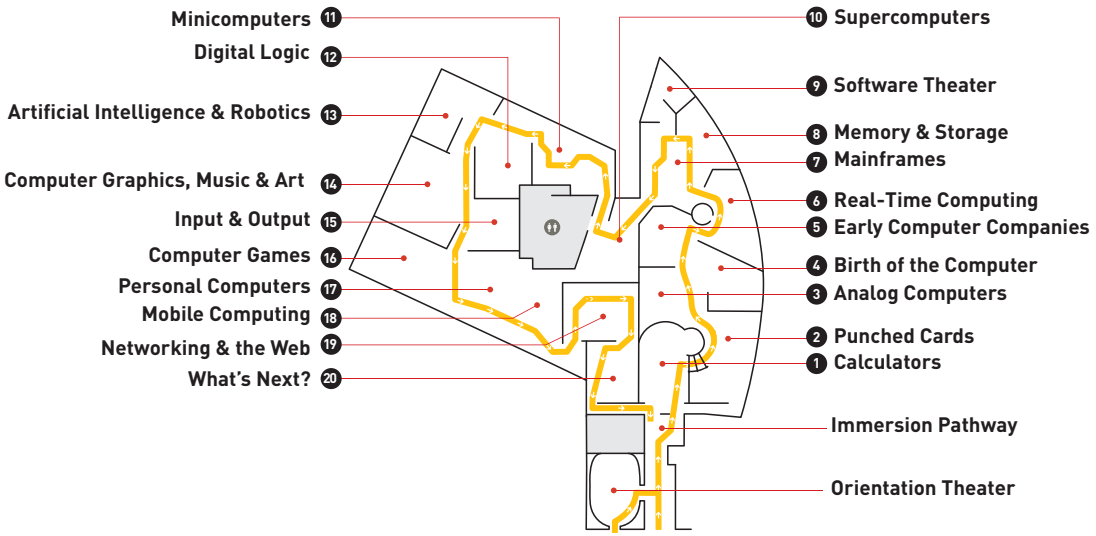
1

2000

2

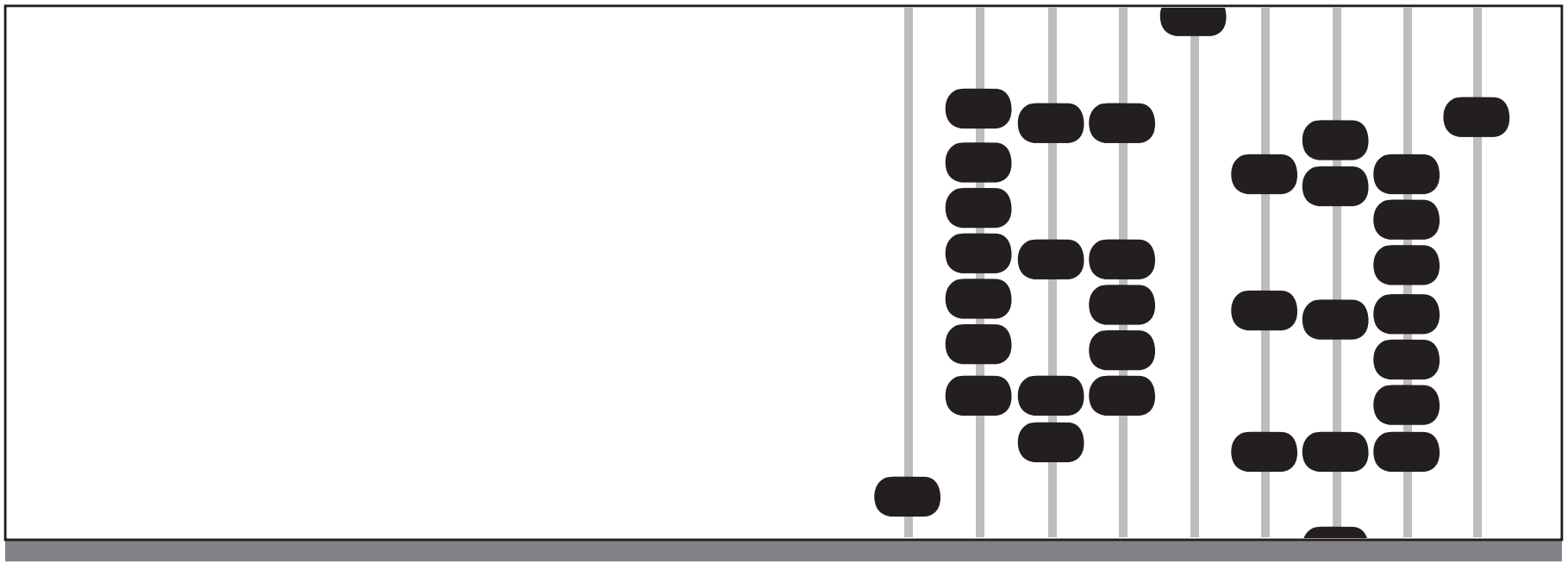


REVOLUTION

THE FIRST 2000 YEARS OF COMPUTING

2000 years? That's a lot of history! Computers haven't been around that long, but they got their start back then, with tools that people made to help them count and use numbers. This Discovery Deck is a tool, too: use it with your friends and family to discover some of the stories from the first 2000 years of computing. Then, just imagine: what do you think will happen in the next 2000 years?

3



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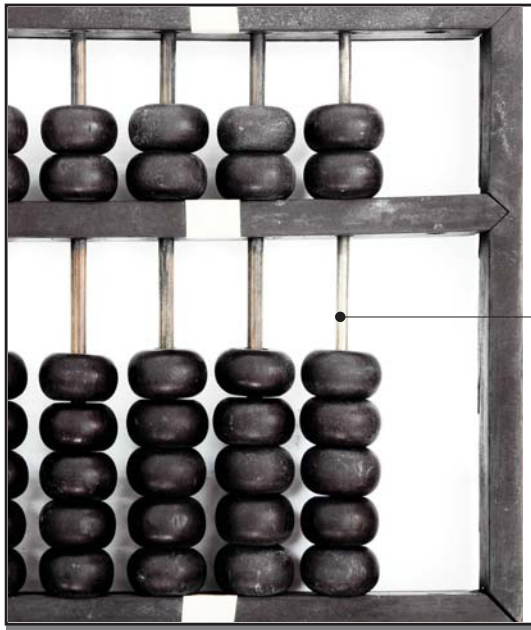
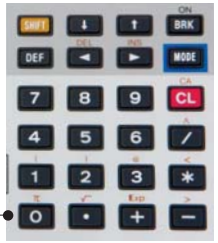


CALCULATORS

63: NUMBER OF BEADS IN A TRADITIONAL CHINESE *SUAN PAN* ABACUS

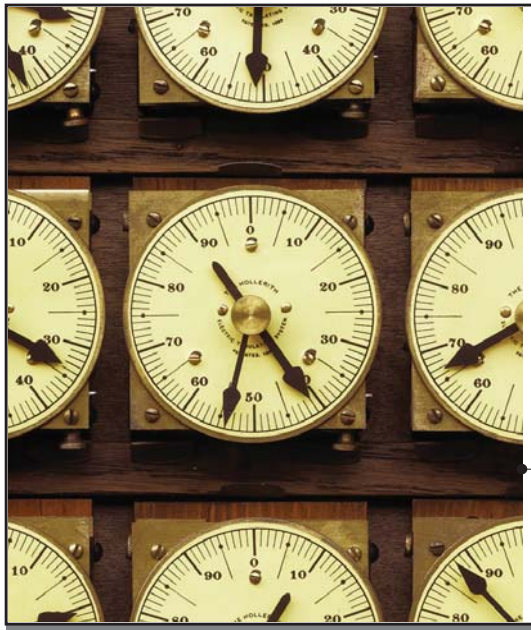
Numbers! They're the language of computers. But how did people work with numbers before computers? One answer can be found just by looking down at your hands: can you find 10 things that help you count? Look around this gallery and you will find many more. Beads, tiles, slide rules—some of them have helped people do math for thousands of years. See if there are any **calculators** that look familiar. Which ones were around when your parents were your age?



5

63,000,000

6



PUNCHED CARDS

63,000,000: NUMBER OF PEOPLE LIVING IN THE UNITED STATES IN 1890

How long do you think it would take to count every single person who lives in the US? The government has done this every 10 years since 1790; by 1890, the country had grown so big that older ways of counting didn't work anymore. Herman Hollerith solved the problem by inventing a machine that recorded information about people as patterns of holes in paper cards. His "**tabulator**" was a technological revolution and was the first step in creating a giant computer company, IBM (you can see lots of their machines in this gallery). **Punched cards** became so successful that they were used in computers for over 70 years afterwards.

