

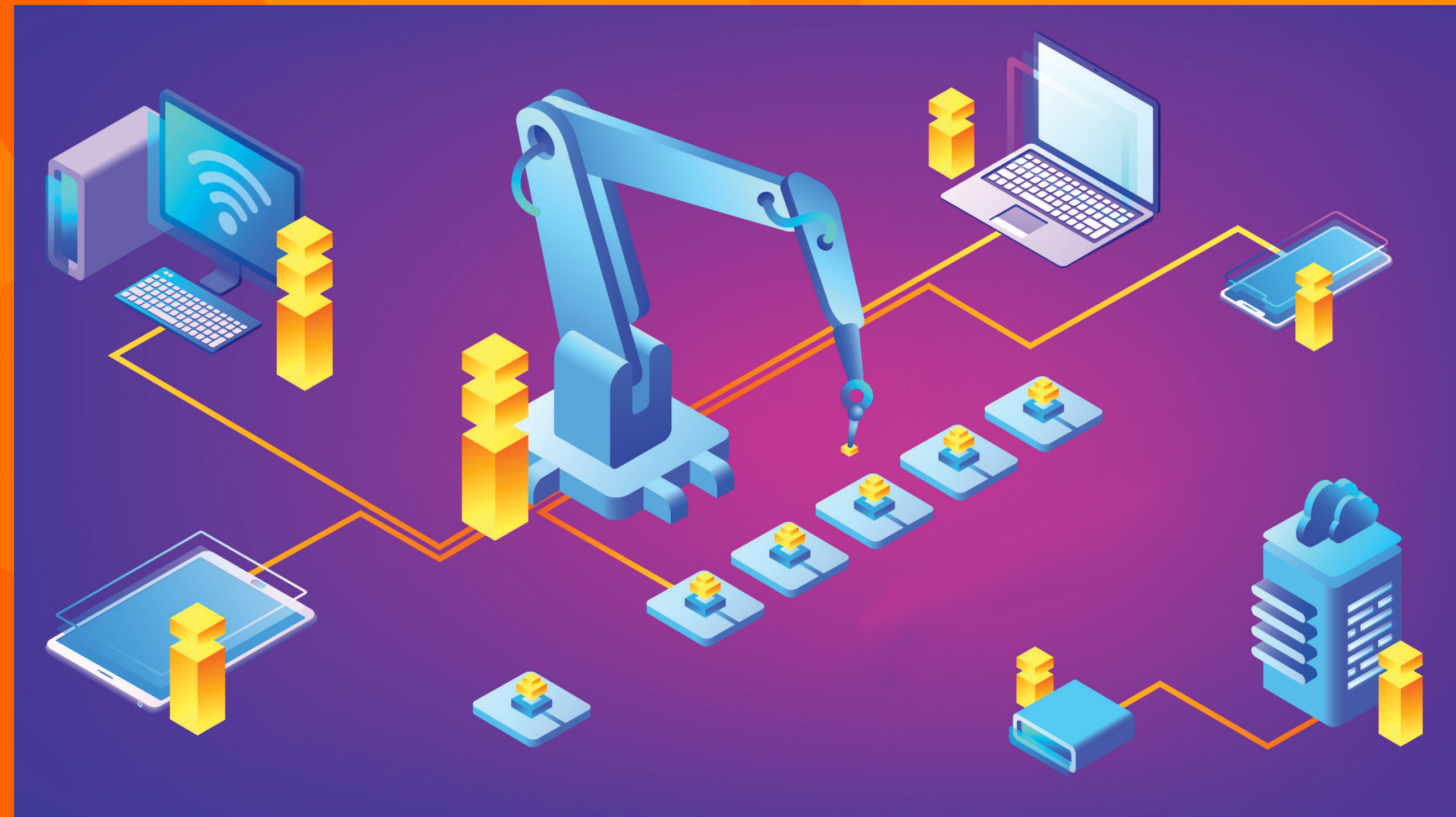
Automating the IoT with BPMN

Why would you do that?

David G. Simmons • April 27, 2022

Why would anyone want to?

- IoT is ripe for automation
 - Wait, you mean automating automation?
 - That's so meta
- Business automation, rather than engineering automation
 - What does that even mean?



How it started

- 15+ years in IoT
- Job negotiations involved "this is not an IoT position"
 - Also: "not an IoT company"
- Executives kept mentioning IoT
 - I told them not to encourage me!
 - They didn't listen



Very first assignment

- Do something 'fun' to show off Camunda BPM
- I've only been here a week!
- "Write about what you know"
 - Hammer, meet nail



The Halloween Project!

- Deep in the Covid times
 - No one wants to talk to people face to face
 - It's Halloween FFS!
- Hammer, meet nail



I KNOW NOTHING!

- Have to pull off a project
 - Do it quick!
- Keep it simple
- Write it in Go
 - Write what you know
 - Hammer, meet nail



Basic Idea

- Kid rings doorbell
- Take a picture of the kid
- Evaluate the picture
- Award candy
- Dispense candy without opening the door

