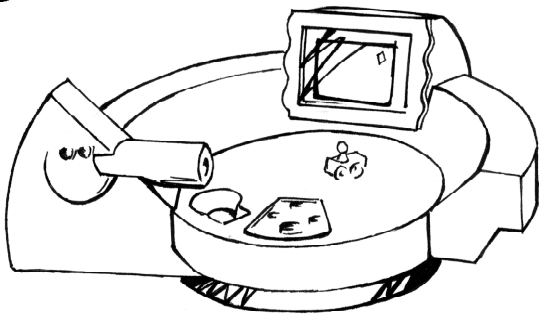


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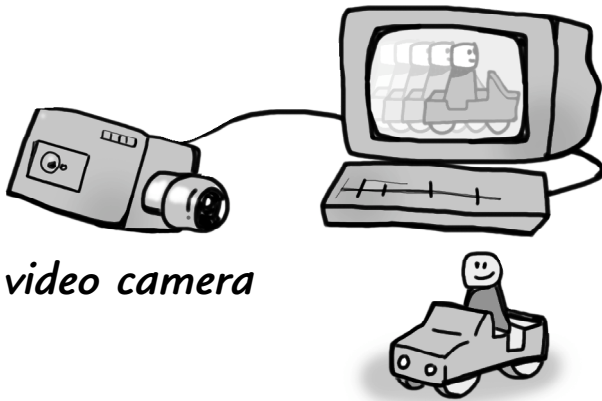
Animate It!



What to do: Sit in the Director's chair, arrange your set and start shooting.

What happens: You can make a twelve-frame animated film!

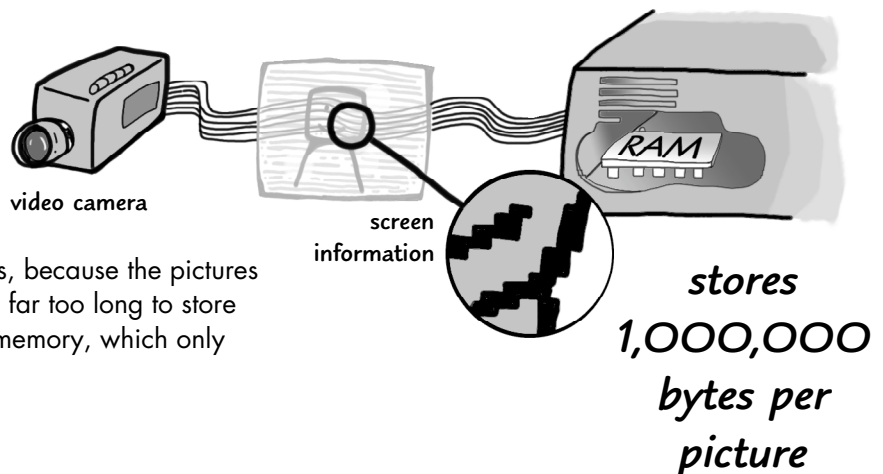
HOW IT WORKS



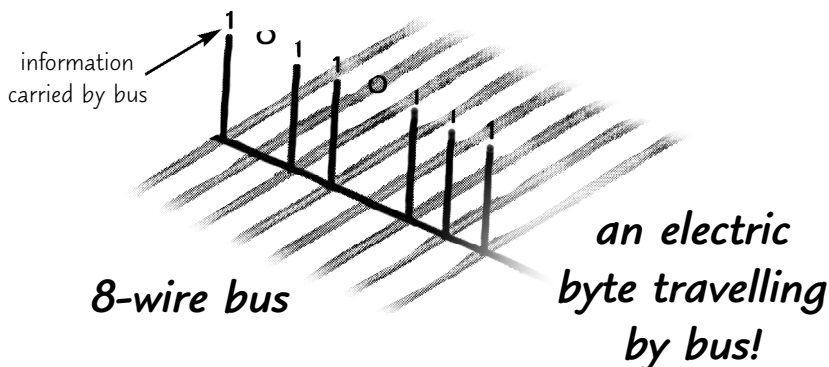
video camera

1. The TV camera will take up to 12 pictures of a scene and store them in the computer's memory. The pictures can then be shown in sequence on the monitor screen, and at different speeds.
2. A scene is set up using small plastic figures, etc. Animated pictures are made by shifting the models slightly and taking one picture at a time between movements. When the pictures are shown rapidly in sequence, the illusion of movement is produced. The idea of the "return previous picture" button is so you can check that you have moved the scene sensibly.

3. A video-camera normally records on magnetic tape, but in this exhibit, each image is stored directly in the computer's memory. The screen has nearly half a million **pixels** (picture cells), with each pixel requires 2 bytes of information to specify its colour and brightness, This makes about one **megabyte** (1 million bytes) of information to specify each picture, so twelve pictures need 12 megabytes of **RAM** (Random Access Memory) space for storage. The computer in the exhibit has 16 megabytes of RAM space.

