Introduction to STEM Topics

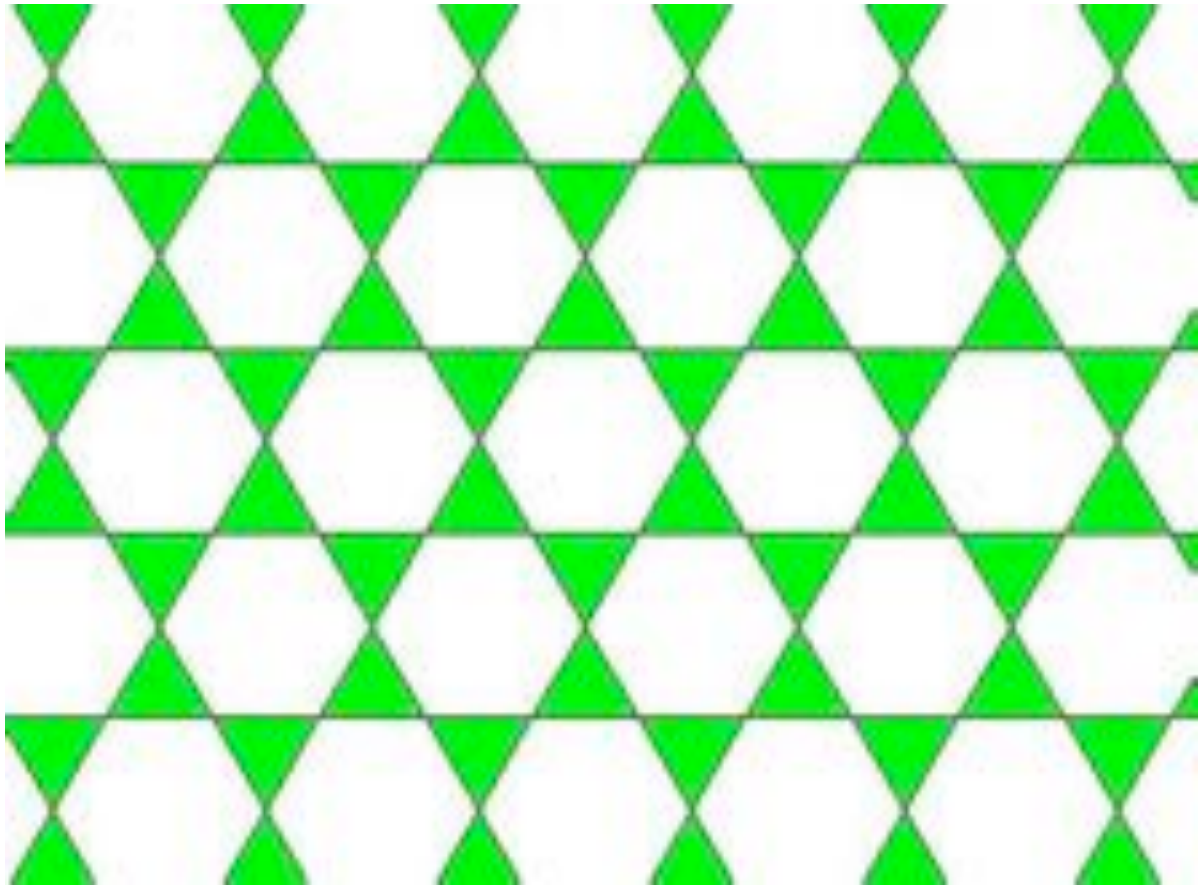
Jim Porell

jim@jimporell.com

STEM = Science Technology Engineering Math

- Patterns
- Ideas
- Inventions
- Fun

There's actually some math here



This is called Tesselation – repeating patterns.
What shapes are these?

