Automating the IoT with BPMN

Why would you do that?

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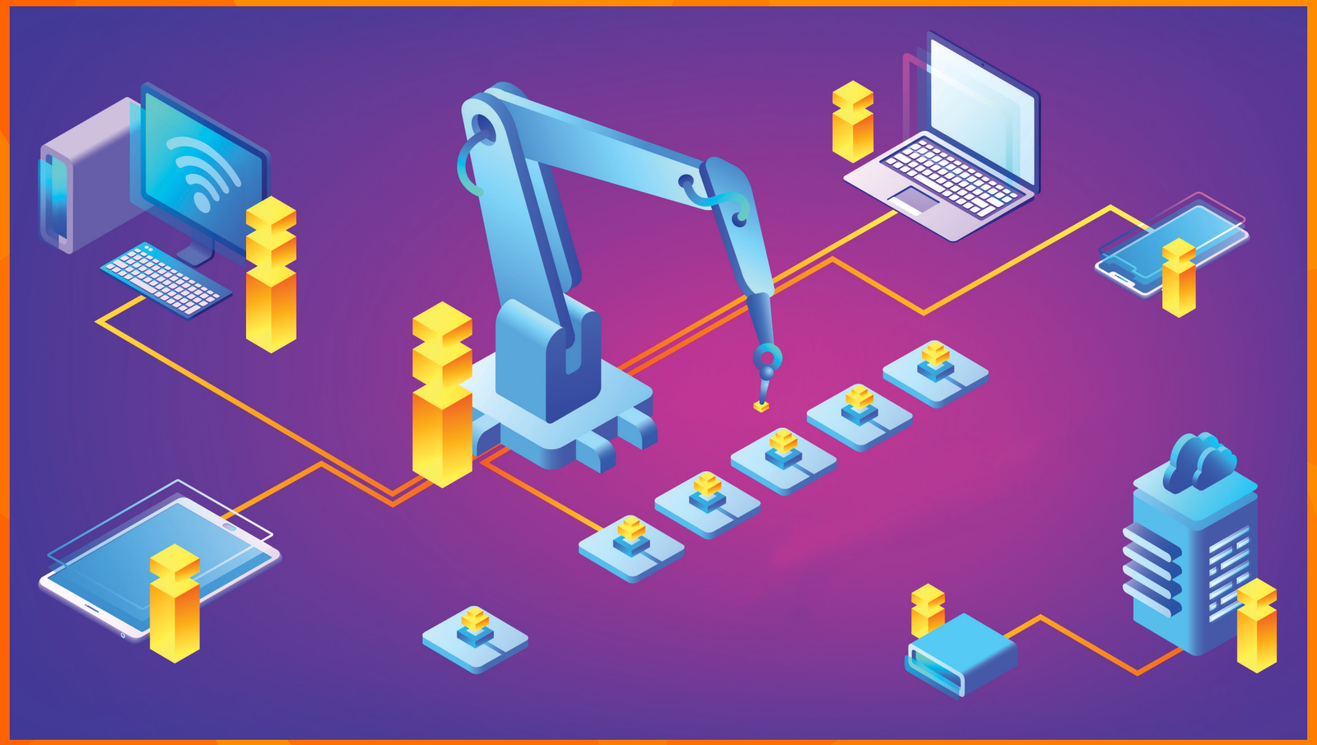
@davidgsIoT

CAMUNDA

Why would anyone want to?

