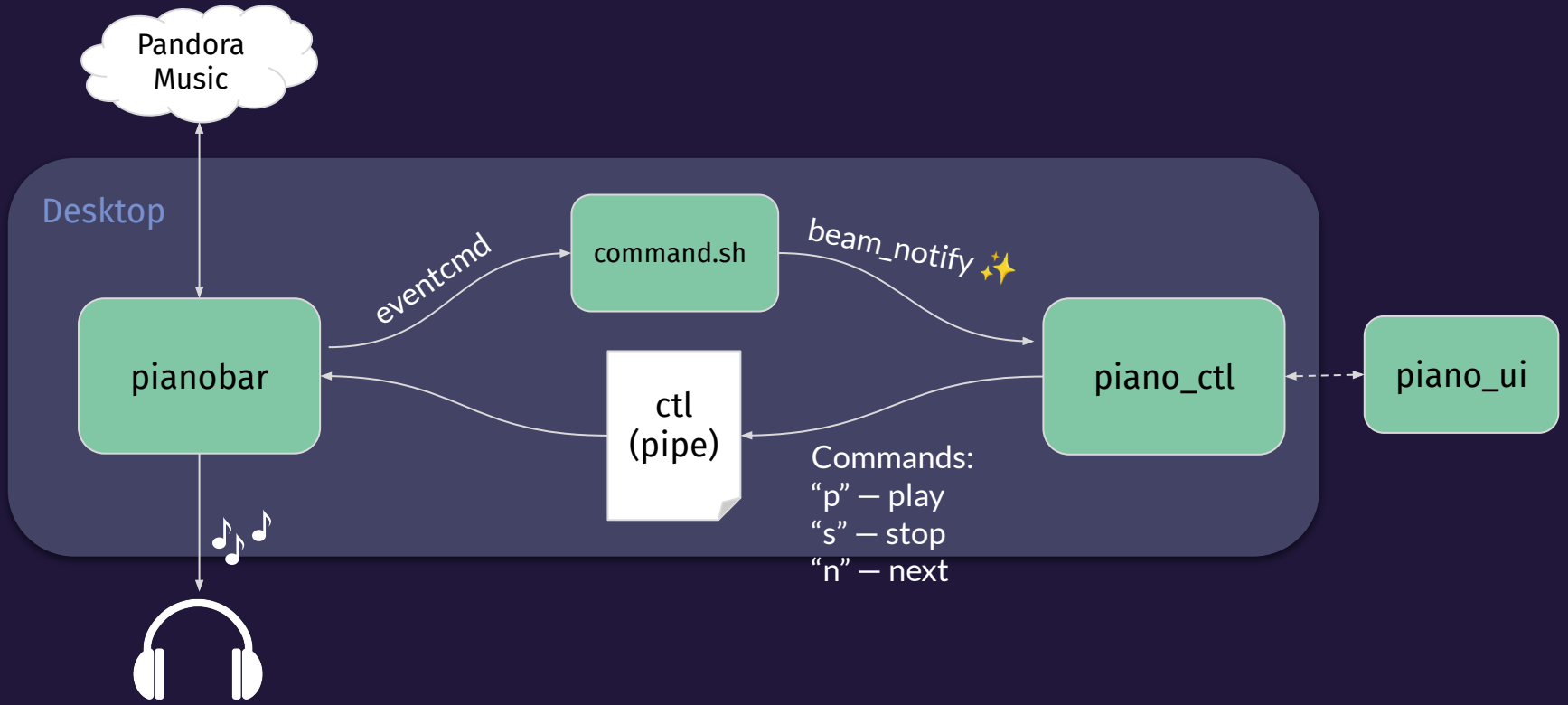
SOLUTION 1

Pianobar Interface



SOLUTION 1

Pianobar Interface & ctl



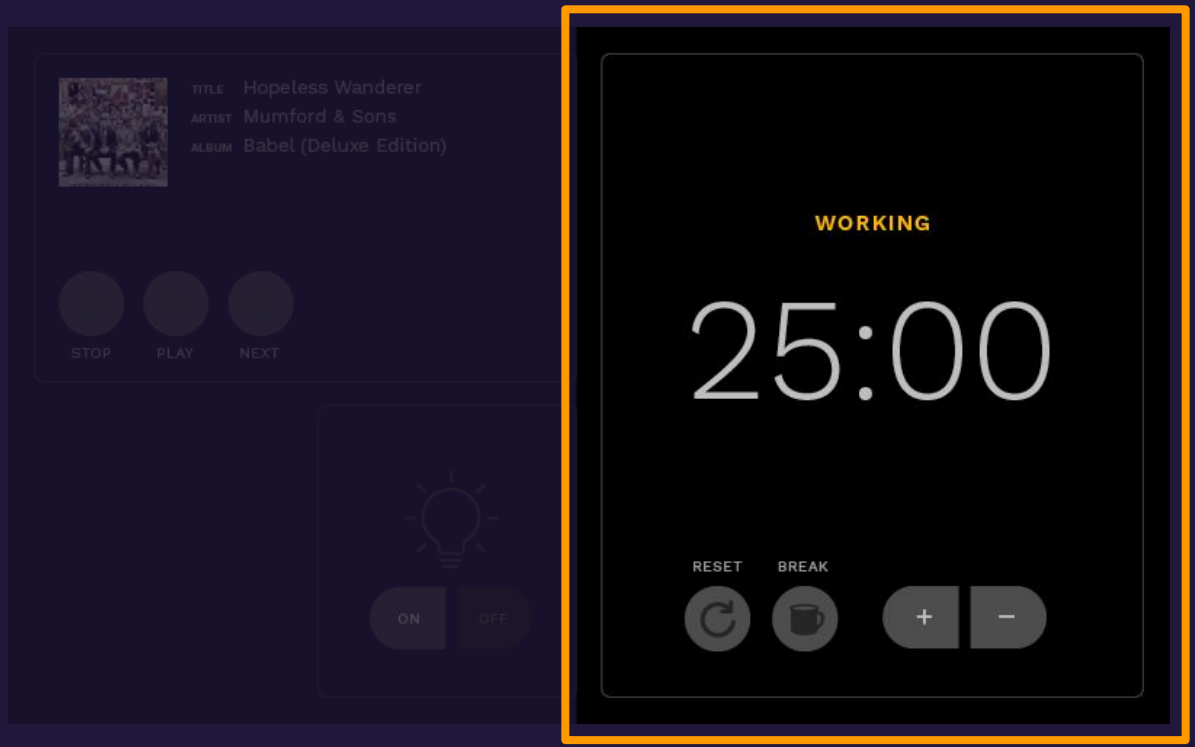
SOLUTION 1

Pianobar Interface: Interesting Code

- `PianoUi.Scene.Dashboard`
- `ScenicContrib.IconComponent (in launcher)`
- `PianoUi.FileCache`