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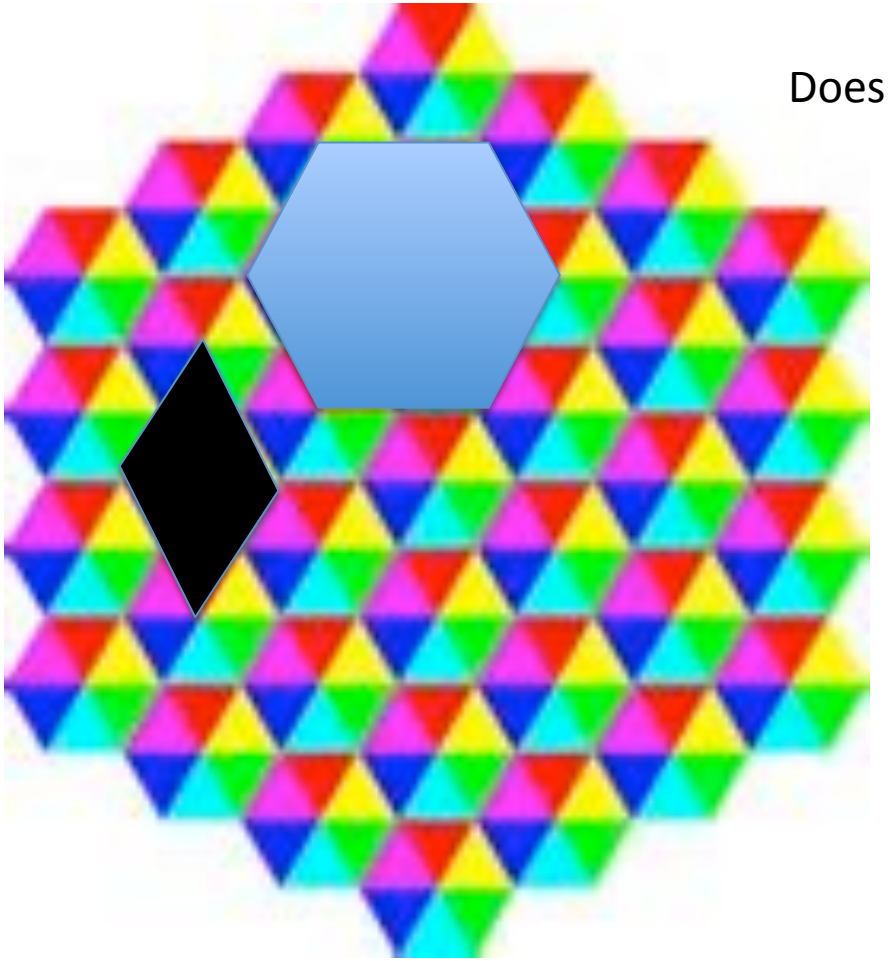


Does it look like it's 3D now?

Is it a diamond?

Is it a hexagon?

Should it be
bigger or smaller?

Some more patterns that repeat

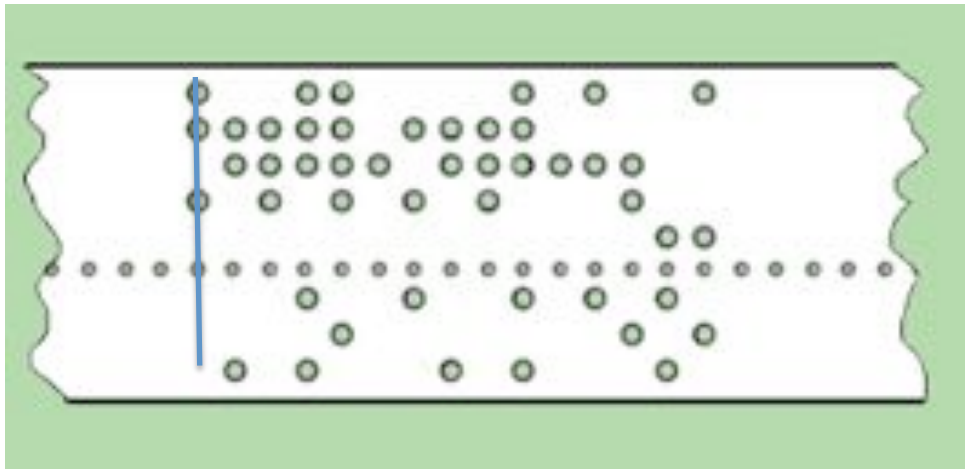
The artist's job is to find something interesting
And then create a pattern around it

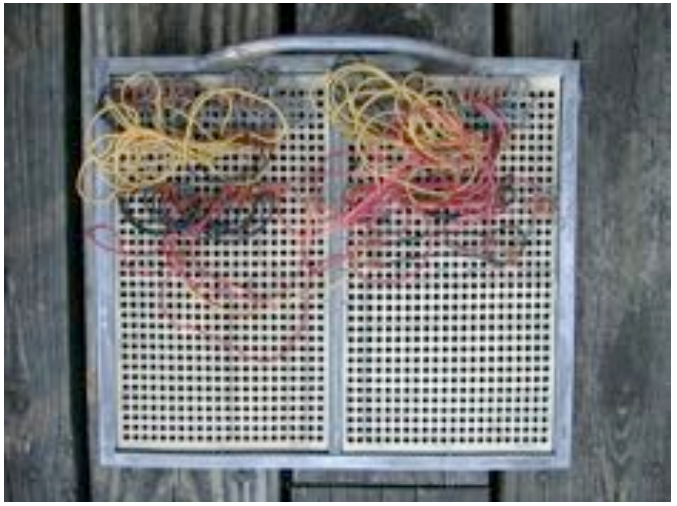

Andre

Repeating things are good

- That's what patterns typically do…they repeat
- Anyone know of some bad patterns?
- So computers are all about patterns and repeating too