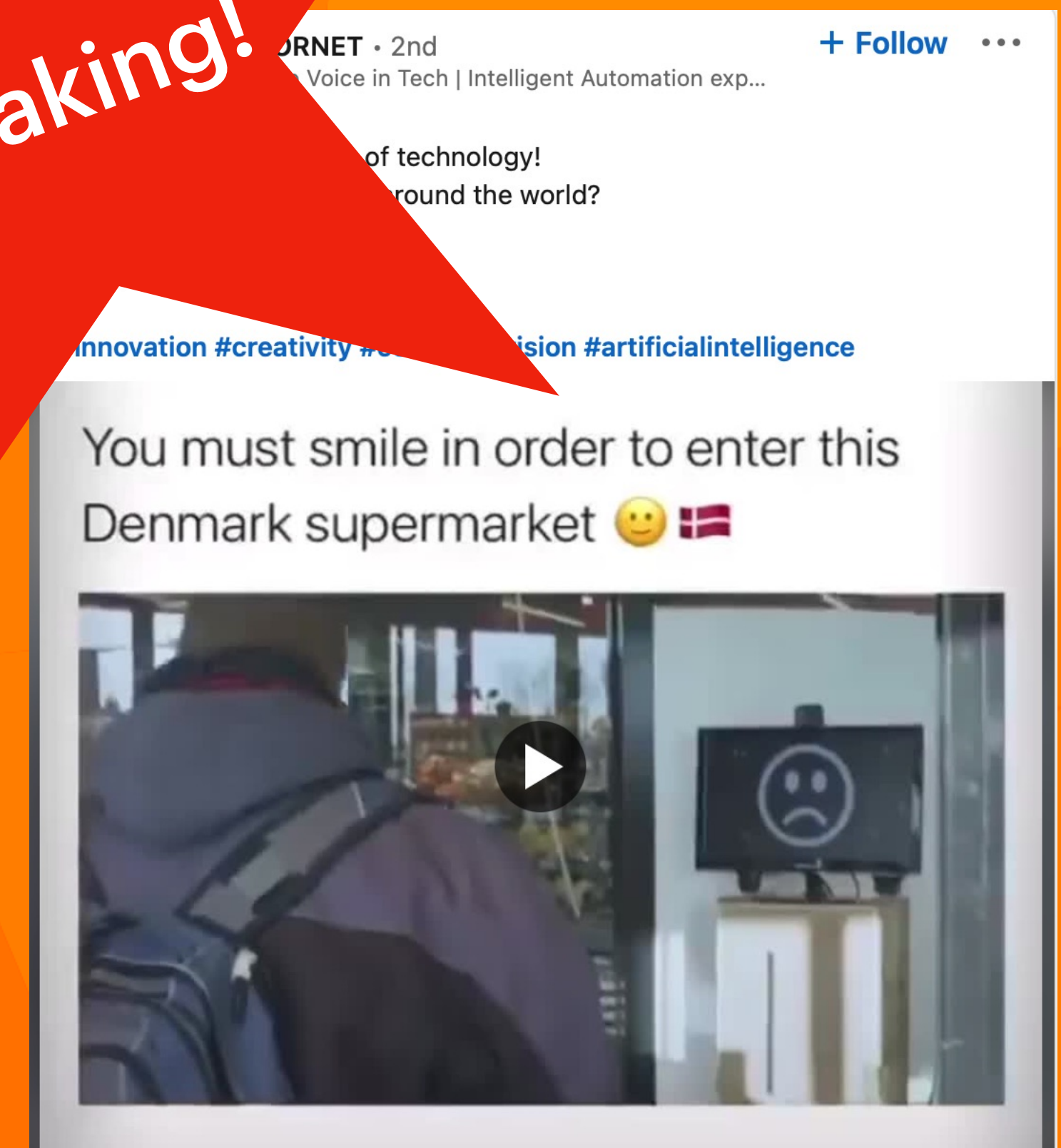
💡 I could do this without even being home!

If you build it, they will come

- Build a doorbell that will take a picture
- Built a candy dispenser
- Automate it all
- mumble mumble mumble
- VC Funding bonanza! Revenue!! Riches!! 💰💰💰💰

This is going to be super simple. 🙄

Breaking!



Hardware list

I just *happen* to have all this lying around

- Doorbell:
 - ESP32-Cam (\$5.00)
 - Push-button (\$0.50)
 - 2 LEDs (\$0.25)
- Candy Dispenser:
 - ESP8266 (\$2.00)
 - Stepper Motor (\$8.00)
 - Stepper driver (\$6.00)