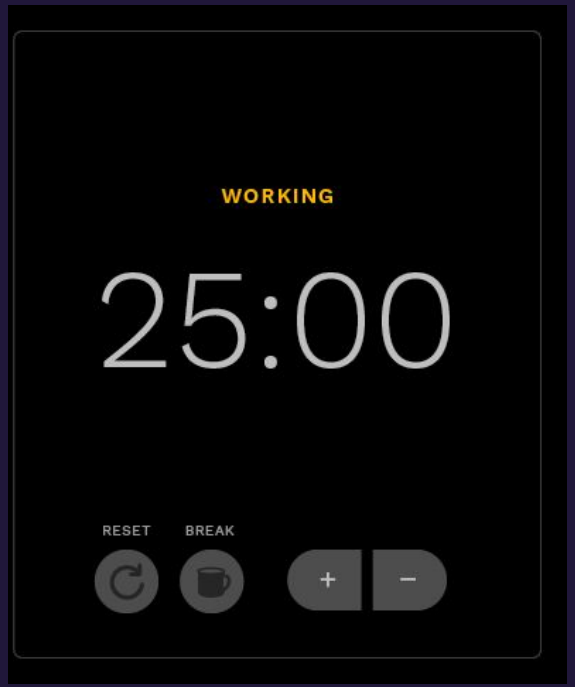
SOLUTION 2

Pomodoro Timer



SOLUTION 2

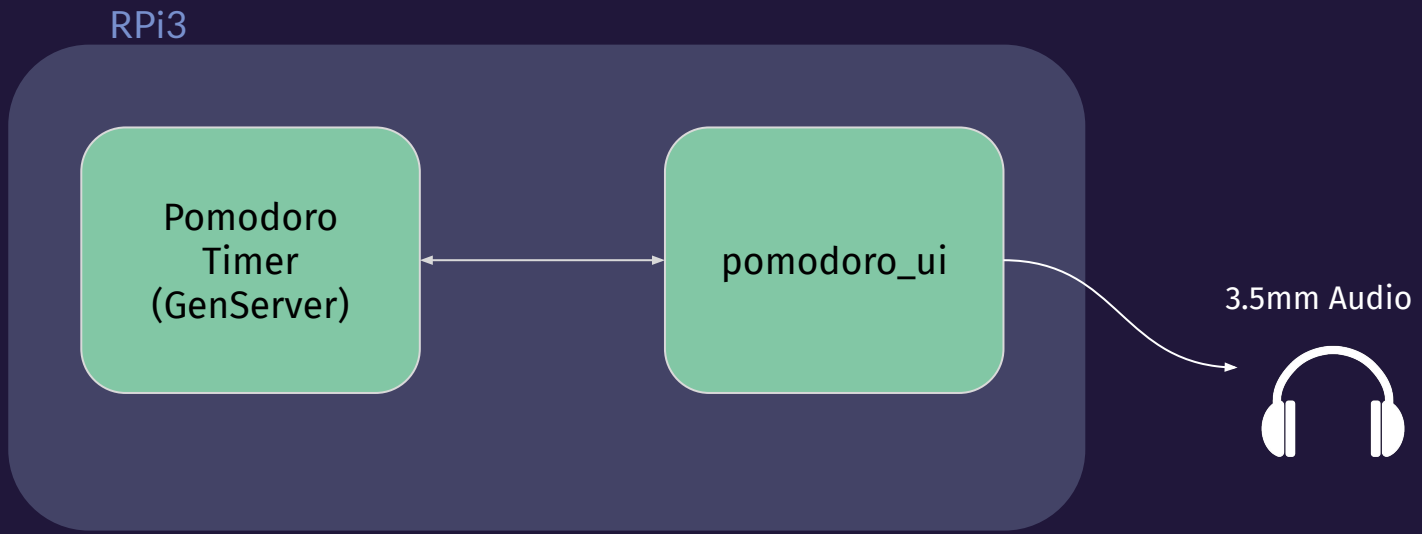
Pomodoro Timer



- Configurable on the fly
- 25 minutes on, 5 minutes rest
- Limbo mode
- Reminds me to take regular breaks
- Plays sounds for transitions
- Logs to an sqlite database