Evolution of “temporary” data



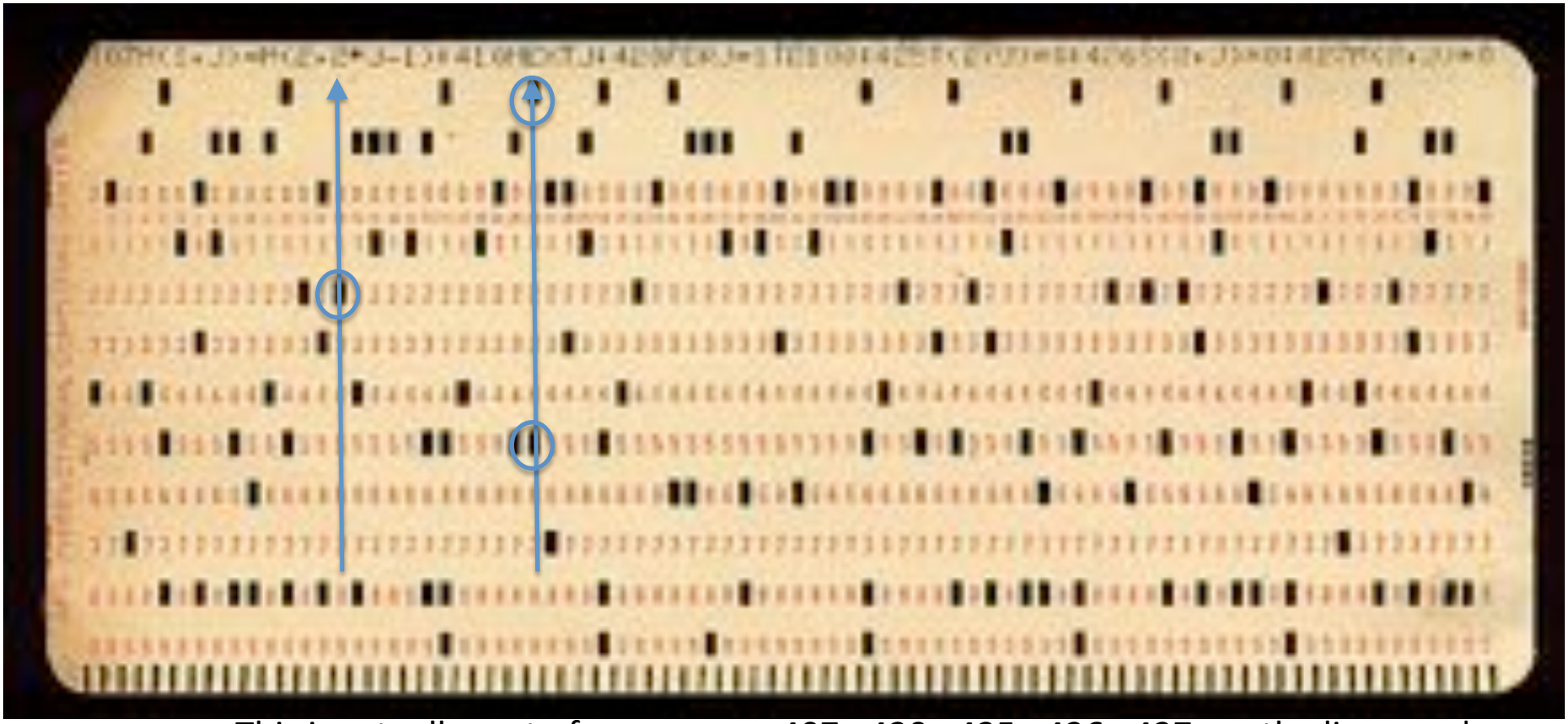


The dots on that line represent one character. What’s a character?
In the after school sessions I’ll show how these patterns are just 1’s and 0’s

Teletype “computer” terminal

This is where it makes the holes in the paper tape

80 Character punch card



This is actually part of a program: :407, :420, :425, :426, :427 are the line numbers