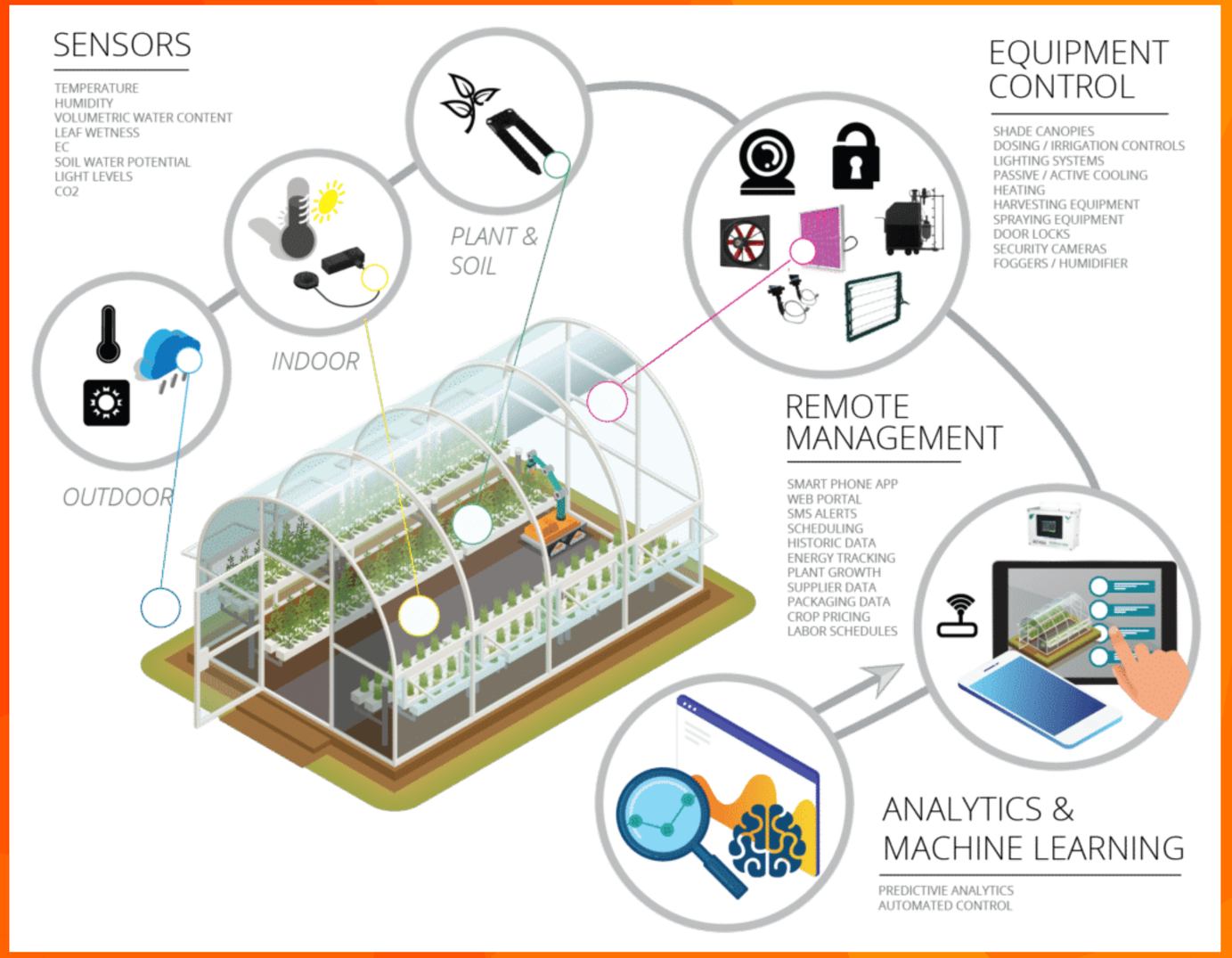
- IoT is ripe for automation
  - Wait, you mean automating automation?
  - That's so meta
- Business automation, rather than engineering automation
  - What does that even mean?



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

Automating a Greenhouse



According to Verified Market Research, The Global Smart Greenhouse Market was valued at USD 0.98 Billion in 2018 and is projected to reach USD 2.46 Billion by 2026, growing at a CAGR of 12.11% from 2018 to 2026.

https://www.verifiedmarketresearch.com/product/global-smart-greenhouse-market-size-and-forecast-to-2025/

That's it for the greenhouse!

Wait, what?

- I haven't finished it!
- I had other things come up
- I have a better demo
  - It dispenses Skittles™!!

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. 🙄

Hardware list

I just *happen* to have all this lying around

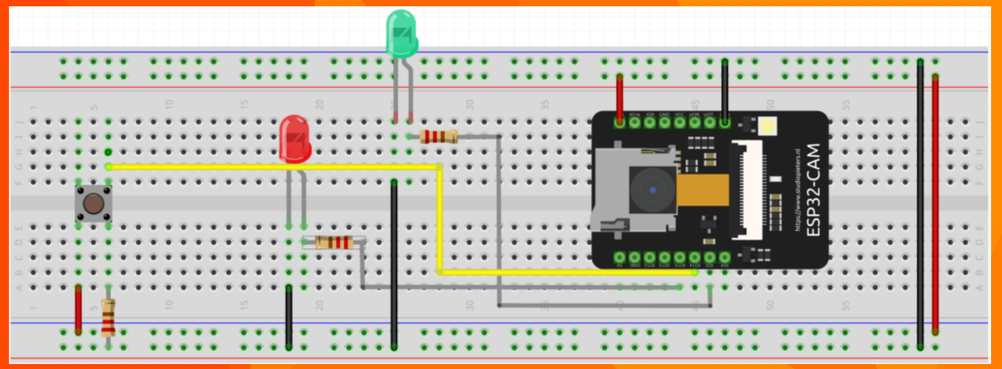
- Doorbell:
  - ESP32-Cam ($5.00)
  - Push-button ($1.00)
  - 2 LEDs ($0.25)
- Candy Dispenser:
  - ESP8266 ($2.00)
  - Stepper Motor ($8.00)
  - Stepper driver ($6.00)

This should surprise no one

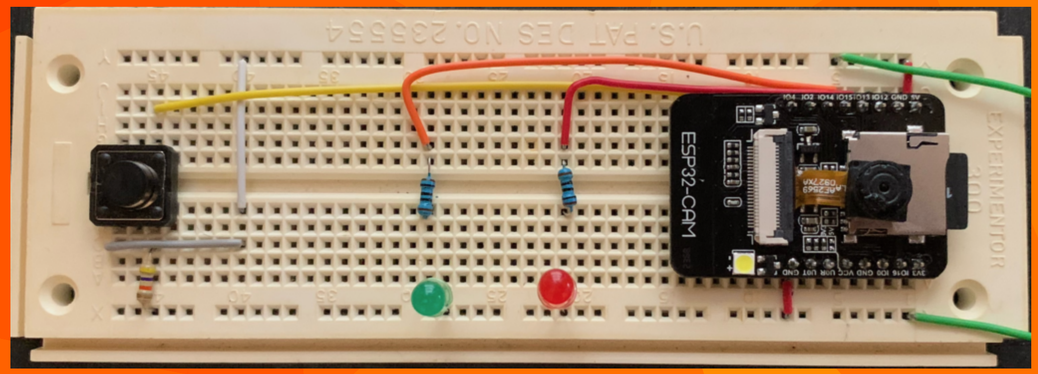
Start with Hardware

Note: Never start with hardware

- First the schematic:

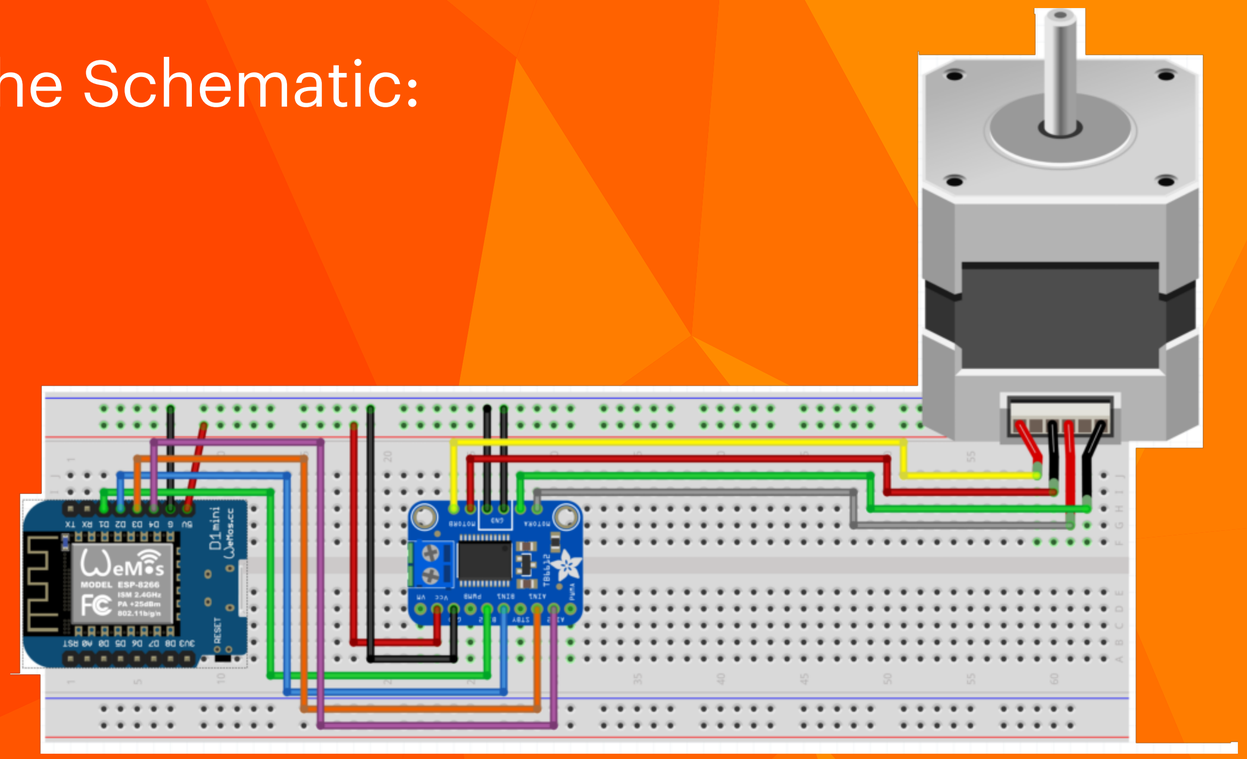


- Then build it (spot on!):



