

Don't Be Afraid of the Kernel

From problem to mainline patch

Linux Days 2026

Kryštof Černý

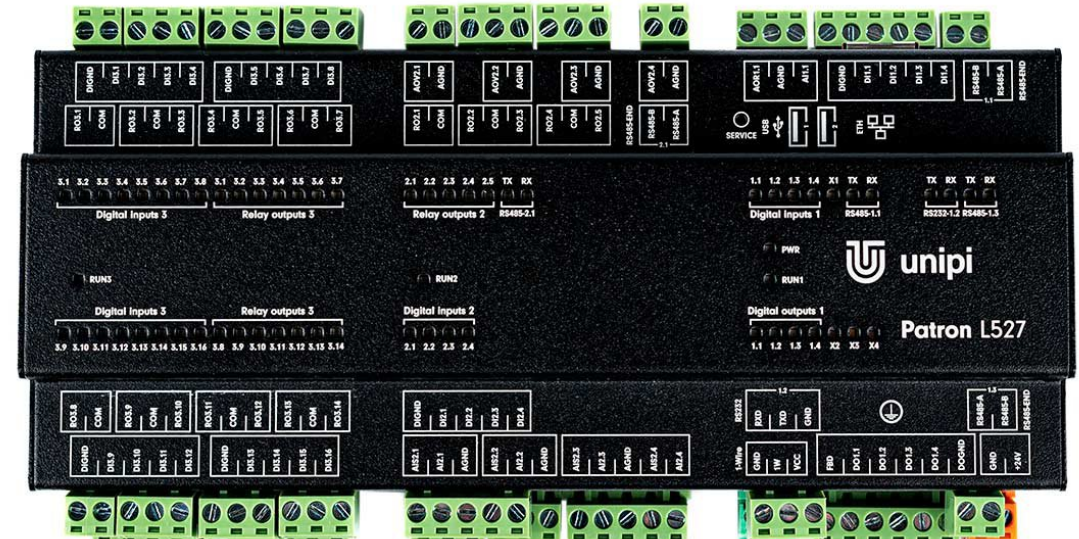
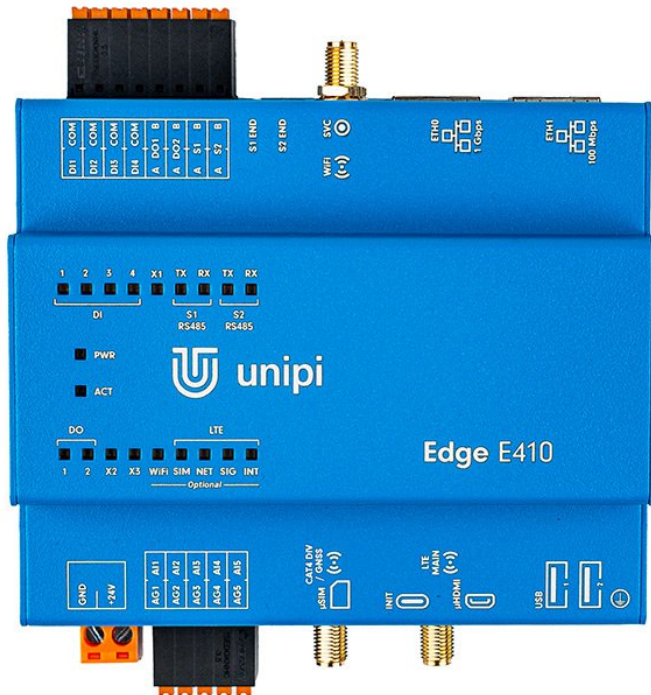