7

8

BIRTH OF THE COMPUTER

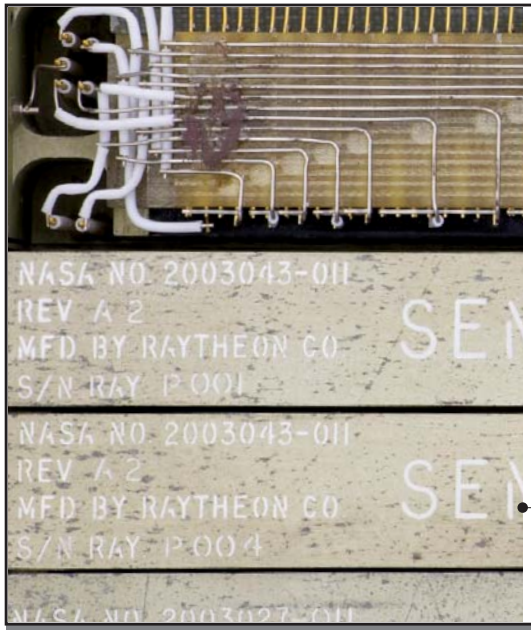
1: ONE-OF-A-KIND

Your fingerprints are unique—and so were the first computers. Early on, if you needed a **computer**, you had to build it yourself. Look carefully at all the computers in this gallery: each was made to solve specific problems, and every single one is the only **one of its kind**. What makes each of them different from the others? How are they similar? Imagine what it would take to build a computer that's like nothing else in the world! What kinds of problems would you want it to solve?

9

7|20|69

10



REAL-TIME COMPUTING

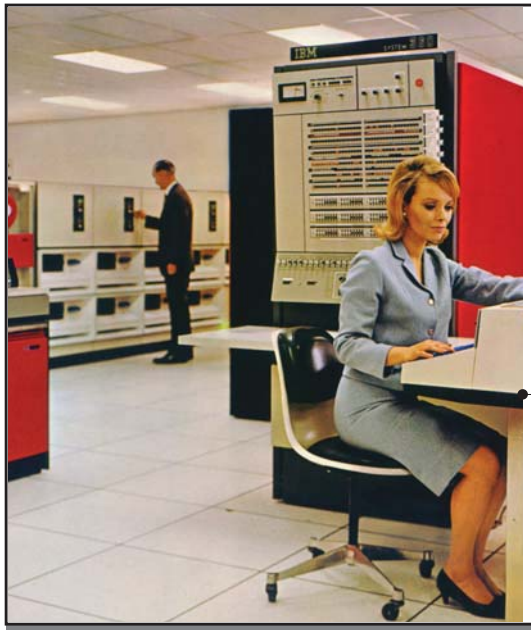
7/20/69: DATE OF THE FIRST MOON LANDING

Did you know that there are computers in your car? The thermostat in your house? Maybe even your washing machine? Many modern devices are controlled by computers that use information from the real world to make very quick changes to what the machines are doing. (House too cold? The heat turns on!) Real-time computers have done the most amazing things. Look around and see if you can find one that was used on a naval ship, in an airplane, in a rocket that went **to the Moon**—even in a **human body**! When you go home, see how many real-time computers you can find around the house.

11

360

12

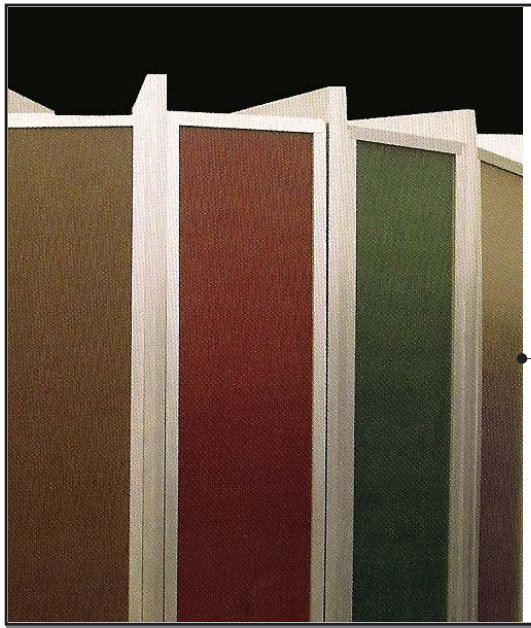


MAINFRAMES

360: NAME OF IBM'S MOST SUCCESSFUL MAINFRAME COMPUTER FAMILY

The computers you see here are only small parts of much bigger ones, called **mainframes**. An entire mainframe could take up a whole room! But even though they were big, they were limited in what they could do. If a business or company outgrew its mainframe, it sometimes needed a whole new computer. Small computers are more common today, but big companies still use mainframes. You may not know it, but there's probably one helping your family's bank give out cash at the **ATM**.