SOLUTION 2

Pomodoro Timer: System Diagram



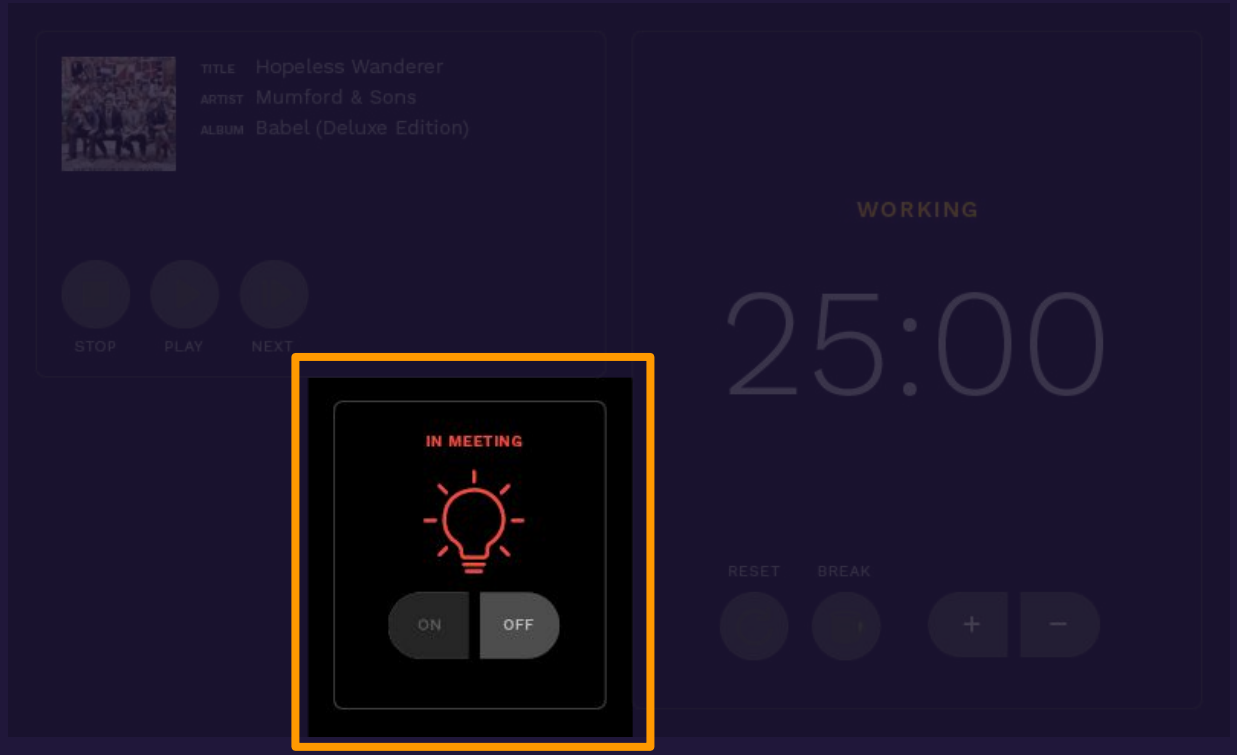
SOLUTION 2

Pomodoro Timer: Interesting Code

- `Pomodoro.SoundPlayer`
- `ScenicUtils.ScenicRendererBehaviour`
- `Pomodoro.PomodoroTimer`