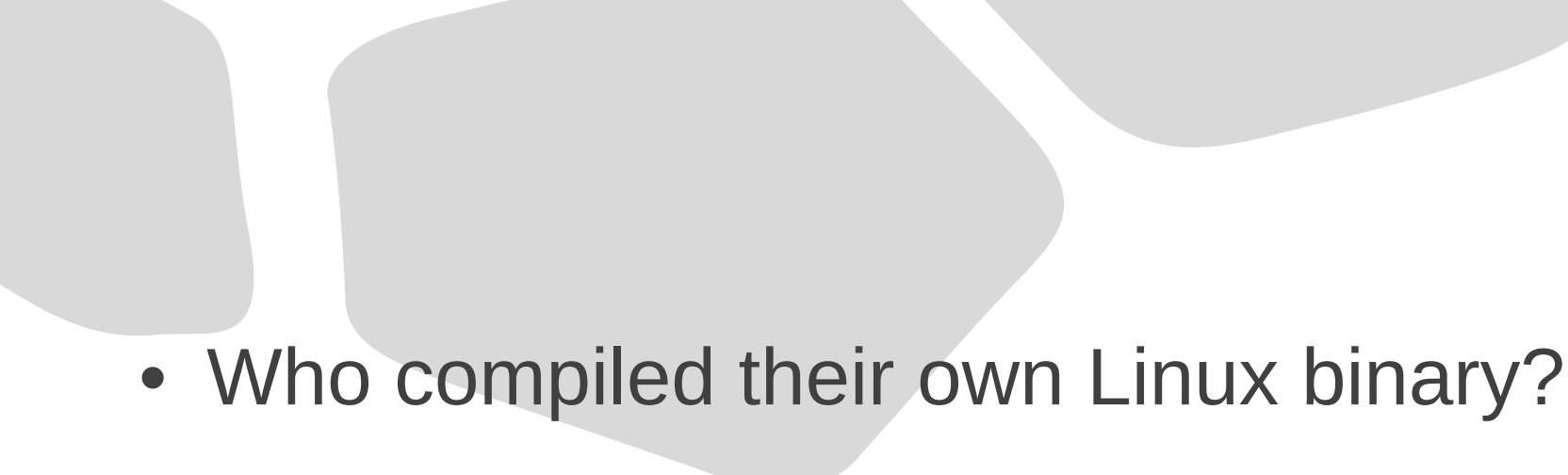
About me

- Open source and self hosting enthusiast
- Product Engineer @ Unipi Technology
- Aikidoka and boulderer