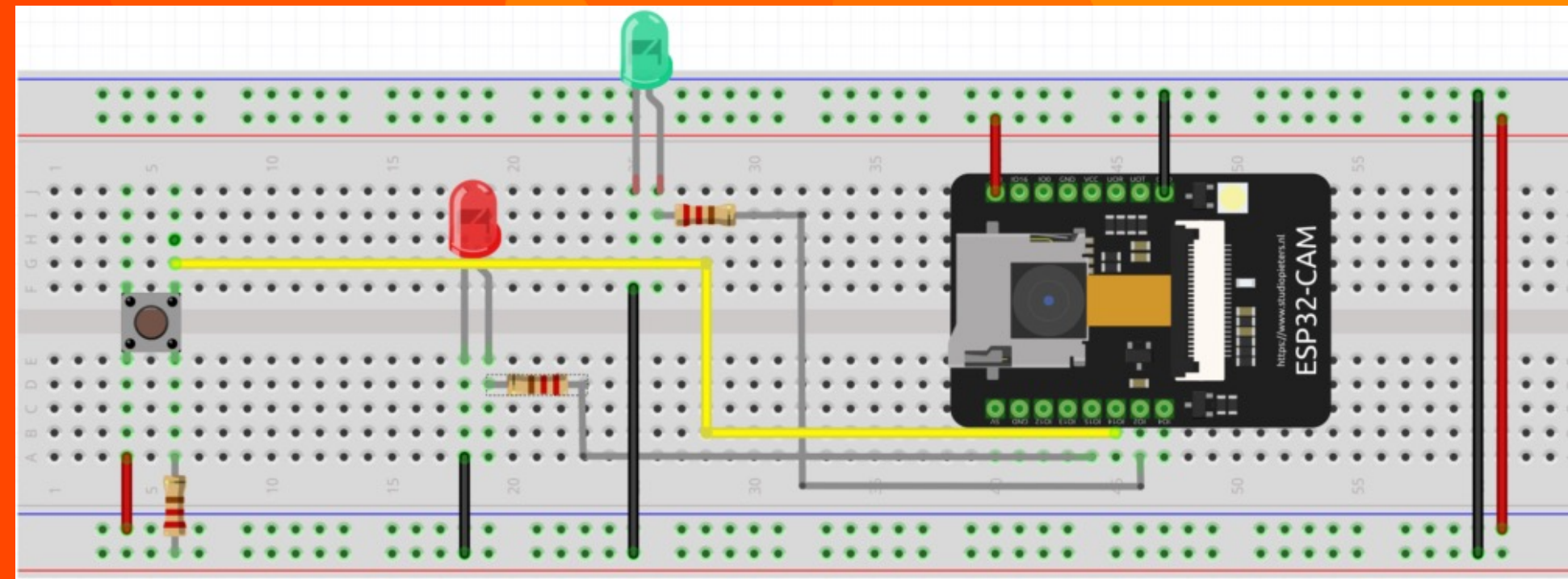


This should surprise no one

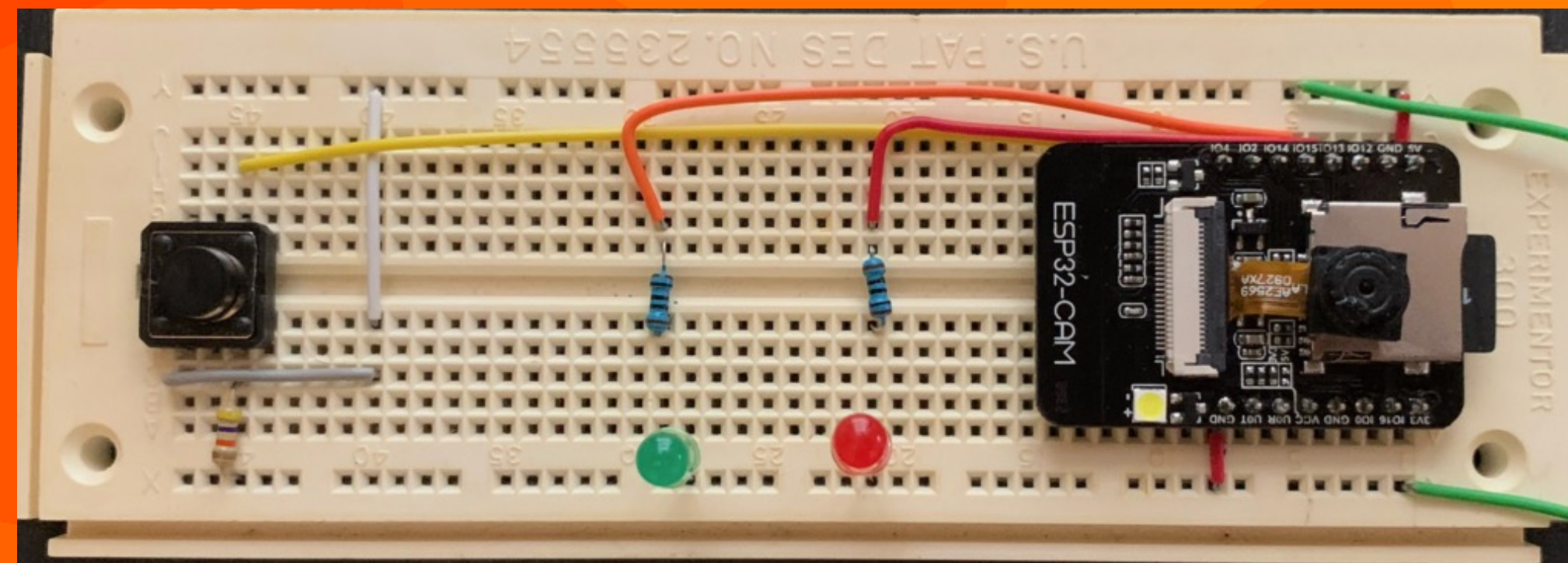
Start with Hardware

Note: Never start with hardware

- First the schematic:

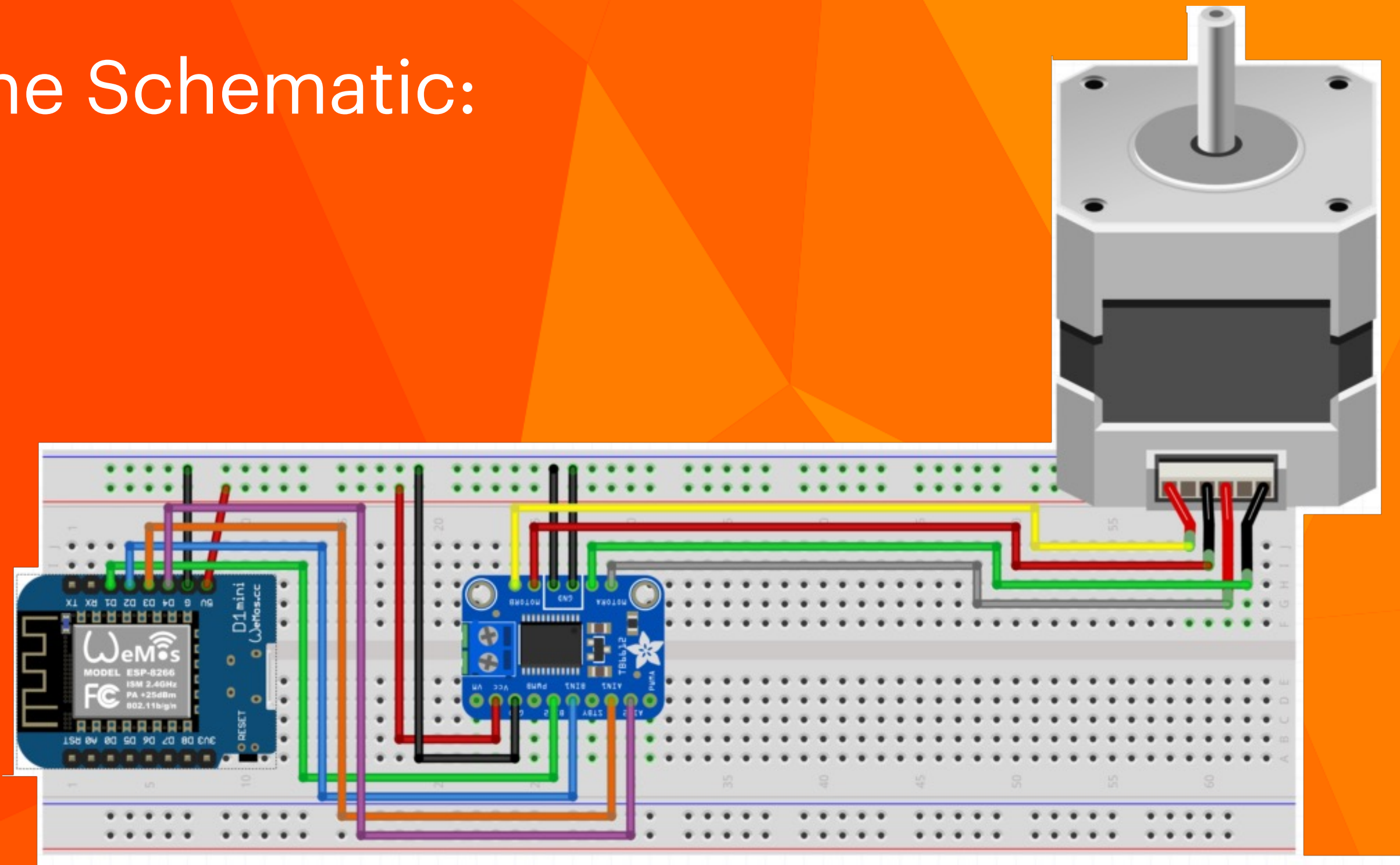


- Then build it (spot on!):



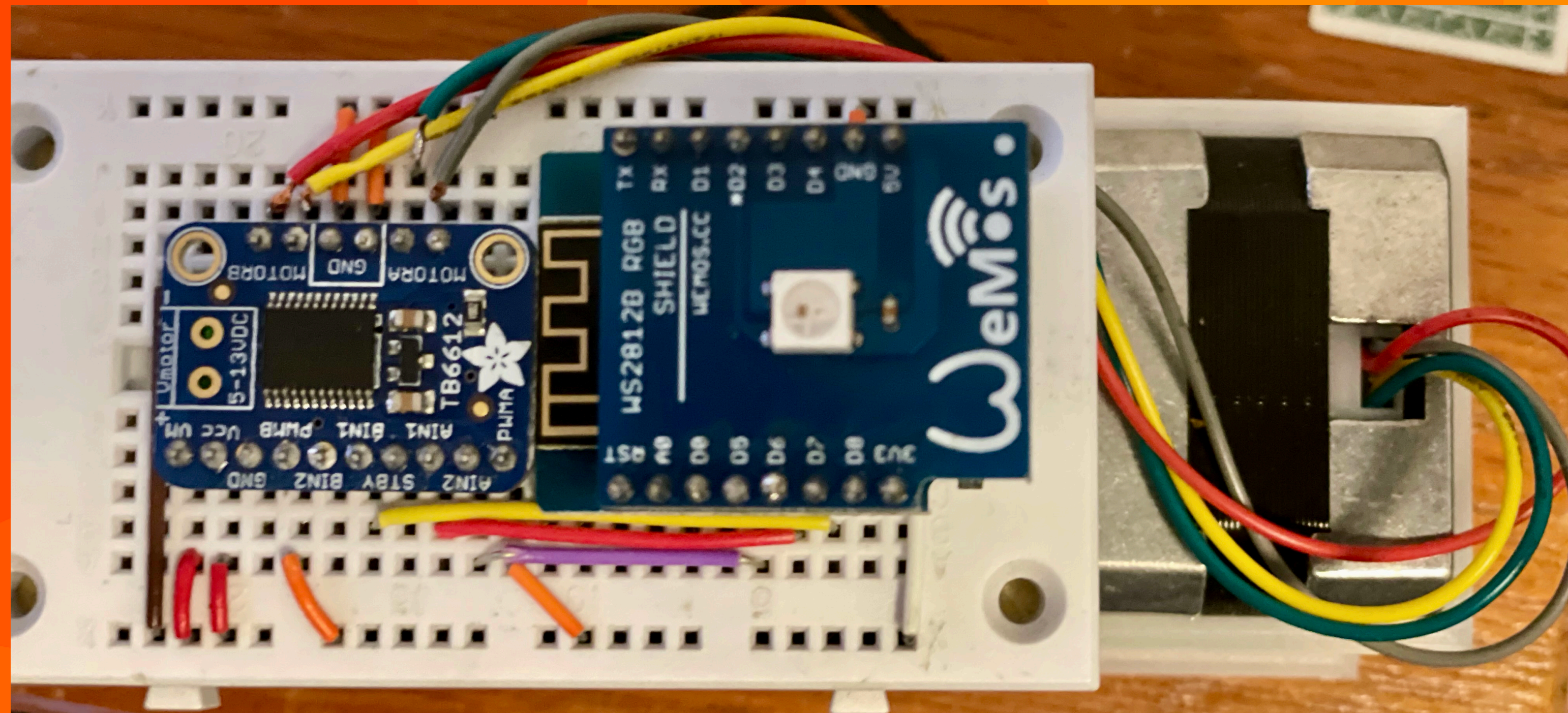
Candy Dispenser Hardware

- First comes the Schematic:



Candy Dispenser Hardware

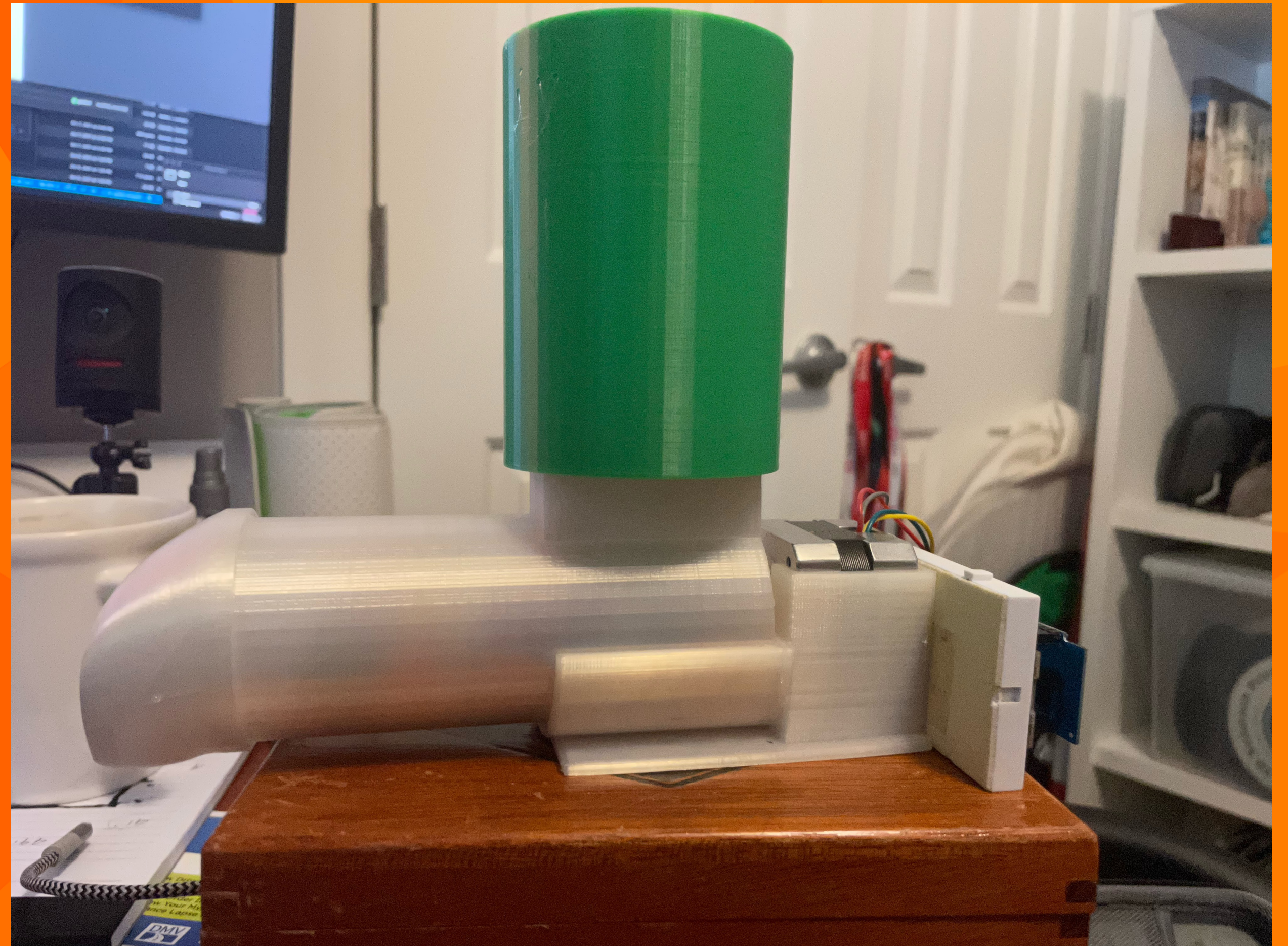
- Then the build (Nailed it!):