6



SUPERCOMPUTERS

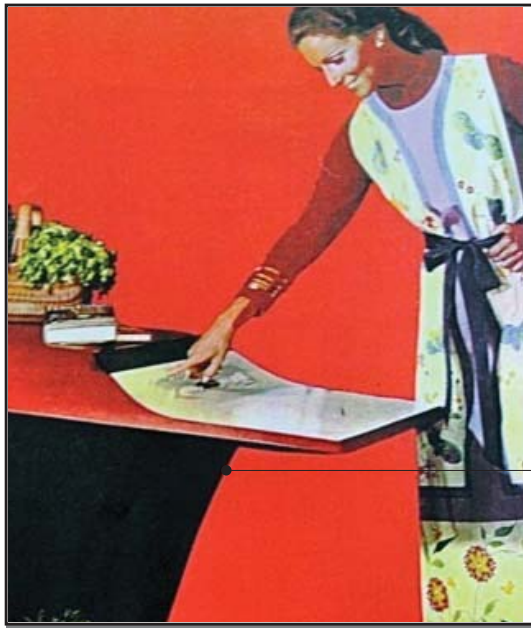
6: NUMBER OF MONTHS IT TOOK TO WIRE A CRAY-1

What is the most powerful computer? From 1976 to 1982, it was the **Cray-1**. The Cray-1 was a supercomputer—it was super-big, super-fast, and super-expensive. It also used a super amount of electricity: 100 homes could have run off the power it used! The Cray-1 had 60 miles of blue and white electrical wires inside, every single one connected individually, by hand. Wiring it was like weaving a tapestry or doing a giant puzzle; the **women who worked on it** needed a super amount of skill and patience to do it right.