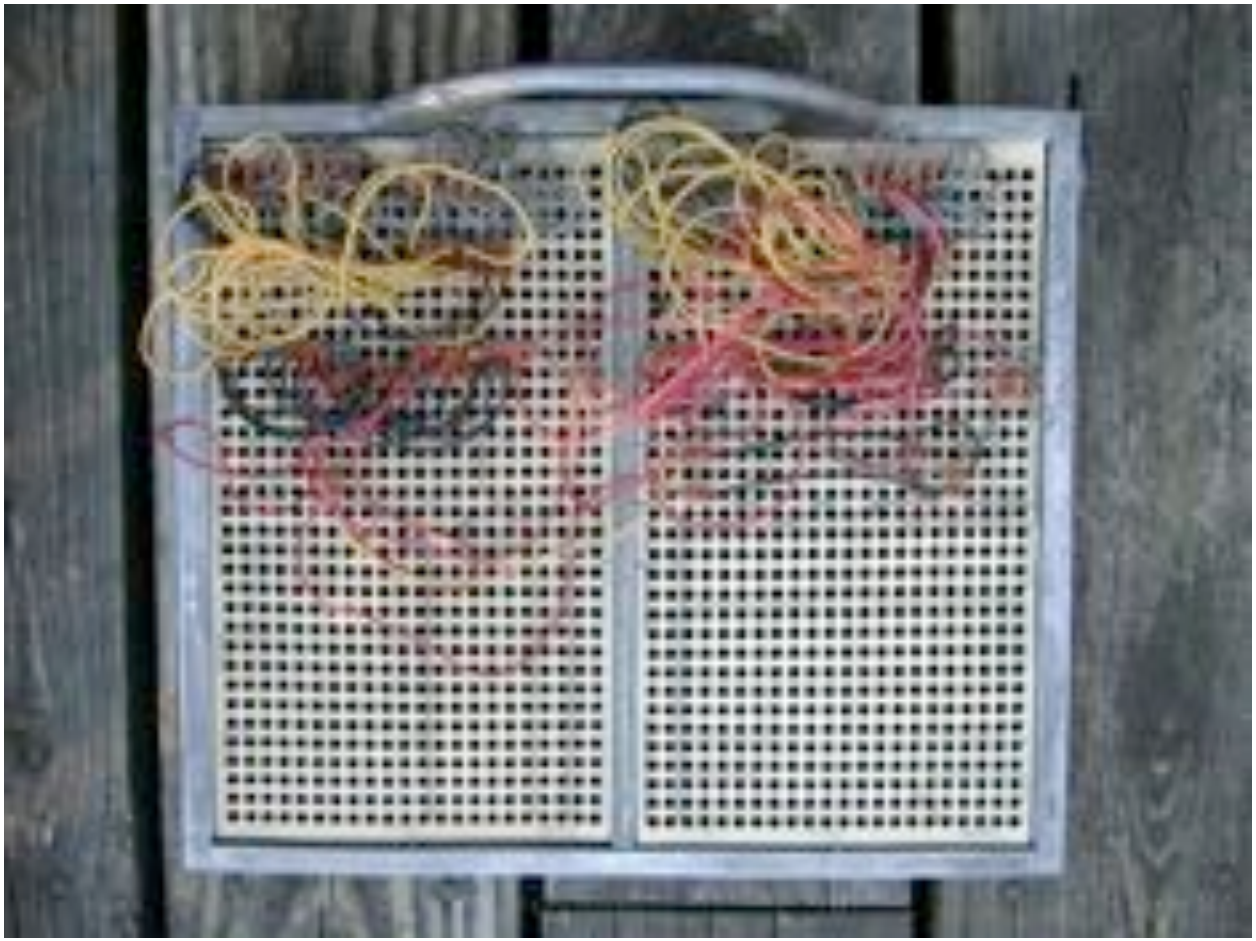
What is a sequence?
Usually, the last 8 characters was a sequence number, but not in this case
Why would you have sequence numbers on the cards?

What if you dropped them?

You’d use the sequence numbers to get them back in order

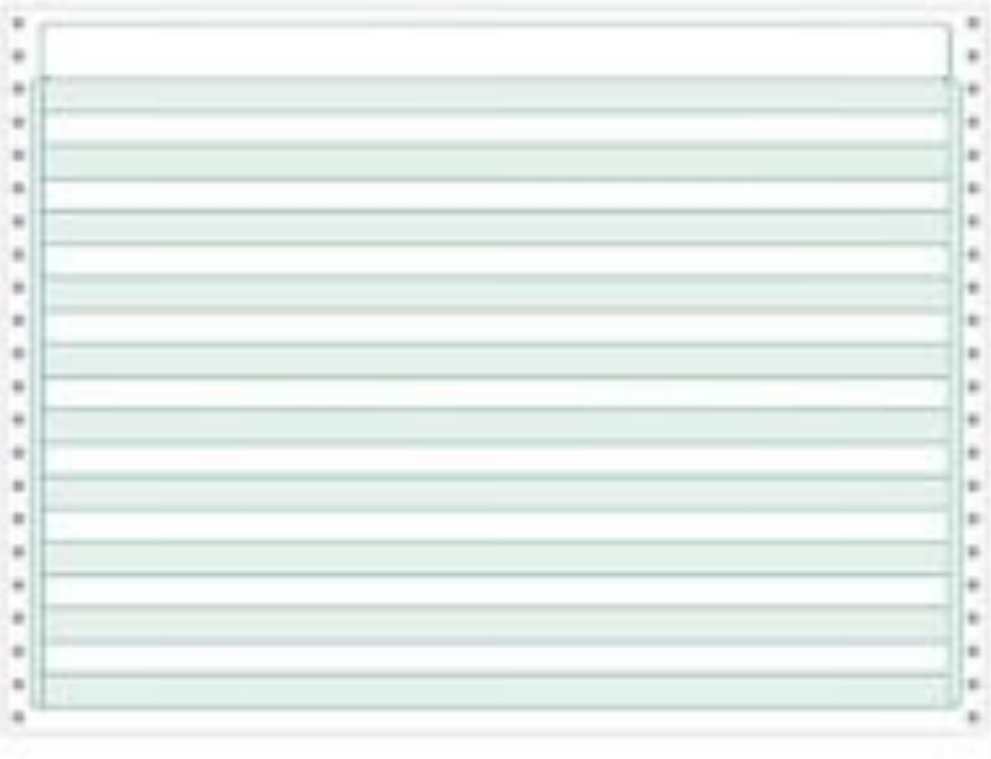
Keypunch machine
Don’t make a mistake!