Unipi and its products

- No association with this presentation
- Manufacturer of Linux based PLCs

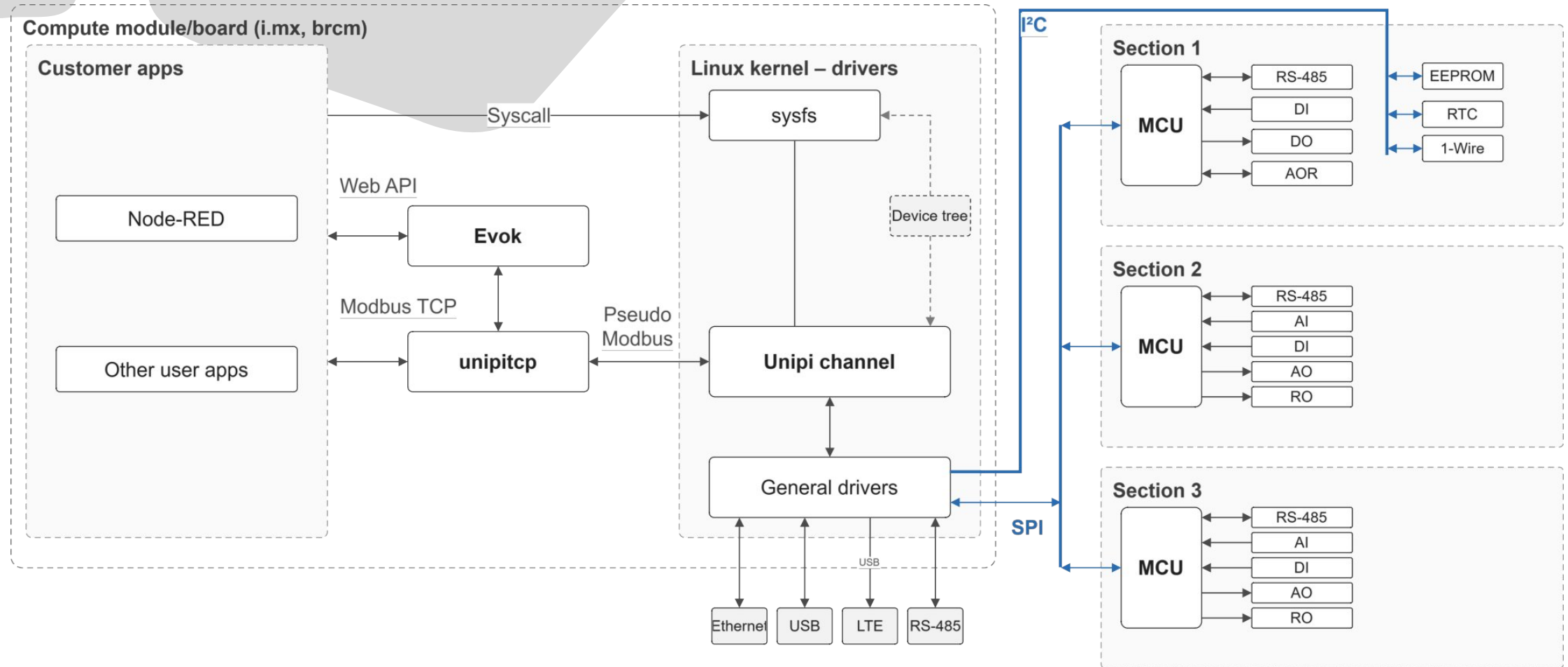




About you

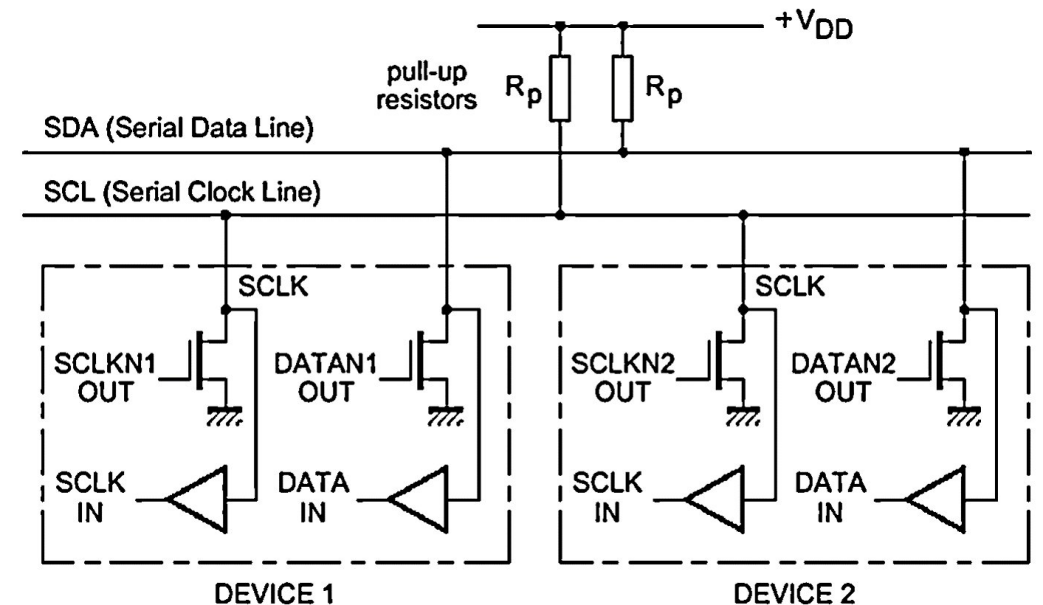
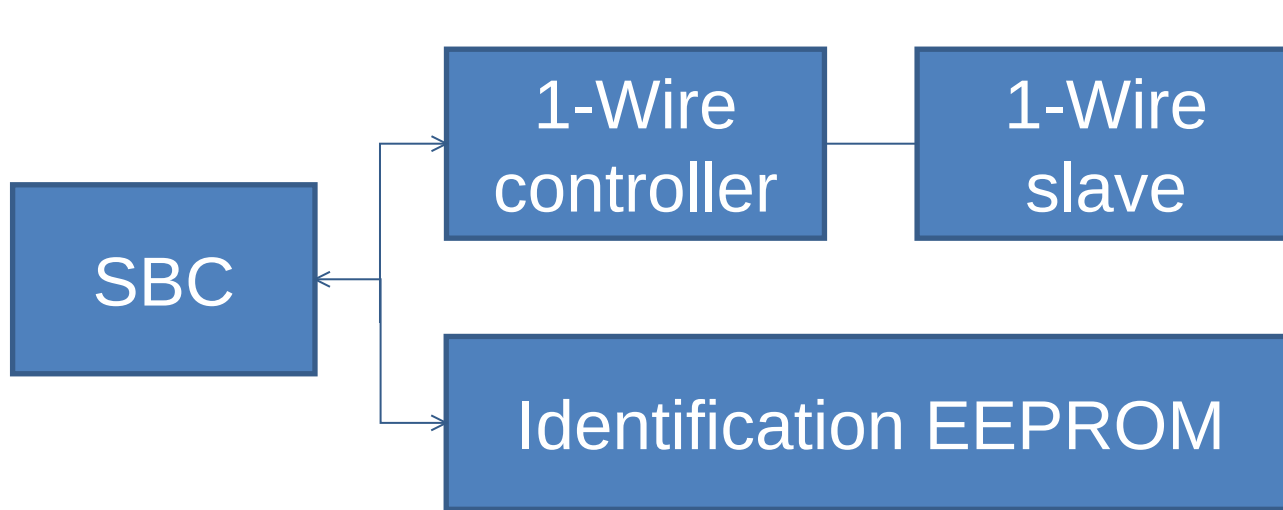
- Who compiled their own Linux binary?
- Who made their own patch?
- Who mainlined their patch?