Build a Candy Dispenser

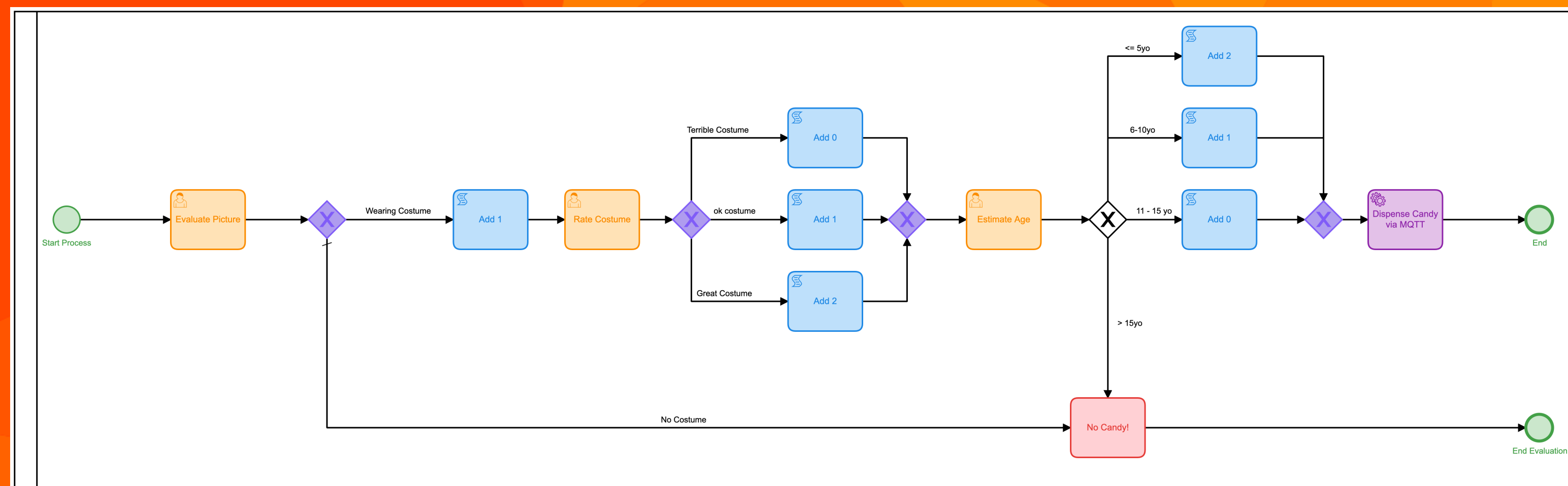
Note: I'm terrible at 3-D CAD

- ~~Design a Candy Dispenser~~
- Copy a Candy Dispenser
- Print!
- Awkward



Where's the BPM?

- Long, complicated process
- 3 tasks require human interaction
- Not easily maintainable



Let's see it in action!



@davidgsloT



CAMUNDA

Your kids look weird

- The candy dispenser I built stole wasn't designed for candy
- It was designed for dog treats
- Dogs are acceptable standins for kids.
 - Fight me.
 - Dont' try to fight them
 - They're useless in a fight.



We can make this better

That's a universal truth

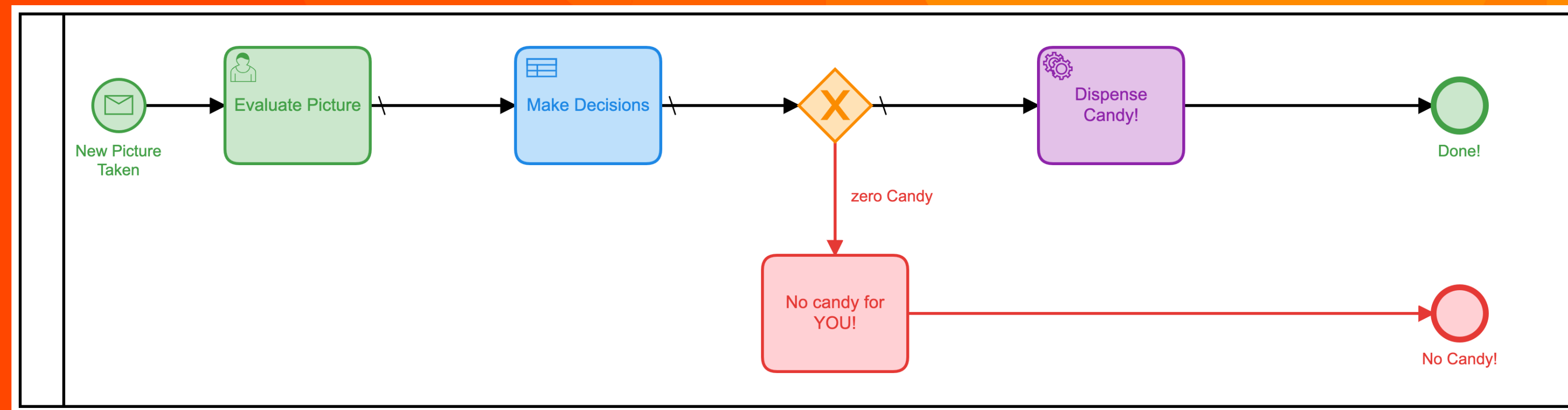
- Most of the 'decisions' are coded into the model itself
 - That's a terrible idea
 - I didn't know any better
 - It's very difficult to maintain
 - Don't do it
- Too much human interaction.
 - We can do better

The screenshot shows the configuration for a task named 'addCandy1' in the Camunda BPMN Editor. The 'General' tab is selected, showing the task's ID as 'addCandy1' and its name as 'Add 1'. The 'Details' section shows the 'Script Format' as 'javascript' and the 'Script Type' as 'Inline Script'. The 'Script' section contains the following JavaScript code:

```
var candy = execution.getVariable('candyPieces');
if(candy == null){
    candy = 0;
}
candy += 1;
execution.setVariable('candyPieces', candy);
```

The 'Result Variable' is set to 'candy'.