This is how my original programming was done



Each “program” was on a different board. You could switch the boards
In the computer to run a different program.
No such thing as an APP STORE then ☺

You used to print on paper like this

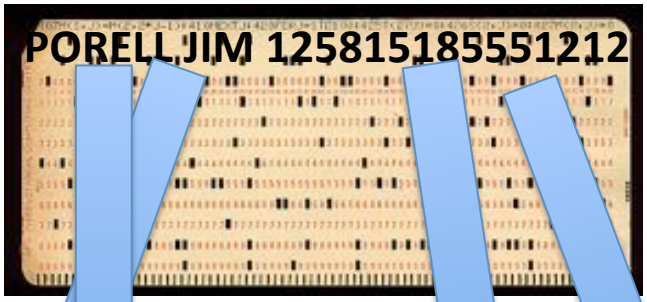


The holes were on a belt to move the paper through the printer.

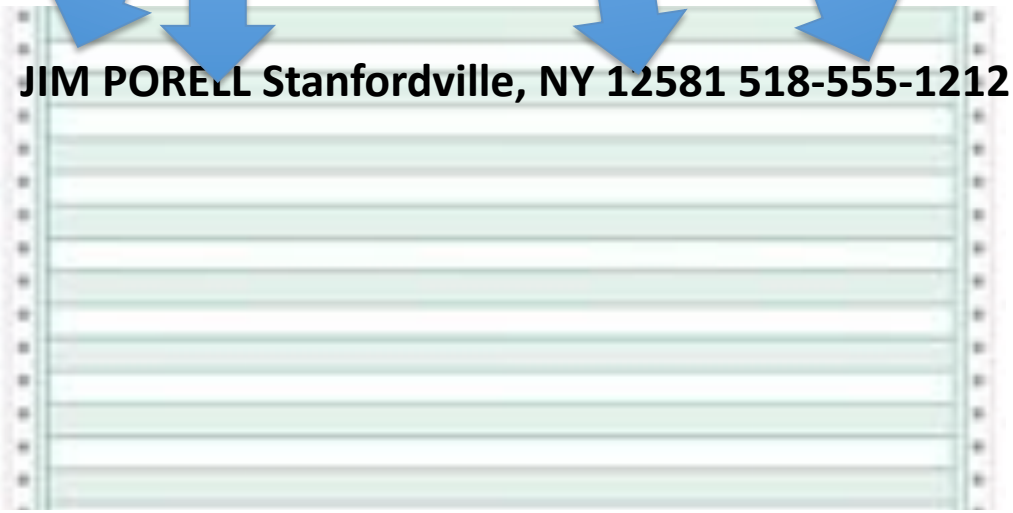
This paper was typically 132 characters across.
Do you know of anything that uses 140 characters?

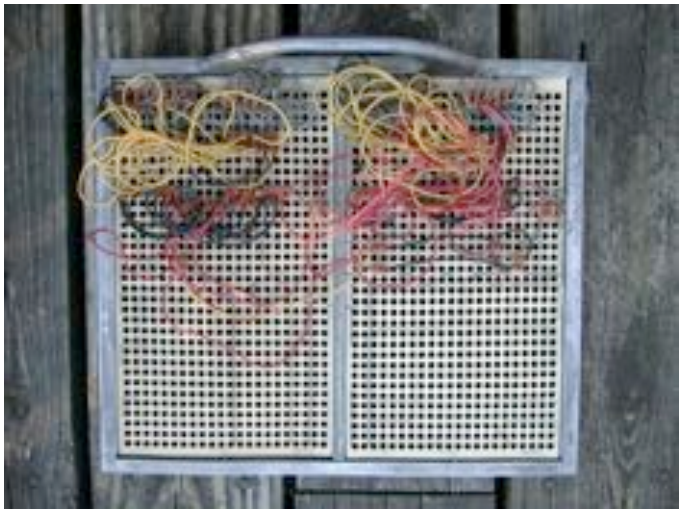
So a program might be:

Take the 72 characters on the punch card



And pri em on the 132 c racte per
E rd becomes a lin n the per
/ aces, comma's to ake it n e readable
ke: Name, Address hone #



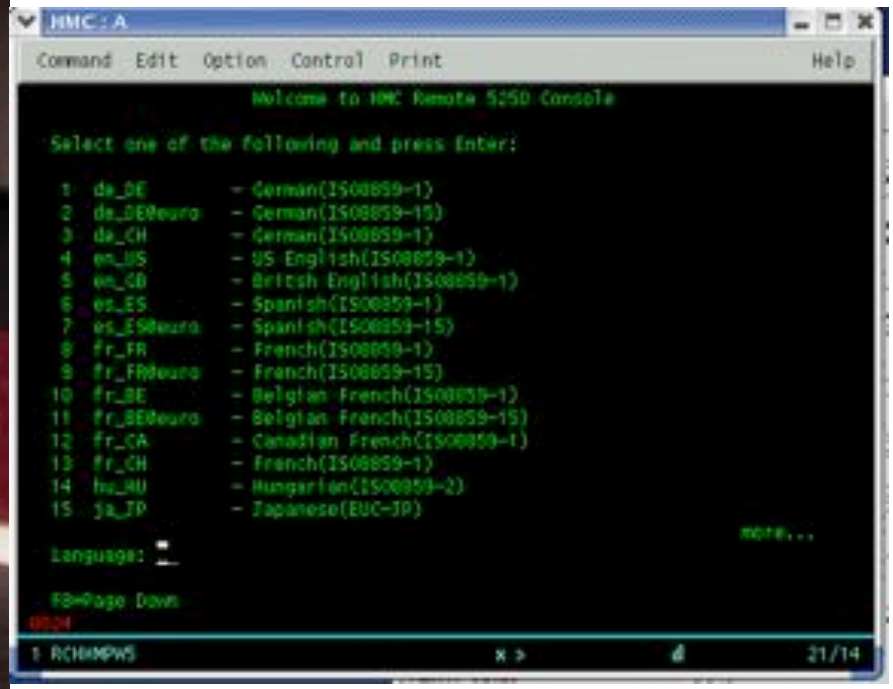


The wires on the board told you what columns on the punch card move to what columns on the pape

You could also add data from other places. Like the zip code changes into the town name

Terminals replaced punch cards

You didn’t waste paper making mistakes



The screen is 72 characters wide – why?

Let’s do an experiment

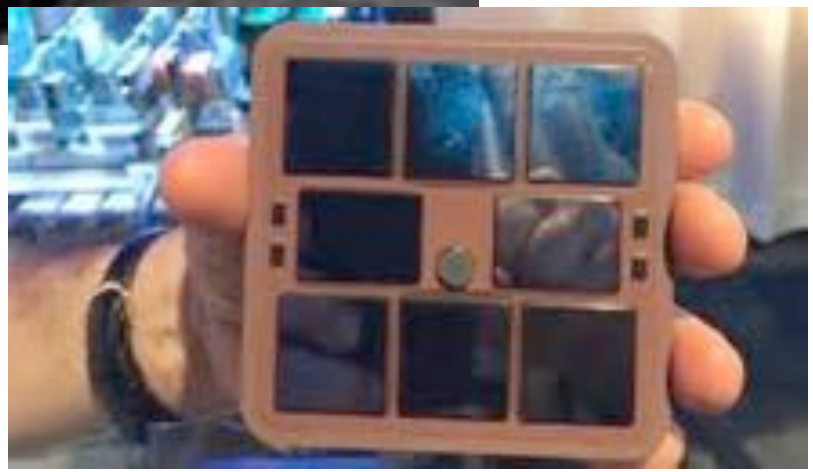
- Can typing or keyboarding be even easier today?

This is the best I can do when I am not looking at the screen
This is the best I cana do whan IU am not looking at the screen
This is the vest I can do when I am not looking at the screen

Here’s what a mainframe computer looked like in 1990

Here's what it looks like today

- It's the size of a refrigerator
- It's one MILLION times faster
- It uses the same amount of Electricity as the toaster in the cafeteria
- It can run 1000's of programs at the same time
- Millions of people can be using it at once
- Remember the wires before. Now that is all on chips.