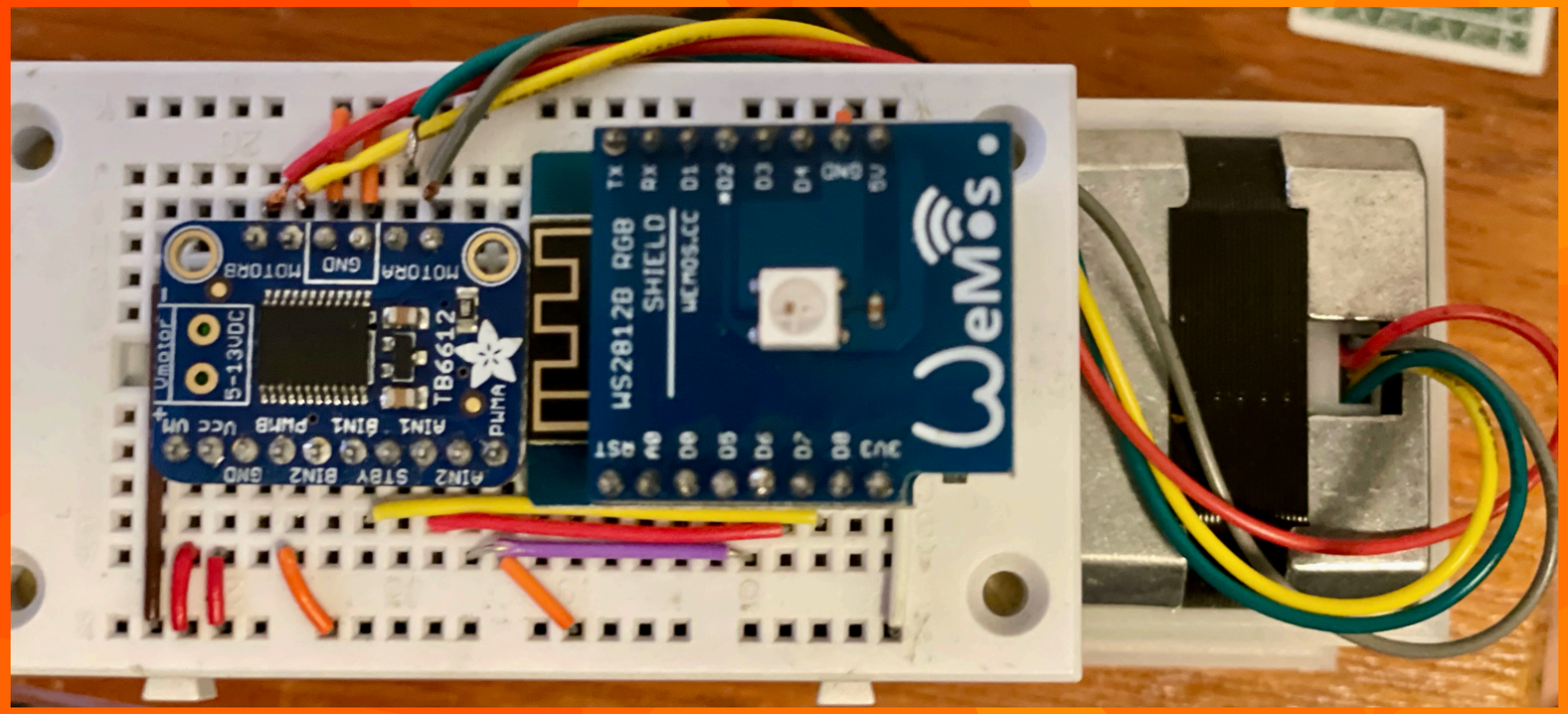
Candy Dispenser Hardware

- First comes the Schematic:



Candy Dispenser Hardware

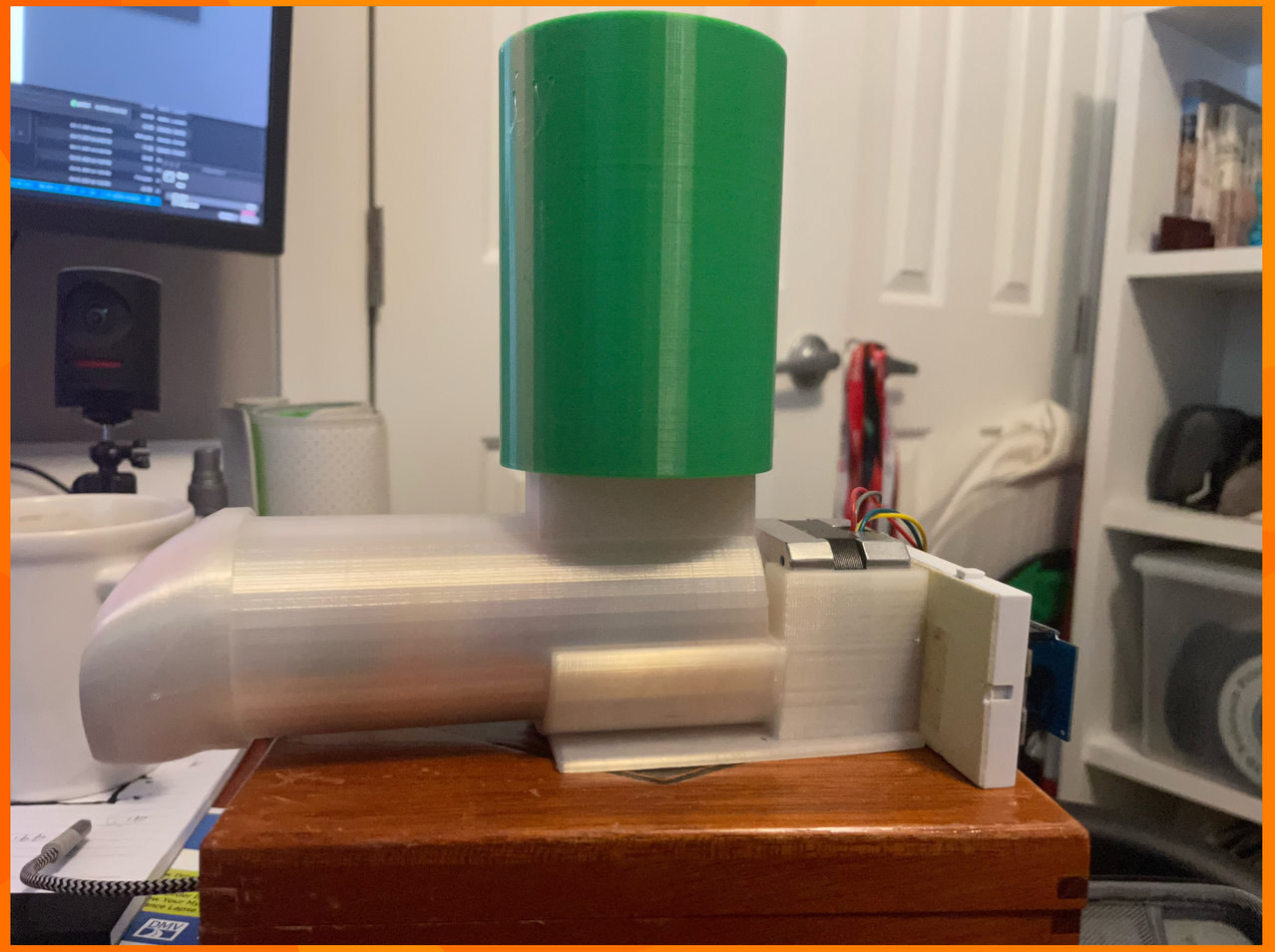
- Then the build (Nailed it!):