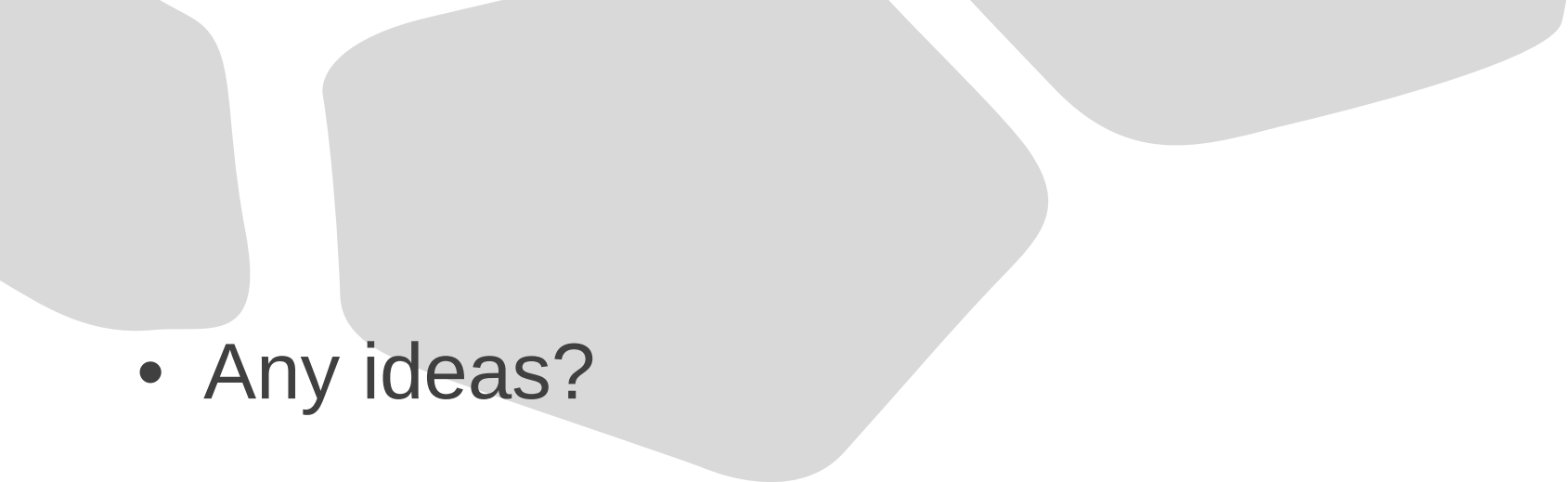
Unipi architecture



The problem

- EMI from 1-Wire bus jams the 1-Wire controller
- The controller pulls down SDA of the I2C bus
- Identification EEPROM on the same I2C bus
- Undefined behavior after restart





Solution?

- Any ideas?

Solution?