15

2

16

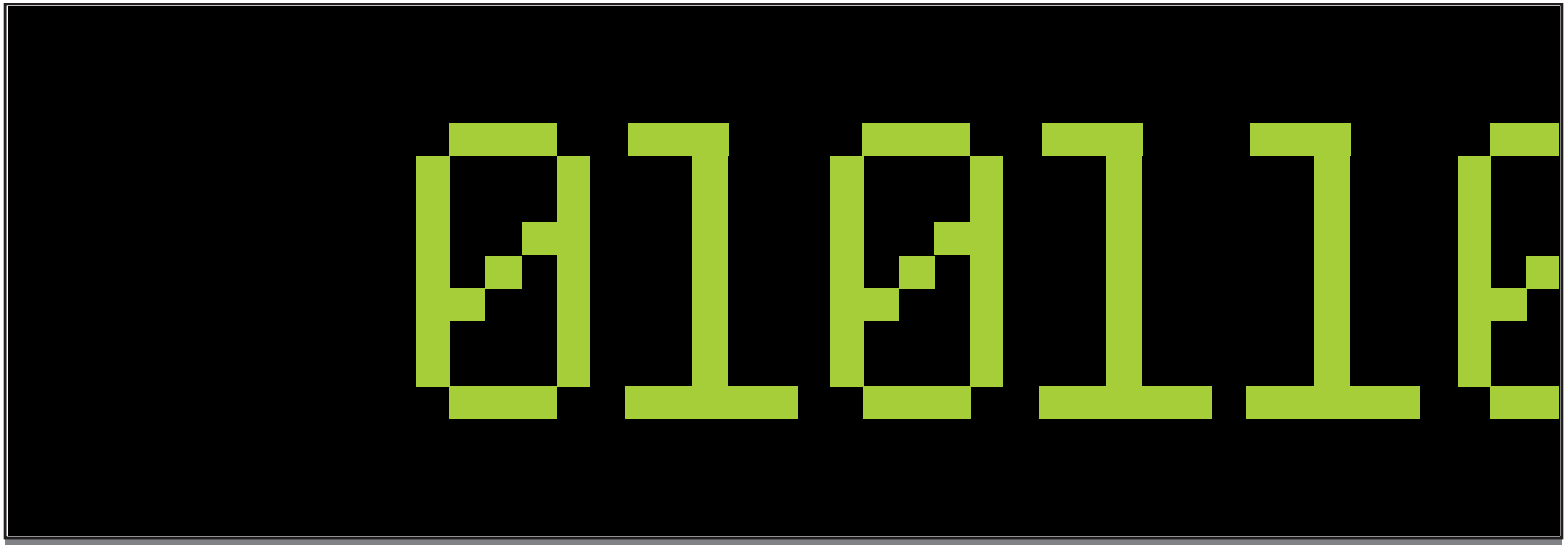


MINICOMPUTERS

2: NUMBER OF WEEKS NEEDED TO LEARN HOW TO USE THE KITCHEN COMPUTER

In 1969, computers were getting smaller, but the idea of a home computer still seemed impossible. So people dreamed up a computer that could store recipes and advertised it to see if anyone would buy one. But it would have cost $10,000—almost as much as a house! No one ever bought a **kitchen computer**, but the dream of having a computer to store recipes never went away. An example is the **Betty Crocker Cookbook**, a handheld recipe database which can be found in the "Mobile Computing" gallery.

17



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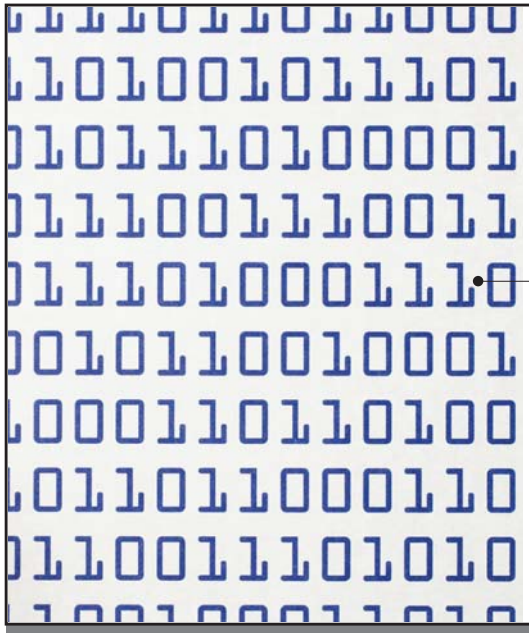


DIGITAL LOGIC

010110: BINARY CODE

Does **this number** look like a secret code? It is a code, but it's no secret: it's binary—the "language" of ones and zeroes that people use to make computers work. See all those tiny **spider-like transistors** around the gallery? They help translate binary code into instructions, telling a computer how to do math, create words or pictures—even move around. The more transistors inside a computer, the more instructions it can follow, and the faster and more complicated its work can be. Today, billions of transistors can be squeezed into even the smallest digital device...all of them being told what to do by ones and zeros.