Build a Candy Dispenser

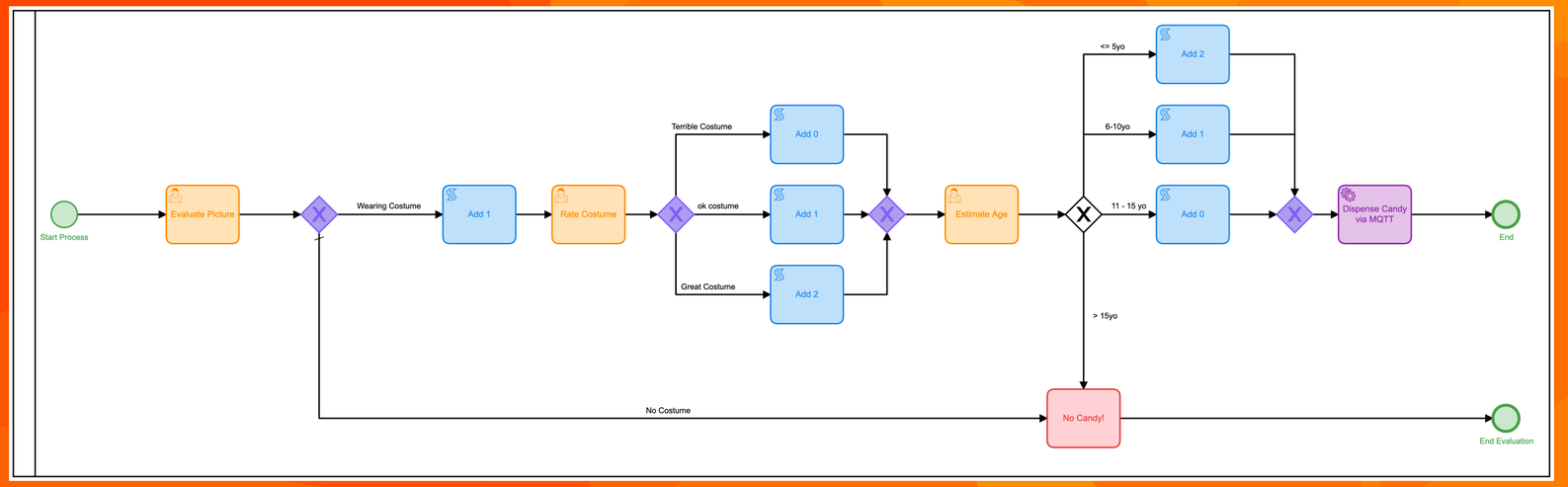
Note: I'm terrible at 3-D CAD

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

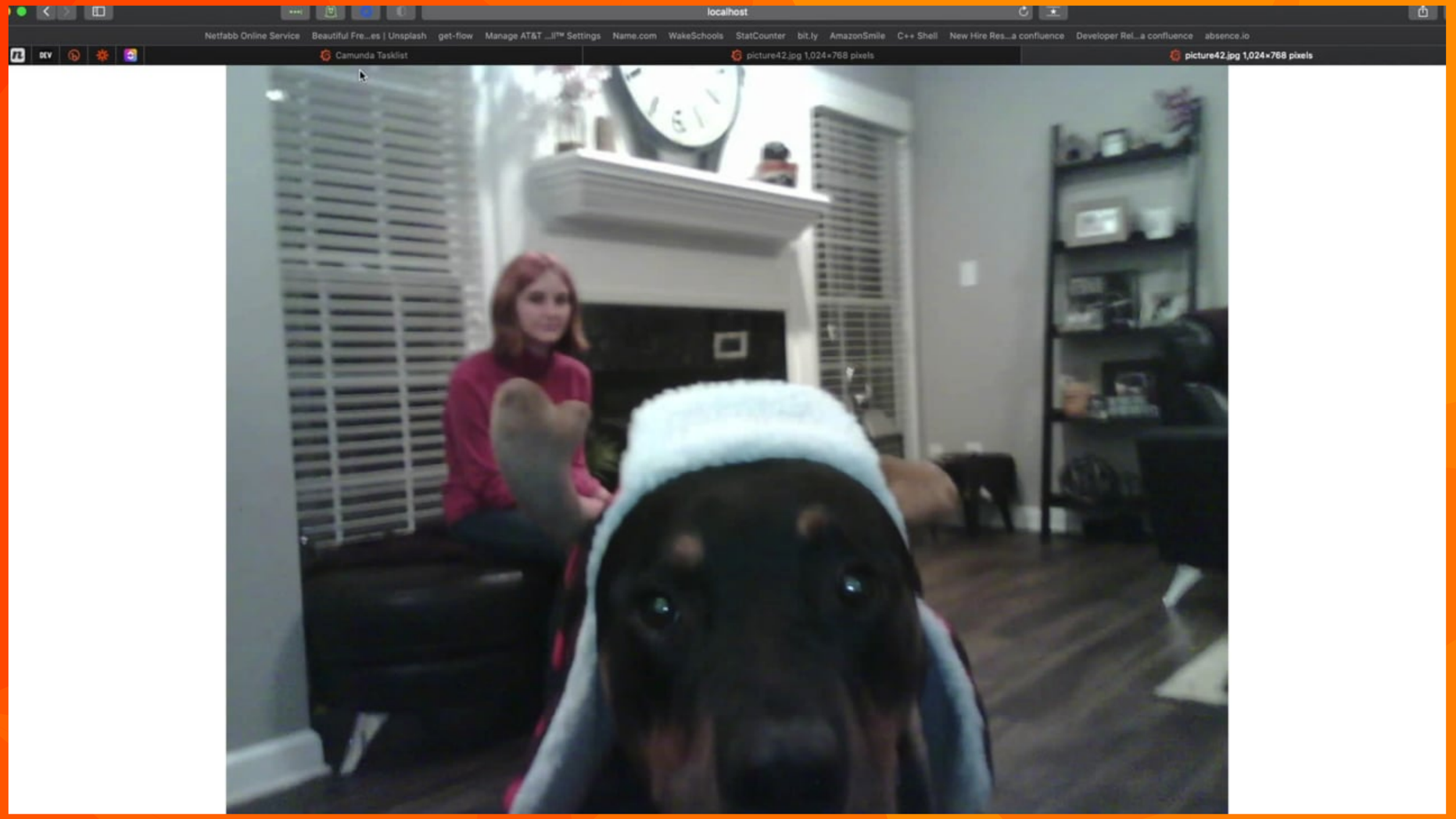


Where's the BPM?

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



Let's see it in action!