- Unipiid (historical kernel module for parsing EEPROM) could restart the 1-Wire
- User space daemon monitoring health of the 1-Wire/I2C buses



The solution

- Adding power management support to ds2482



Plan

- I'm no C programmer
- But I can read and write English
- The easiest way is to get inspiration from other drivers

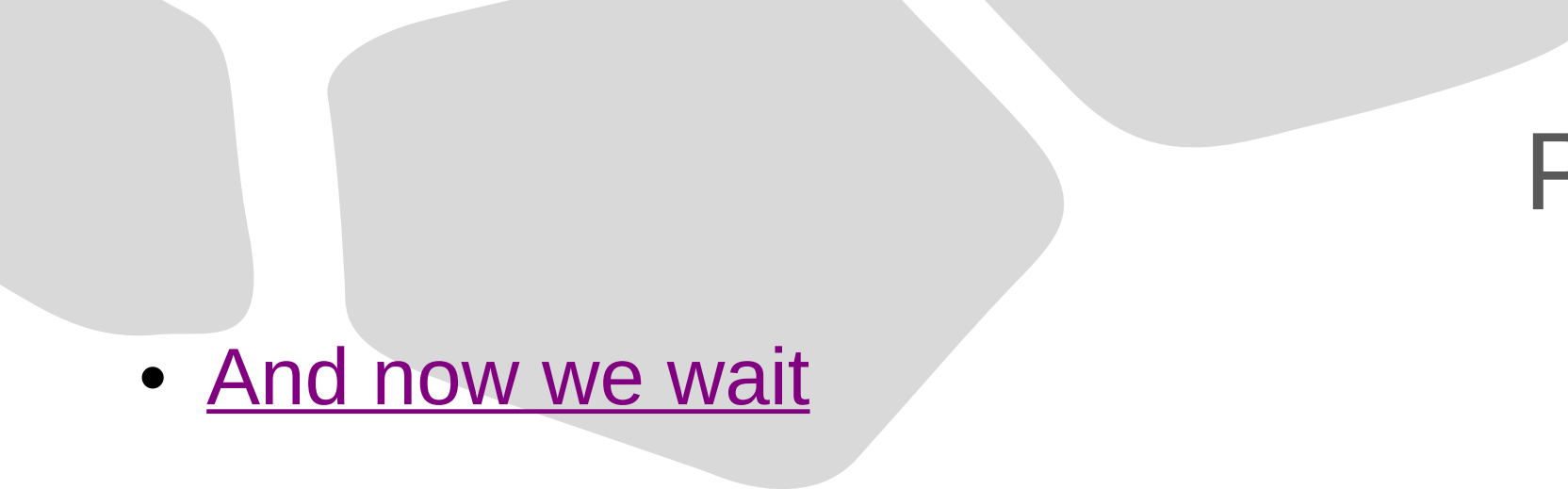


Implementation

- Our downstream 6.1 kernel first
- Testing on real hardware – S107
- Porting on Linux next

B4 – your patch sending buddy

- Linux development uses mailing lists
- Not great to work with manually
- B4 handles all of this for you



Patch was sent

- And now we wait

V1 Pitfall – commit message

```
>>>>>> Adds the newly added vcc-supply property to bindings.  
>>>>>> This commit message is a circular argument. You're adding it to the binding, which of course means it is newly added.  
>>>>> You are right, I will replace with "Adds the vcc-supply property to bindings." in the next version.  
>>>> No, please say why, e.g. because it was missing and device has it according to datasheet.  
>>> Right, what about:  
>>> Adds the optional vcc-supply property to bindings, informs if the device  
>>> needs a regulator to be turned on for its operation  
>> It does not inform at all. All devices needs power, don't they? And what operation?  
> This is probably the best I can do:  
>         ds2482 has a VCC pin, accepting 2.9-5.5 V. Allow optionally specifying  
> a voltage regulator to power the chip.  
Keep only first sentence. Second is obvious, no need to repeat schema in free form text (and schema defines it is optional).
```

V2 Pitfall – copying from old drivers

```
> + ret = regulator_enable(data->vcc_reg);
```

You wanted `devm_regulator_get_enable()`.

... but your comment also suggests
`devm_regulator_get_enable_optional()`.