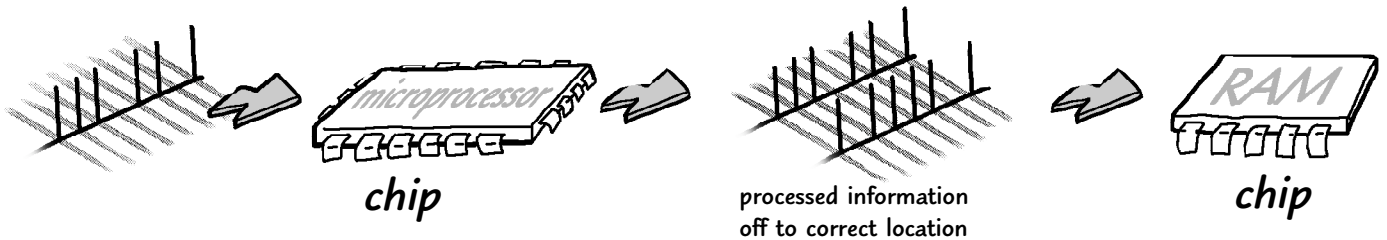


It has to be RAM; which allows very fast access, because the pictures are replayed in rapid succession. It would take far too long to store the information from the computer's hard disc memory, which only recalls at about one megabyte per second!



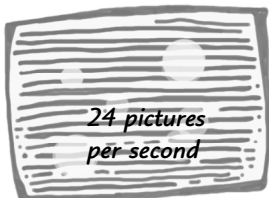
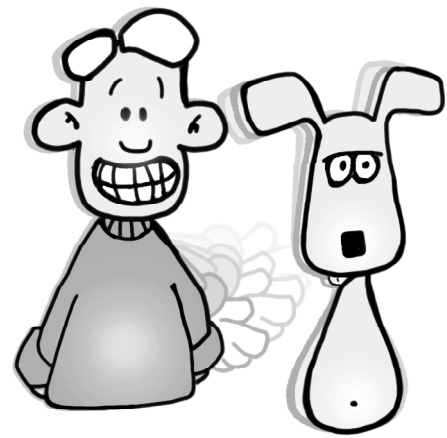
4. Each byte consists of eight bits - a bit being either an electric voltage or nothing (a 1 or a 0). All of the sections of the computer are connected by "busses" of parallel wires, so that entire bytes can be sent as single entities from one place to another.

5. The processing occurs in a microprocessor which works incredibly quickly. In less than one millionth of a second, the microprocessor collects six fresh bytes of information from the camera, and then sends the output information onwards to the memory locations. When the pictures are being replayed, the microprocessor works just as quickly, collecting the bits from the memory locations and passing them on to the monitor to produce a picture on the screen.



DID YOU KNOW?

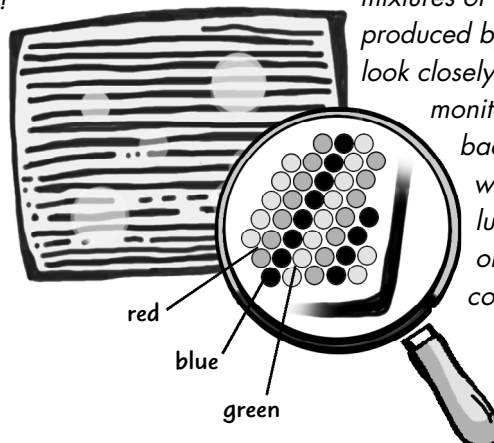
- Cartoons are often made by showing sequences of pictures of models, with slight shifts in position between pictures. ("Wallace and Gromit" and "Morph" are good recent examples.) 24 pictures per second give us the illusion of continuous movement. Most cartoon films get away with less than this, often by showing the same picture twice or even three times.
- Television pictures and cinema pictures work in the same sort of way - 24 static pictures appear every second on your screen, so that small changes from one picture to the next are seen as steady movement.



In the case of TV, the picture is built up line by line (625 lines in each picture) during each twenty fourth of a second!

625 lines

- There are fancy ways of compressing the information in pictures, which reduce the amount of memory space required. Since if entire picture does not change with each frame, a system of recording only the change in each successive frame (picture subtraction) produces considerable memory space savings. Similarly, the colour and brightness of pixels does not always change from one pixel to the next, so a system of specifying how many pixels remain the same along a picture line can reduce the amount of information to be stored. Our exhibit, however, is not as sophisticated as CD Rom players and stores each pixel separately.



- The colours on the screen are made up of mixtures of red, green and blue light produced by glowing phosphor dots. Look closely at a TV or computer monitor and you will see that the back of the screen is covered with lots of dots or lines of luminous paint which glow red or green or blue to make any colour of the rainbow.

THINGS YOU CAN TRY YOURSELF

- You can draw your own cartoon on the margin of the pages of a redundant book. Choose some simple shape (e.g. a matchstick figure) and use a sharp pencil, so that the impression of the last picture you have drawn can be seen on the next page. Small changes in each drawing produce realistic movement when you flick the pages!