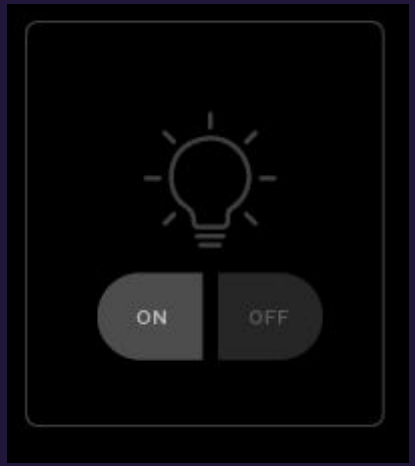
SOLUTION 3

Meeting Indicator Light



SOLUTION 3

Meeting Indicator Light



Light is off

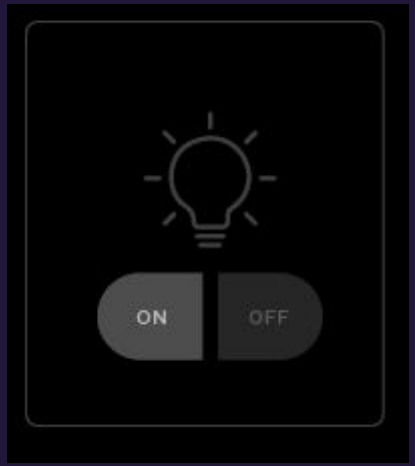
SOLUTION 3

Meeting Indicator Light

The Meeting Light
lets my “co-worker”
know that
I'm on a call

SOLUTION 3

Meeting Indicator Light



When I finish a call,
I turn the light off.

It flashes green then
fades off.

SOLUTION 3

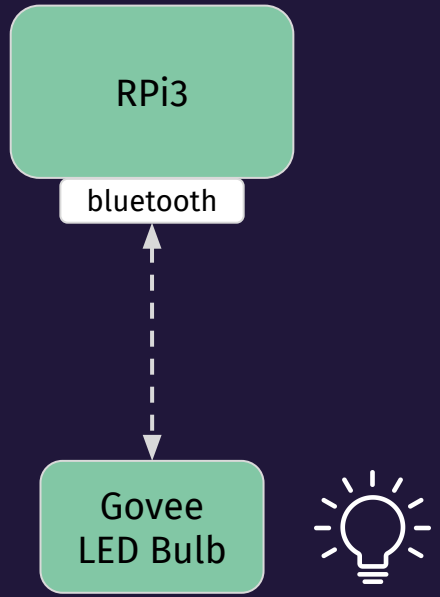
Meeting Indicator Light: Diagram

Hardware:

- RPi 3B+ Built-in bluetooth module
- Govee H6001 LED light (~ $13)

Uses the Blue Heron library

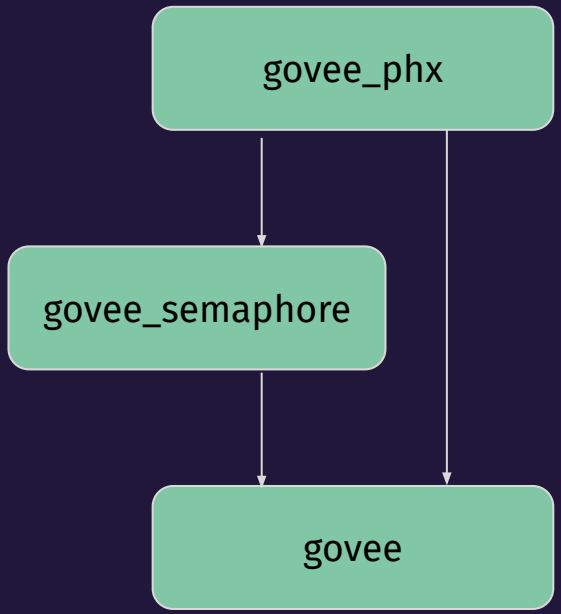
- Supports BLE (Bluetooth Low Energy)
- Originally created by SmartRent



See also: https://github.com/livebook-dev/nerves_livebook

SOLUTION 3

Meeting Indicator Light: Applications



Composed of three applications:

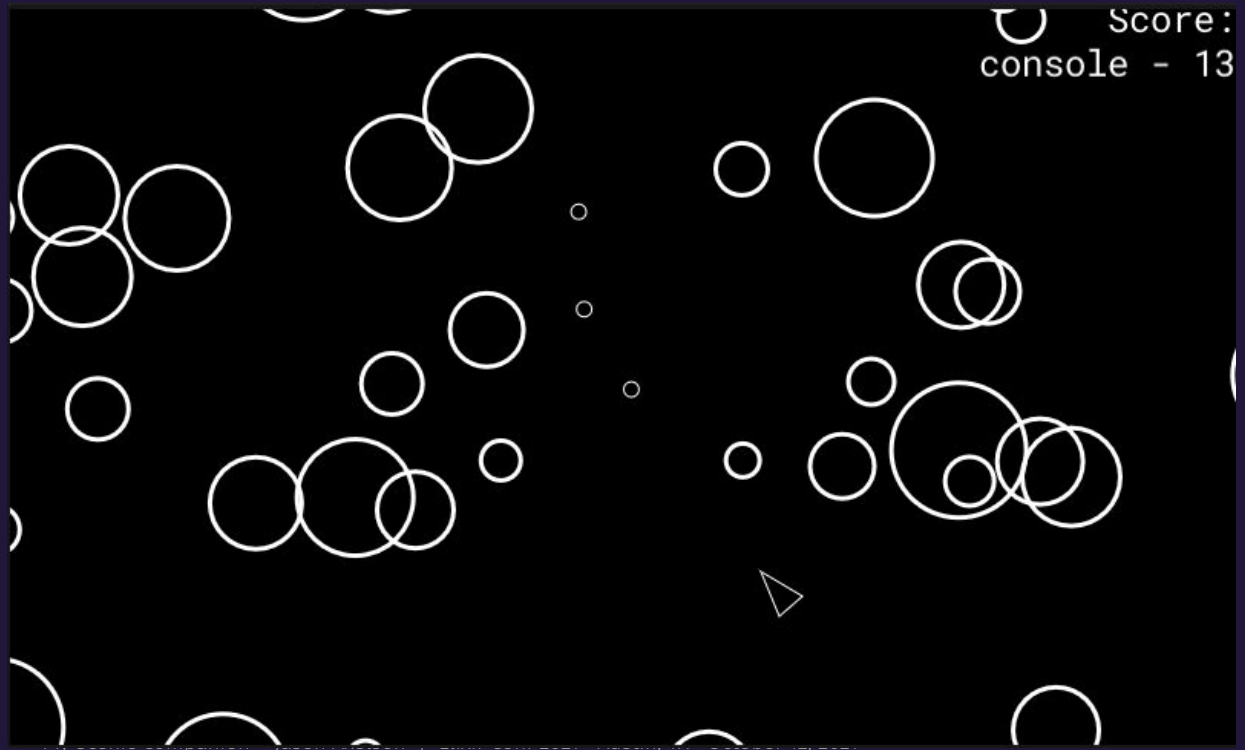
- govee_phx: Phoenix Interface
- govee_semaphore: Controls timing and colors
- govee: low-level library to communicate with the light

SOLUTION 3

Meeting Indicator Light: Interesting Code

- `Govee.ShadesOfWhite`
- `Govee.CommonCommands`
- `GoveeSemaphore.Server`

Bonus: Asteroids!



- No practical use

Bonus: Nerves Livebook!

Yes, it is running on my device alongside everything else!

http://livebook.nerves.jaxlsn.com
(sorry, this address won't work for you)

See also: https://github.com/livebook-dev/nerves_livebook

About Scenic

- Built by Boyd Multerer
- Released during ElixirConf 2018 (I was there!)
- Targets IoT and desktop devices that require interfaces
- Will be part of Kry10 Operating System
- Currently undergoing a large v0.11 update/rewrite

Why is Scenic cool?

MY BELIEF:

As developers we should have other options to build interfaces besides web-based technologies.