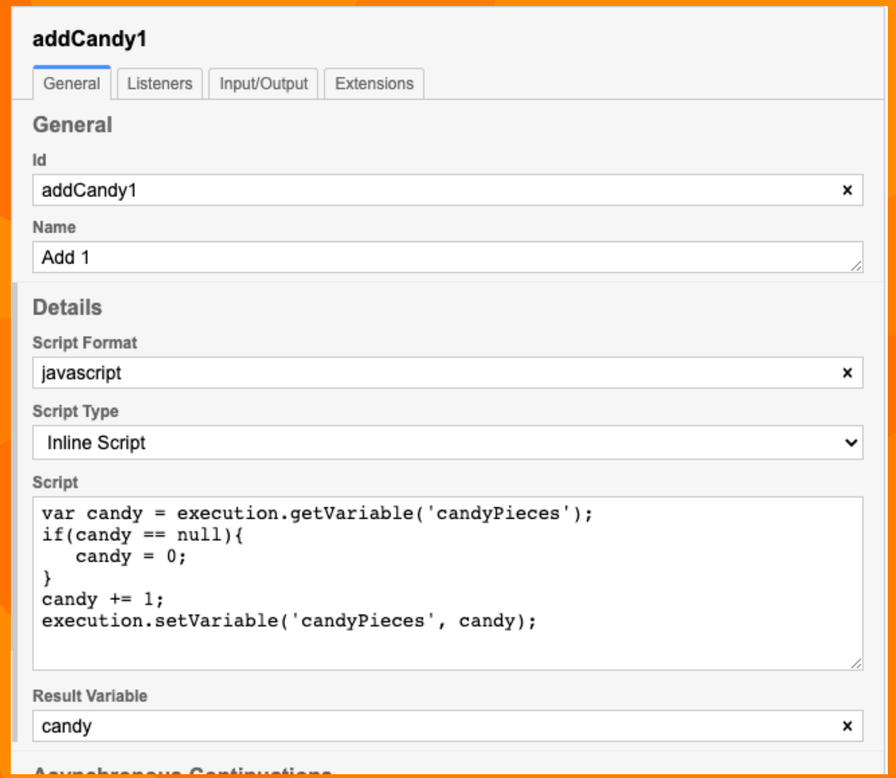


Your kids look weird

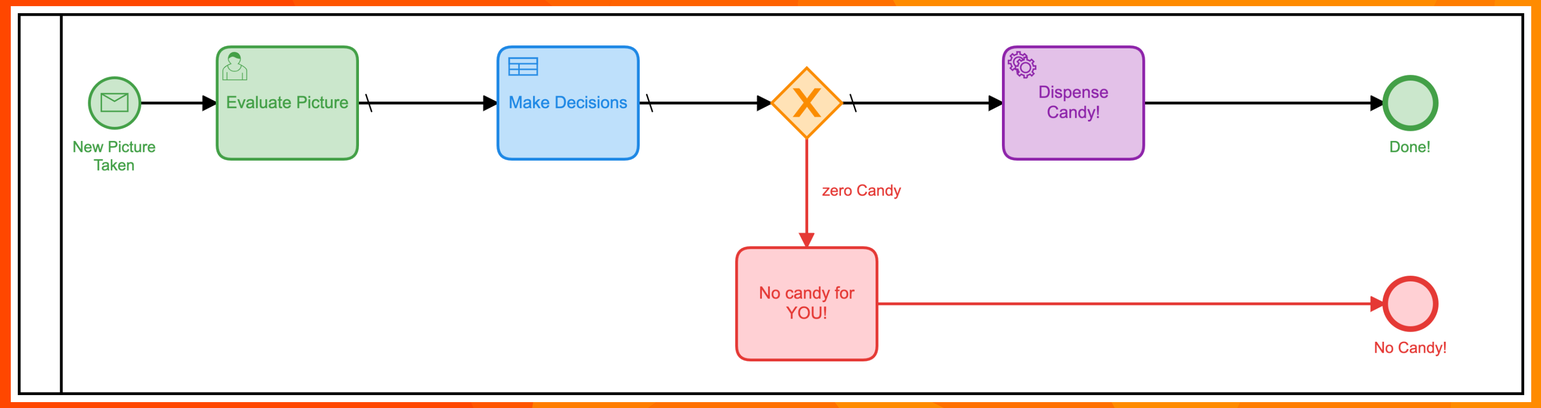
- The candy dispenser I ~~built~~ stole wasn't designed for candy
- It was designed for dog treats
- Dogs are acceptable standins for kids.
  - Fight me.
  - Dont' try to fight them
  - They're useless in a fight.