Now let’s look at cars

This is a 1939 Nash

The engine is very simple

This is a 2014 Buick Regal

The car is smaller, but faster and uses less energy. Just like the new computer
The engine is more complex and includes many computer chips too

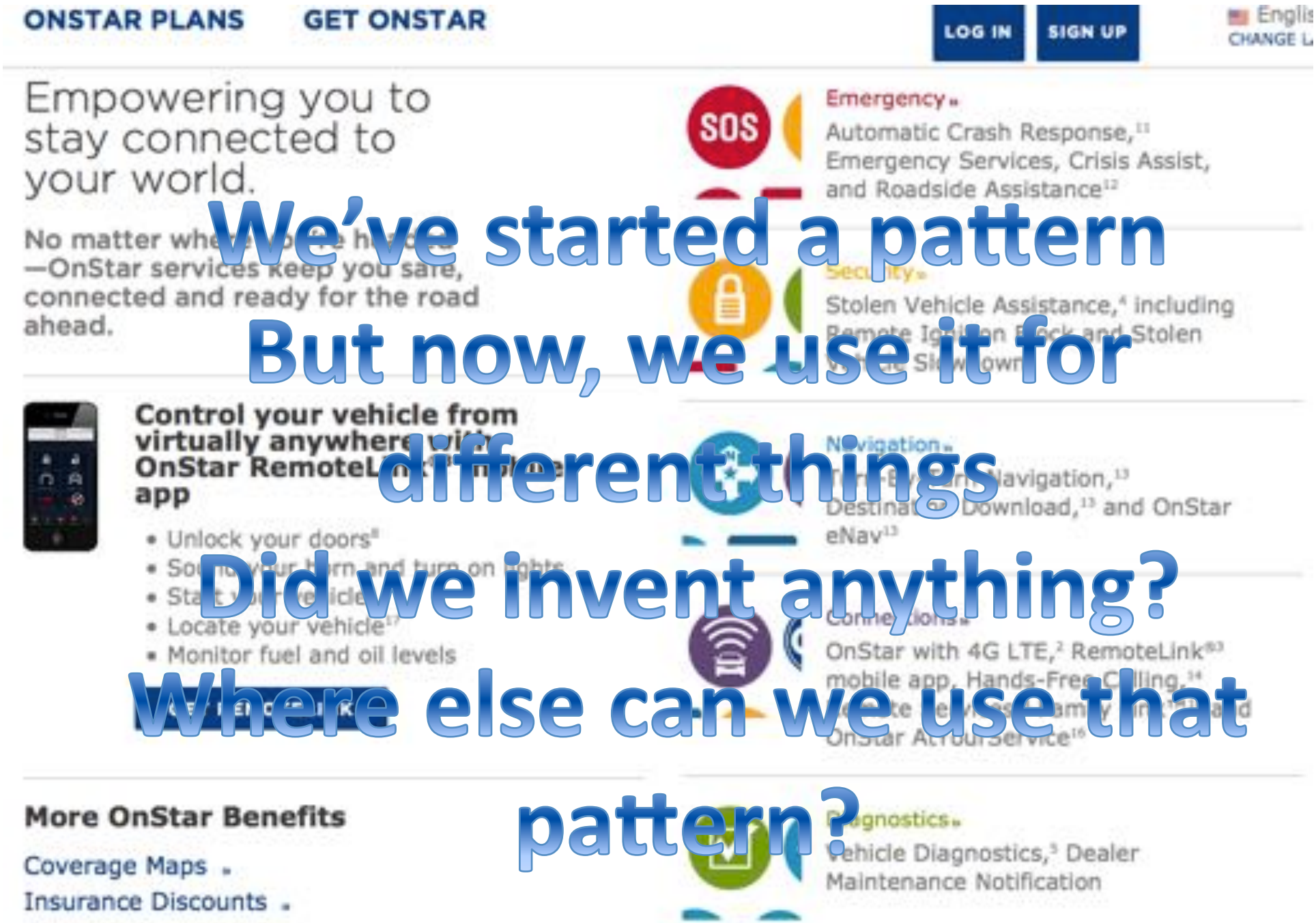
This computer was the first to “call home” if it had a problem

So let’s take some simple things and add them to the car based on what we learned from that big computer

GPS

Cell phone

An engine with computers



We've started a pattern

But now, we use it for different things

Did we invent anything?

Where else can we use that pattern?

What else can we do with this pattern?

GPS

Cell phone

HELP **Life Alert**
I've fallen and I can't get up!

1-800-852-3081

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Medical Emergencies ▪ Fire Protection ▪ CO Gas Protection ▪ Home Intrusion ▪ Mobile Apps

Call Now 24/7

Saving a LIFE
from a potential catastrophe
Every 10 Minutes!*

Protection Services
- Medical Emergencies
- Fire Protection
- CO Gas Protection
- Home Intrusion
- Emergency Cell Phone
- App On Your Cell Phone

① Press

② Speak

We talk to you, whether you can reach a phone or not, and send help fast, 24/7

③ Help

GPS

Satellite Phone

Military Plane

Spy Satellite

You are in the desert, in a war and you don’t know if bad guys are on top of the mountain or behind them
What should you do?