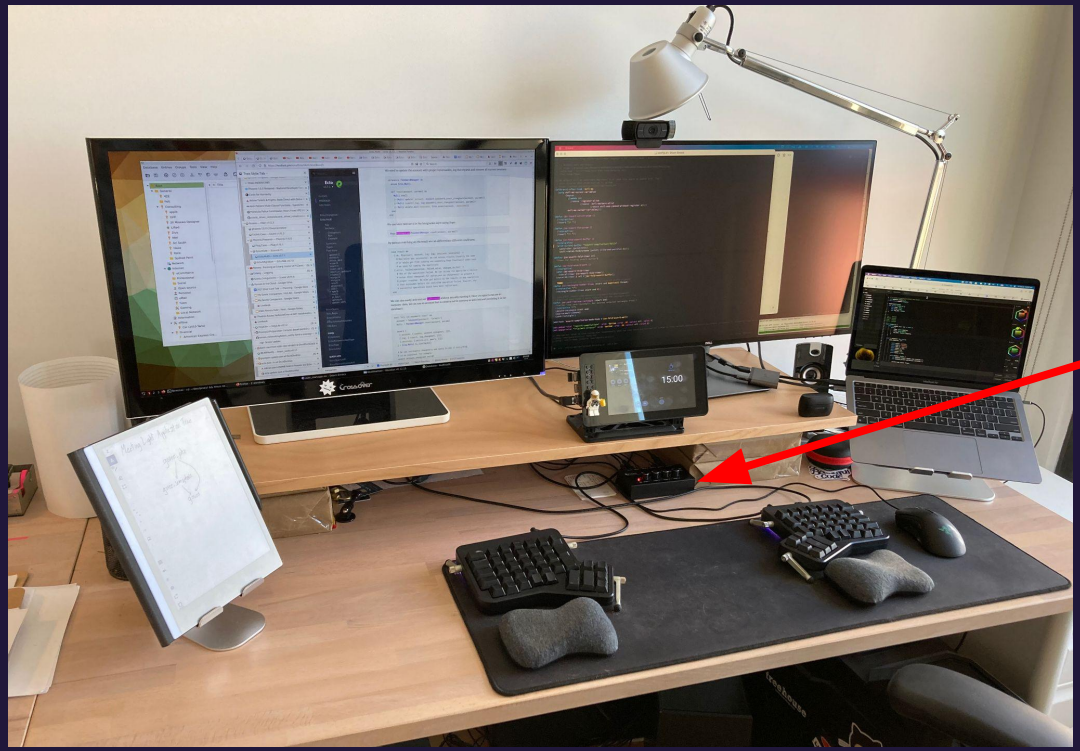
Why Scenic?

- Scenic + Nerves size < Electron minimum size
- Scenic is robust against errors and provides nice primitives
- Scenic helps you build composable UI's