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



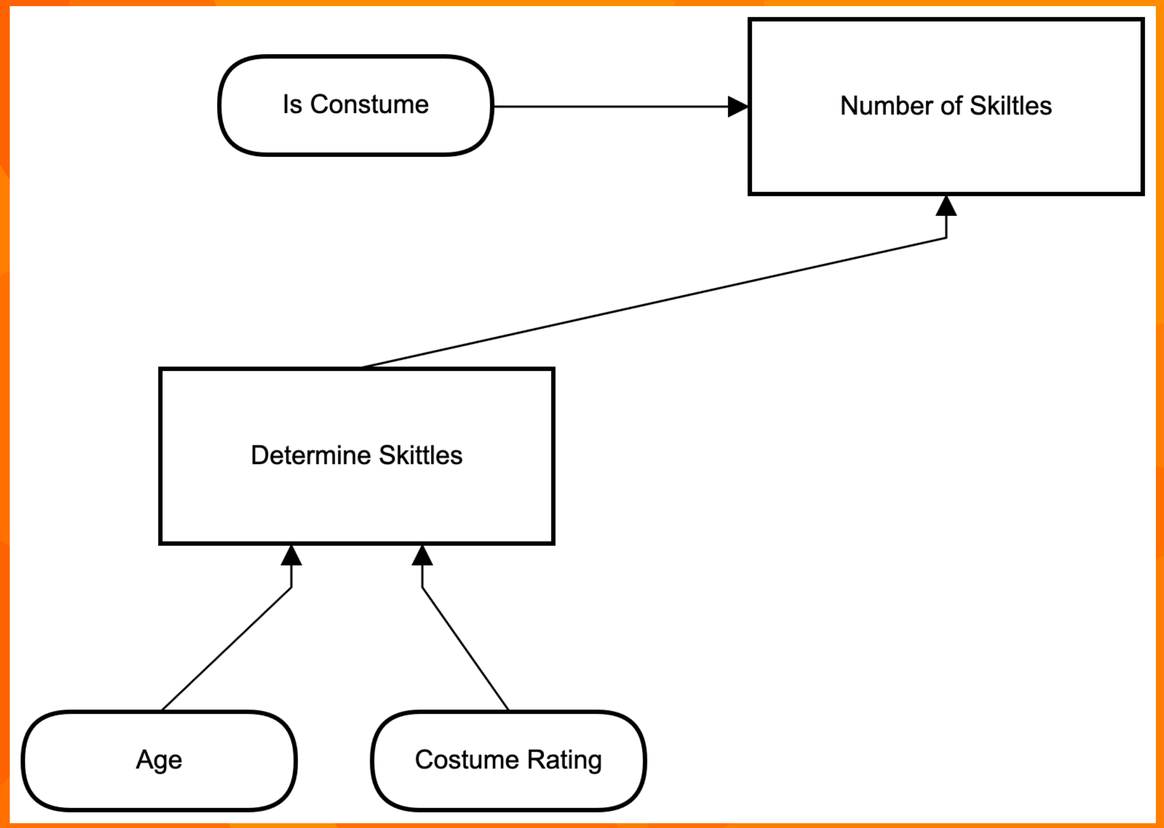
Let's collapse the model



- 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

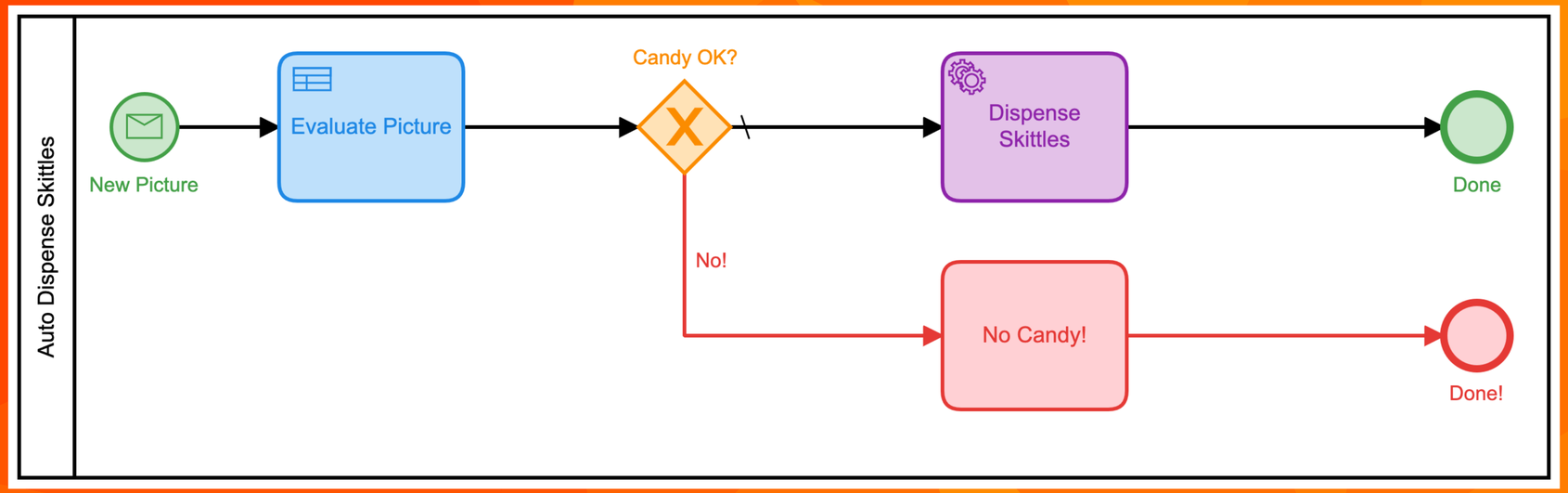


Who needs people anyway?
I did say "automating IoT with BPM"

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