V3 Pitfall – wrong commit order

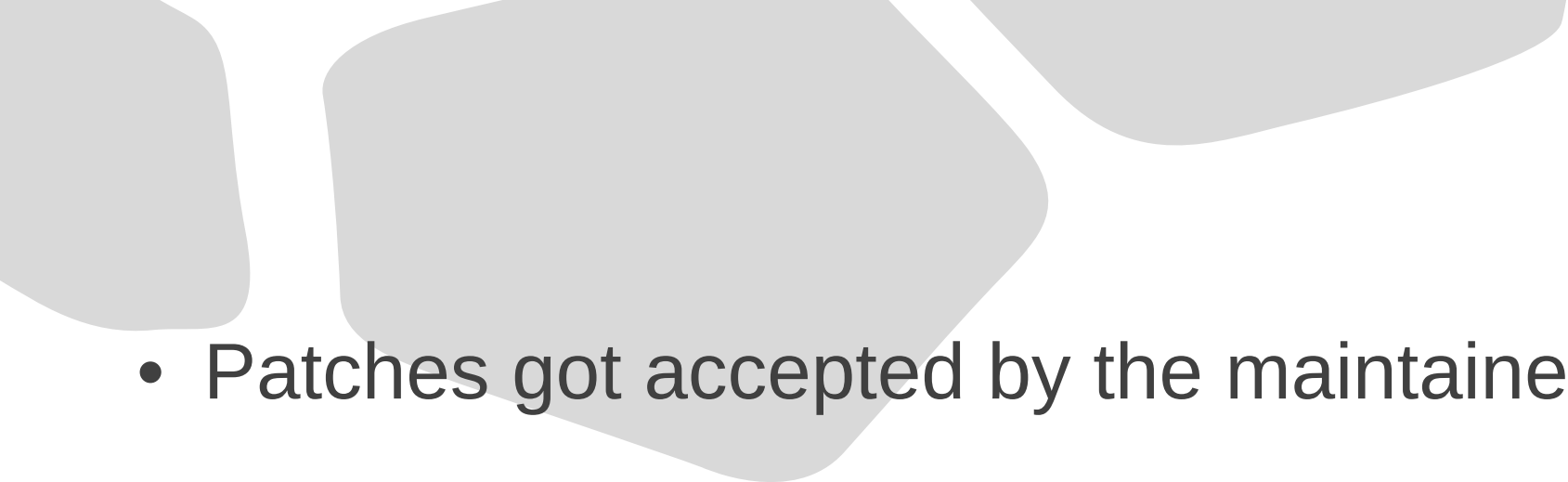
- Binding has to be first, then code implementation
- Finally some Acks and approves

V4 Pitfall – introduced a memory leak

- Ups...
- Refactored the driver from `kzalloc()` to `devm_kzalloc()` for next version