*Note: Scenic + Nerves is an **entire** operating system*

There was a suspicious number of arrows pointing at your headphones

Audio Setup



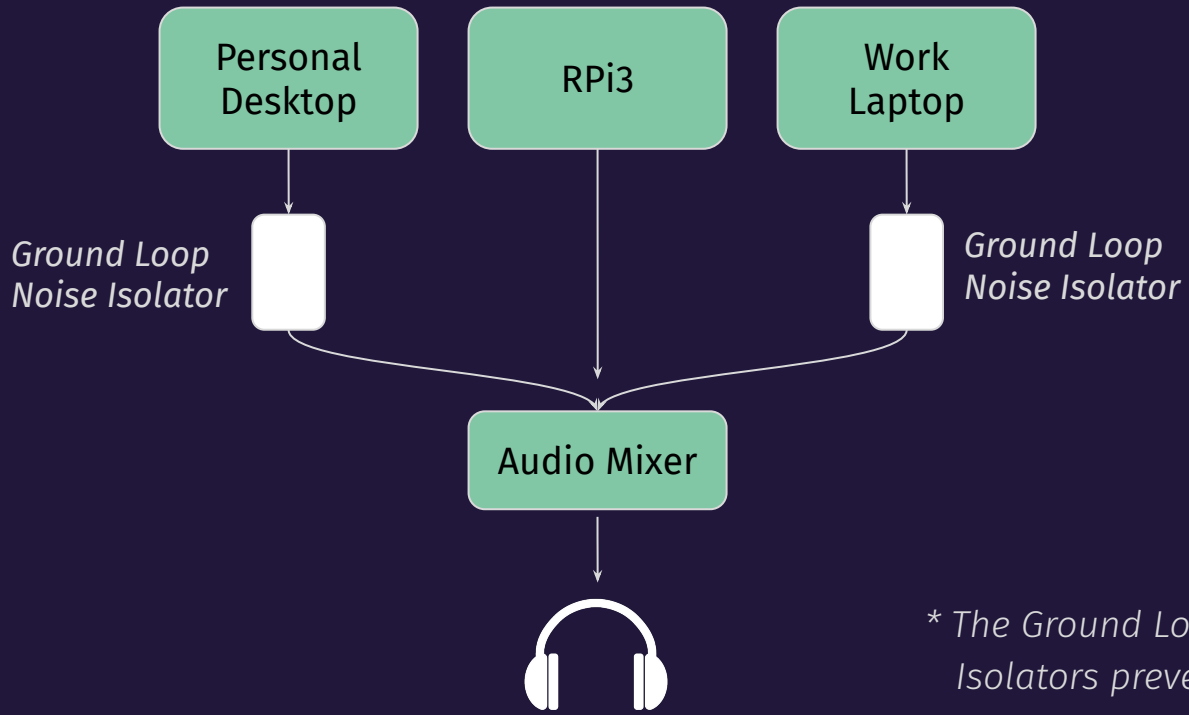
Audio Setup

4-Channel Line Mixer

I love analog interfaces!

Overkill? Who cares?

My Audio Hookups



** The Ground Loop Noise Isolators prevent static noise*

Recap

- I had fun building software using hardware I had on hand
- Improved workflow: less context switching
- I use it every day

Challenges

- Can be a lot of work to manage the mess of dependencies
- All applications must run on a single BEAM instance
  - Therefore only one version of each library can be used (e.g. Phoenix)
- Managing Elixir configuration across many repositories is a chore

Future Work

- Auto-sleep the screen
- Auto-pause music after no interaction for X hours
- Shared state for piano_ctl/piano_ui
  - instead of ad-hoc messages
- Come up with an excuse to use Membrane

My Scenic Companion Can Become Your Scenic Companion

These are all the repos

- https://github.com/axelson/scenic-side-screen
- https://github.com/axelson/piano_ex
- https://github.com/axelson/pomodoro
- https://github.com/axelson/govee
- https://github.com/axelson/govee_phx
- https://github.com/axelson/govee_semaphore
- https://github.com/axelson/scenic_launcher
- https://github.com/axelson/scenic_asteroids
- https://github.com/axelson/scenic_live_reload

It's all opensource

Libraries Used - Thank You Maintainers!

- **Scenic** — Primary graphical interface library
- **Nerves** — Runs the BEAM on the RPi
- **blue_heron** — Bluetooth Low Energy (BLE) to control Govee light
- **beam_notify** — Receive the pianobar eventcmd output and read into the BEAM
- **ecto_sqlite3/exqlite/ecto** — SQLite database to track Pomodoros
- **finch** — Fetch Pandora album art
- **Phoenix** — Web interface for GoveePhx and LiveBook
- **sched_ex** — Timing loop for Asteroids
- **pid_file** — used in pianobar eventcmd script to check if piano_ctl is running
- **muontrap** — Calls aplay to play sounds for pomodoro
- **vega_lite and Kino** — Creates graphs in Livebook
- **boundary** — Helps to define boundaries between areas
- **credo** — Enforces styles
- **master_proxy** — serve multiple Phoenix applications on the same port

Thank You!

Questions?

This is the launcher screen

This is driven by code!

```
config :launcher,
  scenes: [
      {"piano_ui", "Dashboard", {PianoUi.Scene.Dashboard, []}},
      {"pomodoro", "Pomodoro", {PomodoroUi.Scene.Main, []}},
      {"asteroids", "Asteroids", {Play.Scene.Splash,
Play.Scene.Asteroids}}
  ]
```

The offsets for each button are dynamically calculated