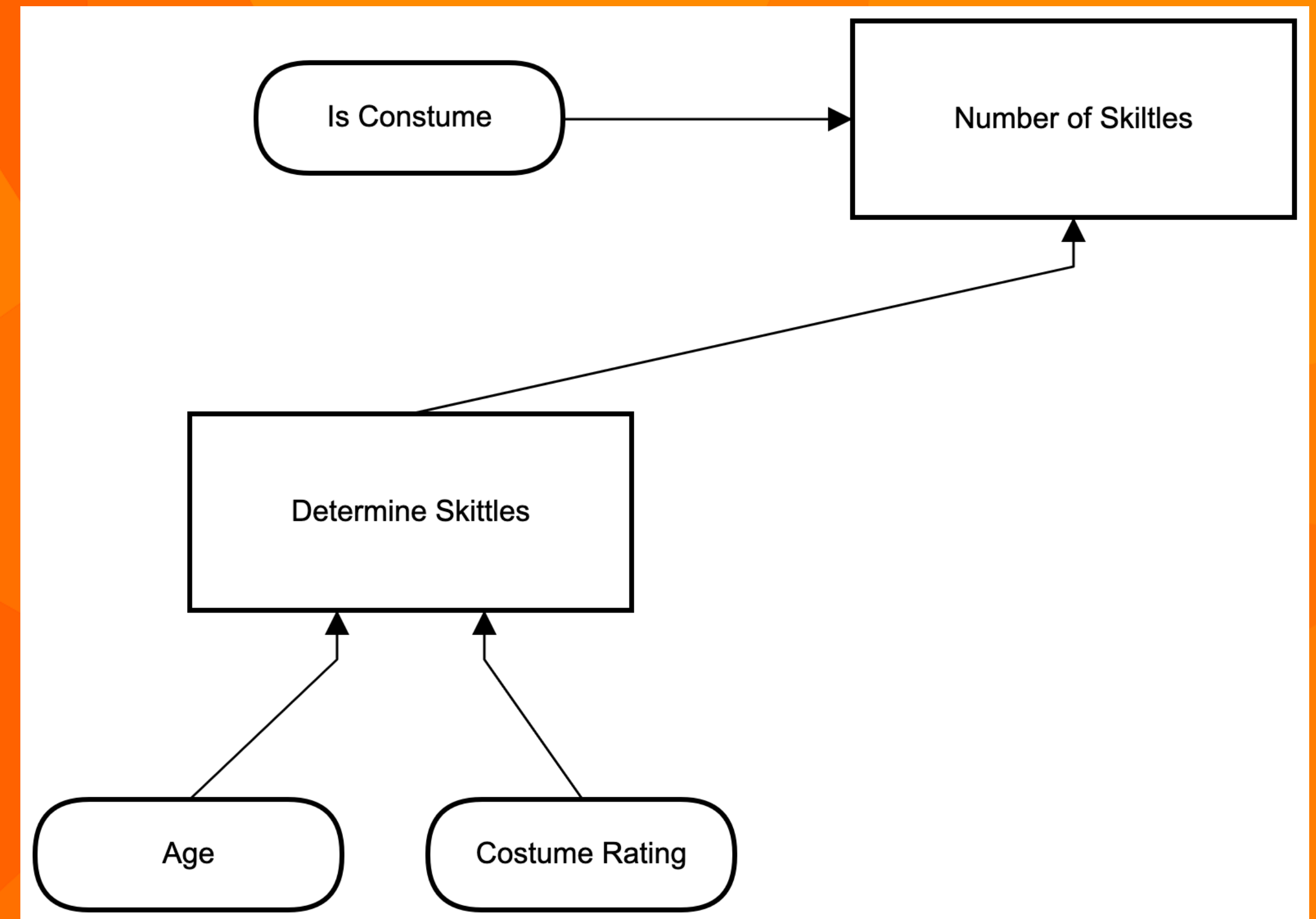
Let's collapse the model



- Only one Human Task
- All the decisions automated with DMN
- Much more efficient!

Let's use DMN to automate decisions

- Use nested decision tables
- Same result, but faster
- Less human interaction



Who needs people anyway?

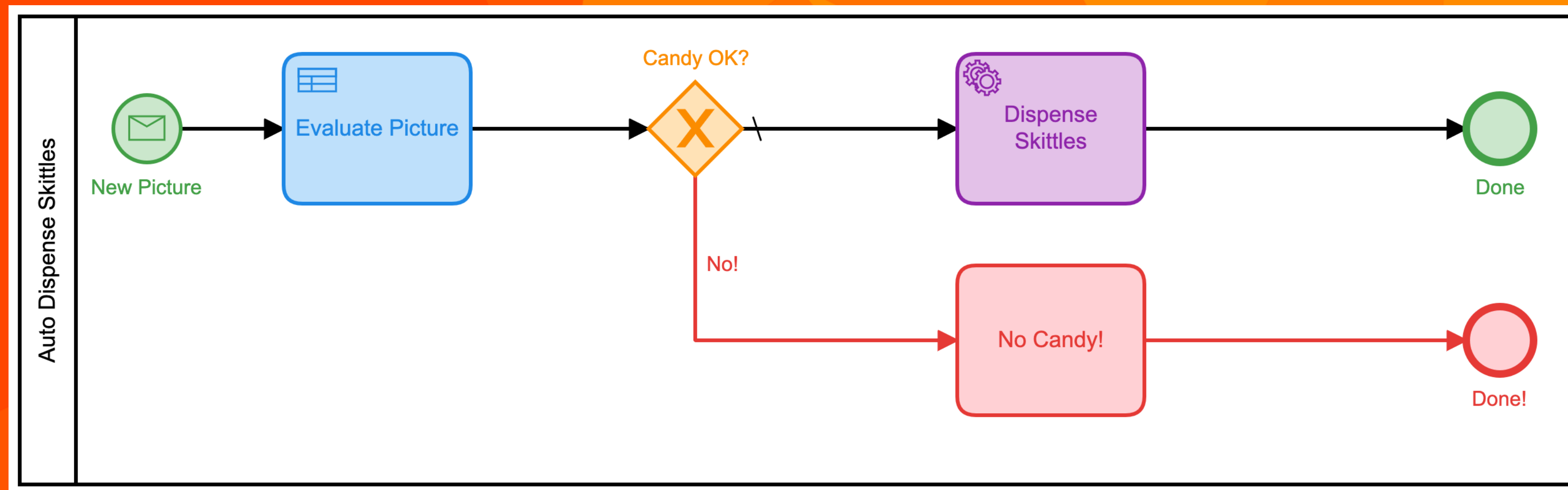
I did say "automating IoT with BPM"