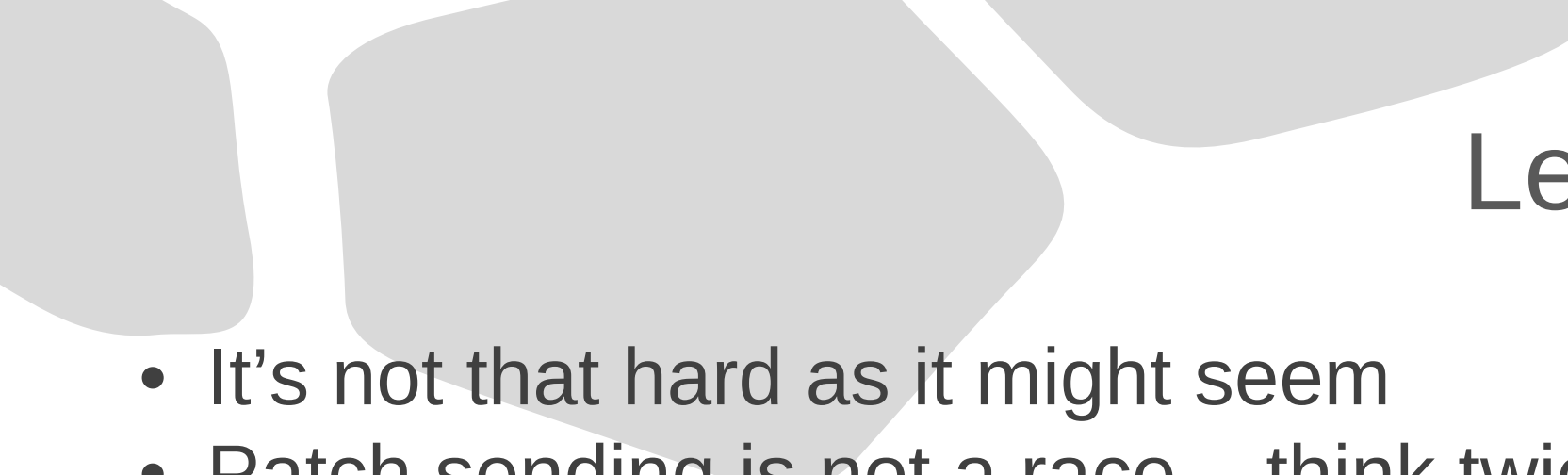
V5 Pitfall – too much cleanup

- Deleted probe exit path that should remain



V6 – victory

- Patches got accepted by the maintainer

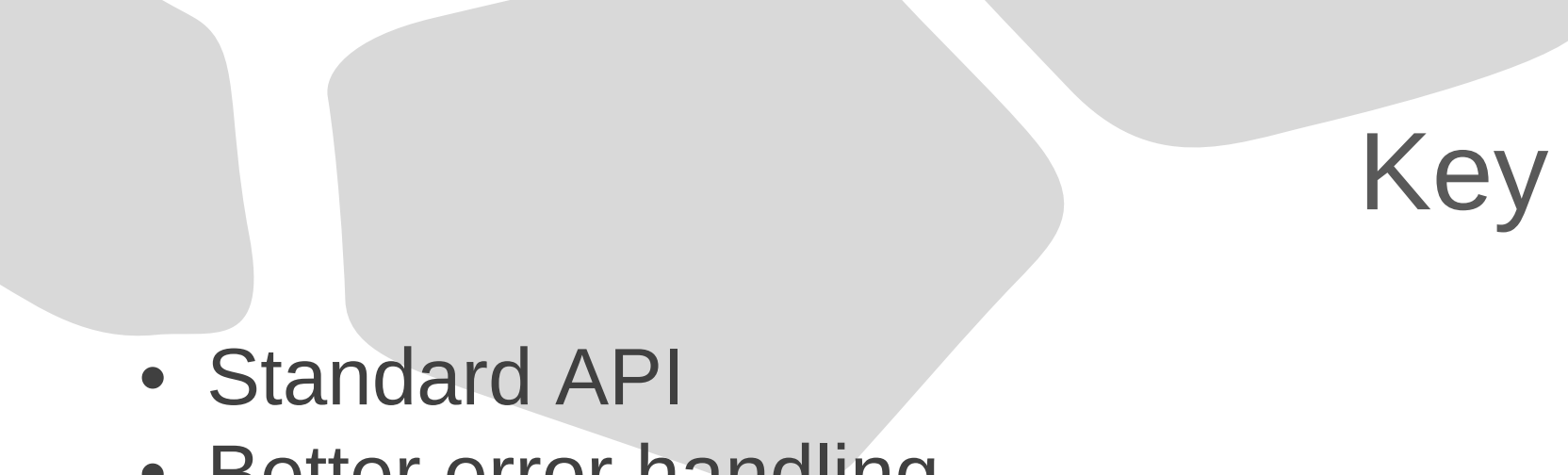


Lessons learned

- It's not that hard as it might seem
- Patch sending is not a race – think twice