Let’s look how “spy planes” and then “drones” have changed

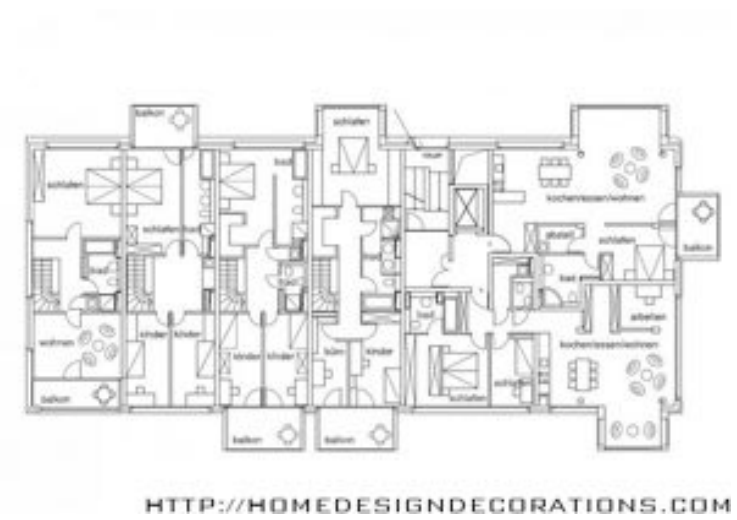
Anything else?

GPS

Cell phone

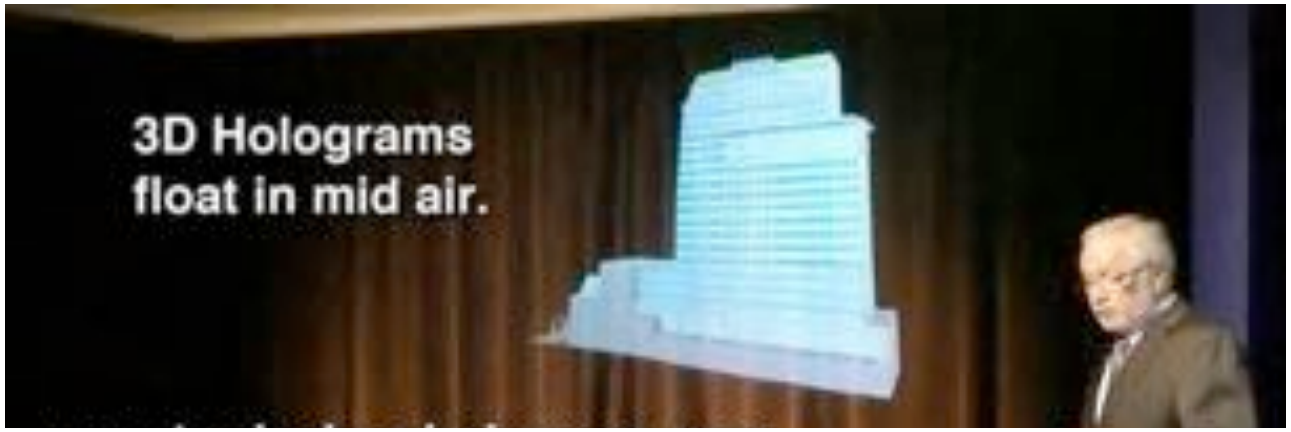
Fingerprint reader

Virtual Reality Goggles

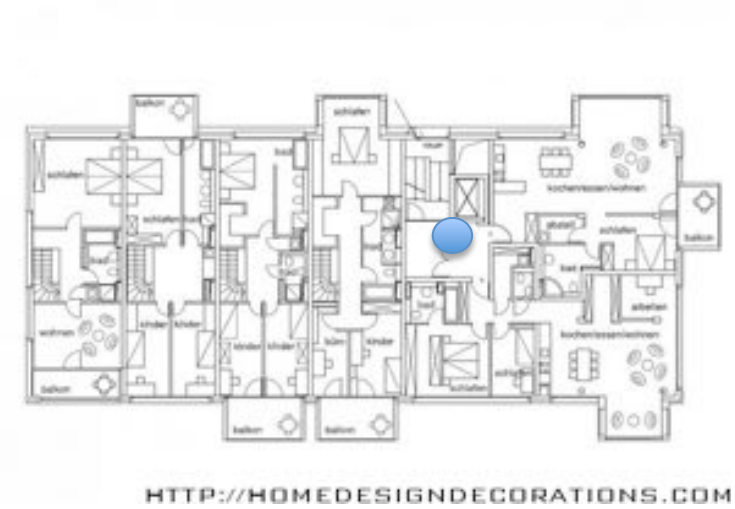


Blueprints of a building

A fireman could see the plans of a building and know where they are in a building



But if someone stole the goggles,
They couldn't see anything
Since their fingerprint isn't registered



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- Ideas
- Inventions
- Fun

- We are going to have after school sessions every Thursday in February.
- We'll talk about games, music and art
  - We'll play some games too
  - We'll use a little math as well
- We'll talk about jobs that use patterns and create these ideas
- Hopefully, you'll see more patterns in your own life and have some fun learning about them