19

1920

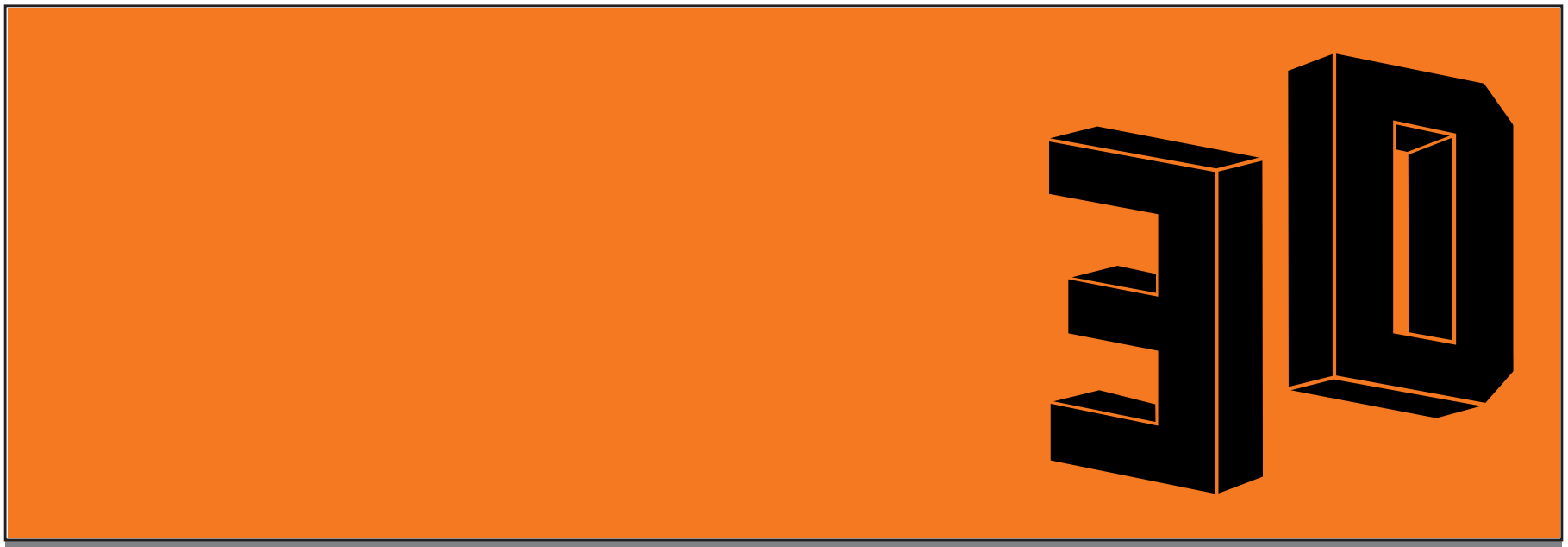
20

ARTIFICIAL INTELLIGENCE & ROBOTICS

1920: YEAR THE TERM "ROBOT" WAS COINED

Look at all the robots! Almost 100 years ago, in 1920, a writer named Karel Čapek wrote a play in Czechoslovakia; in it he invented the word "**robot**" to describe characters that were created to serve humans. Similar to Čapek's machines, many of the robots you see around you were designed to help people with their work or research; others were just created for fun. What uses could you find for **Squee**, the robot squirrel? Shakey? Officer Mac?