- We can completely remove all human tasks
 - If we move the goal posts just a *little* bit



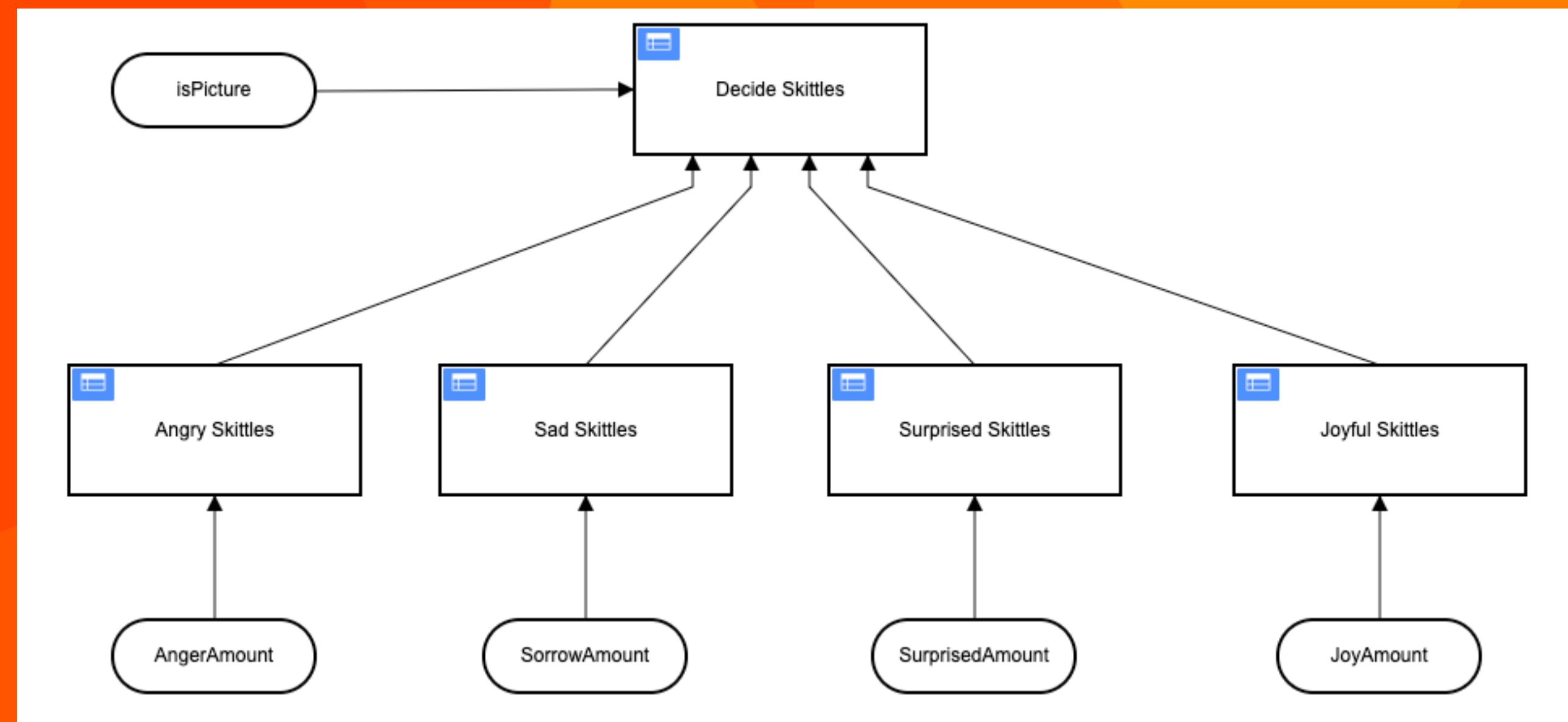
Even shorter Task

- No human tasks
- A single Decision Table



Ok, so it's not a single decision table

- Wait, what? Anger, Sorrow, Surprise, and Joy?



Using AI to augment the automation

- Google image processing
- Get the emotions

```
absPath := fmt.Sprintf("%s%s", serverPath, strings.Trim(s, "."))
ctx := context.Background()
options := opts.WithCredentialsFile("path/to/credentials.json")
client, _ := vision.NewImageAnnotatorClient(ctx, options)
defer client.Close()
file, _ := os.Open(absPath)
defer file.Close()
image, _ := vision.NewImageFromReader(file)
annotations, _ := client.DetectFaces(ctx, image, nil, 10)
emotions := Emotions{}
```

```
} else {
    emotions.IsPicture = true
    for _, annotation := range annotations {
        goodStuff := interestingAnnotations{}
        data, _ := json.Marshal(annotation)
        json.Unmarshal(data, &goodStuff)
        emotions.Anger = annotation.AngerLikelihood.String()
        emotions.AngerNumber = goodStuff.AngerLikelihood
        emotions.Joy = annotation.JoyLikelihood.String()
        emotions.JoyNumber = goodStuff.JoyLikelihood
        emotions.Surprise = annotation.SurpriseLikelihood.String()
        emotions.SurpriseNumber = goodStuff.SurpriseLikelihood
        emotions.Sorrow = annotation.SorrowLikelihood.String()
        emotions.SorrowNumber = goodStuff.SorrowLikelihood
    }
}
return emotions
```



All talk, no demo



@davidgsloT



CAMUNDA

**I hate this damned machine
I wish that they would sell it.
It never does what I want
But only what I tell it.**

My mom



@davidgsloT



CAMUNDA

Questions?

David G. Simmons, Principal Developer Advocate
Camunda, Inc.

david.simmons@camunda.com

<https://github.com/davidgs>

<https://davidgs.com/>