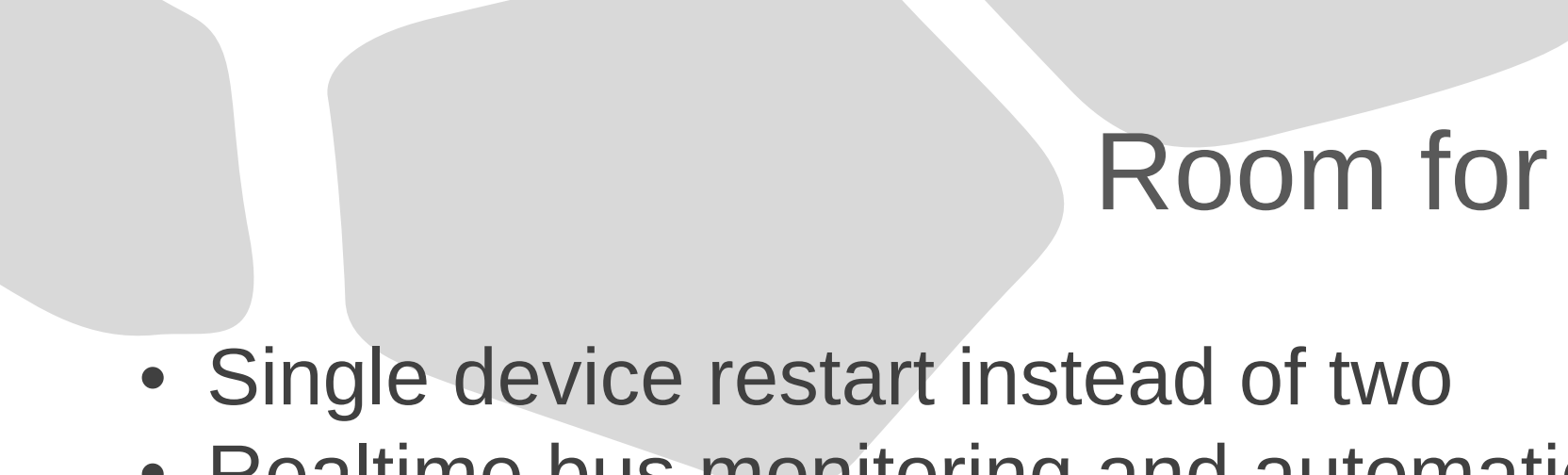
Release to production

- Waiting for Debian 13
- Internal changes
 - Device tree
 - Kernel patch backport 6.14 → 6.12
 - unipitcp (Modbus TCP) server
 - Documentation



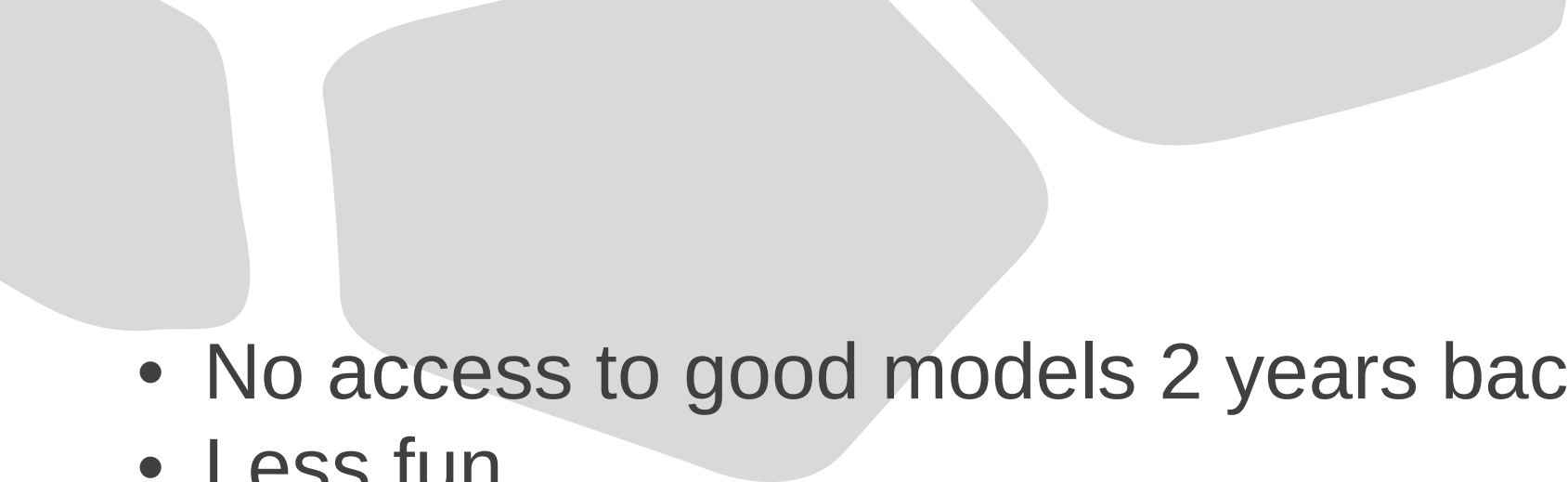
Key improvements

- Standard API
- Better error handling
- Bigger user comfort



Room for improvements

- Single device restart instead of two
- Realtime bus monitoring and automatic restart



Why no AI?

- No access to good models 2 years back
- Less fun

Q&A

- Time for your questions
- Feedback is appreciated

Question came up later? Write me an e-mail: cleverline1mc@gmail.com