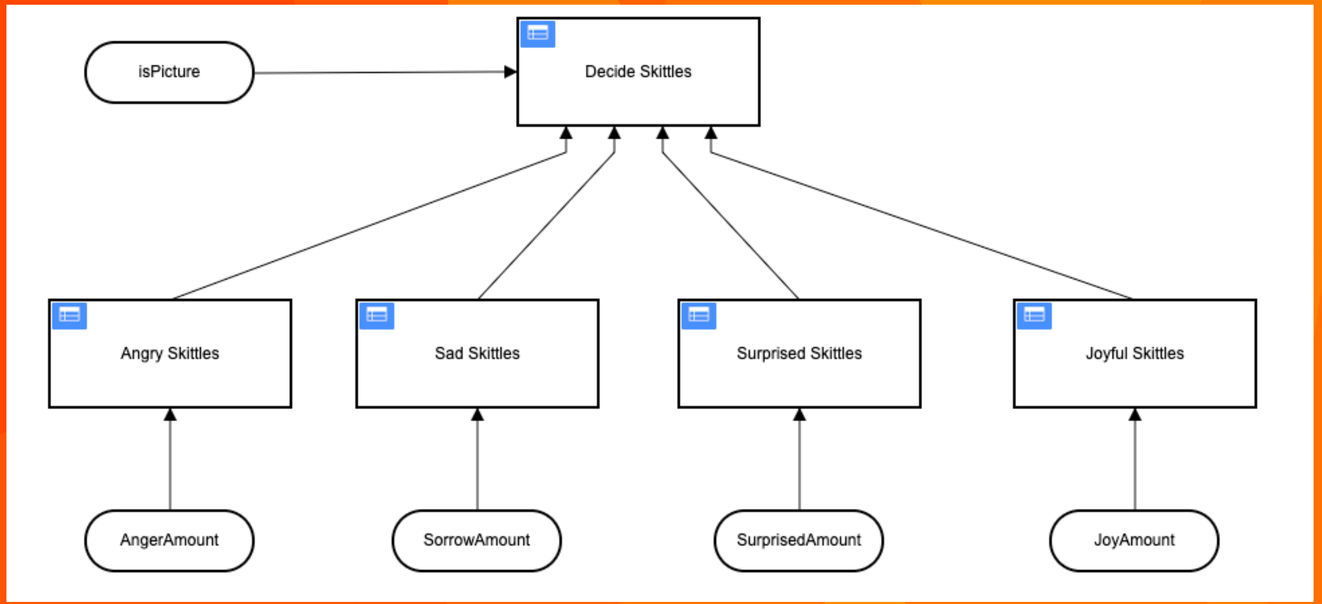
Even shorter Task

- 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

```
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{}
```

- Get the 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

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

Questions?

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