21



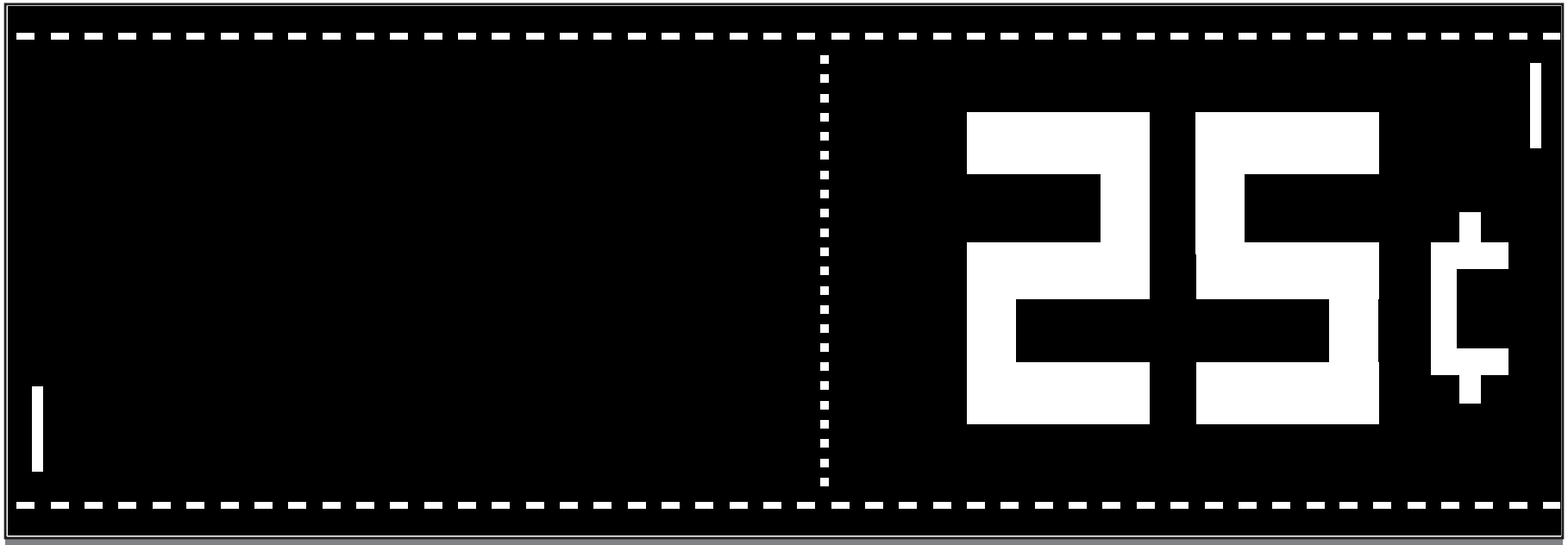
22

COMPUTER GRAPHICS, MUSIC & ART

3D: 3-DIMENSIONAL

In 1975 a computer scientist at the University of Utah was trying to figure out how computers could make realistic pictures of 3-dimensional objects. He searched for the right model. Hmm...a block would be too easy...and something like an octopus might be too hard...but a **teapot** was perfect! It had rounded curves, straight lines, and a handle that was a challenge. The "**Utah Teapot**" became the standard model in computer-generated images for more than 20 years. You may have seen it as Mrs. Potts in Disney's "Beauty and the Beast."

23



24

COMPUTER GAMES

25¢: COST TO PLAY ONE ROUND OF PONG IN 1972

How much would it cost to play video games at home if you had to pay 25 cents every time you pressed "start"? Years ago, computer games were found only in public places such as arcades, amusement parks, and pizza parlors. Players had to insert coins into a slot to make a game begin. You can still find video games in public places, but many people also have them at **home**. If you use any of the games in this gallery, keep track of how many times you play. How many quarters would you have had to spend if you were at an arcade?

II

PERSONAL COMPUTERS

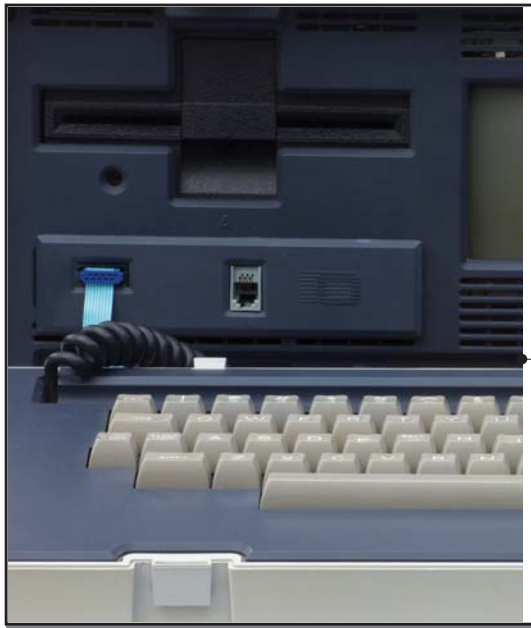
II: APPLE II

Doesn't everyone need a computer? 40 years ago, only a few geeky guys who liked tinkering with electronics thought the answer should be yes. Steve Jobs and Steve Wozniak, working in a family garage not far from here, invented a computer that anyone could use, without having to build one themselves or write binary code. They sold millions of Apple computers, and then lots of other people got into the act. Bill Gates and Paul Allen started **Microsoft**. And what about those guys over at Google, just down the street from this museum? Ordinary people like these have changed the world by inventing extraordinary technologies.

27

23.5

28



MOBILE COMPUTERS

23.5: WEIGHT, IN POUNDS, OF THE OSBORNE COMPUTER

Find the **Osborne 1 computer**. Can you lift it? Is it heavy? The Osborne was one of the first "mobile" computers, meaning it was designed to be taken from place to place—a breakthrough in computing technology. People have always looked for ways to take their tools with them, but it wasn't always possible with computers. Remember the giant computers that you saw earlier in the exhibition? In comparison, the Osborne is small, light, and tiny! What is the **smallest computer** you've seen lately?

29

2,000,000,000+

30

NETWORKING AND THE WEB

2,000,000,000+: NUMBER OF PEOPLE AROUND THE WORLD WHO USE THE INTERNET

Sometimes it seems like everyone is connected online. But once, the idea of getting different kinds of computers to "talk" to each other seemed impossible, like trying to connect your dishwasher to your microwave. In 1969 a US government agency started the first big experiment in networking computers together. They used **IMP**s like the one you see in this gallery. The first connection was made late at night between a programmer in Los Angeles and another in Menlo Park. From this small beginning came the enormous **online world** we use today. Quick! Text a friend to tell them about it!