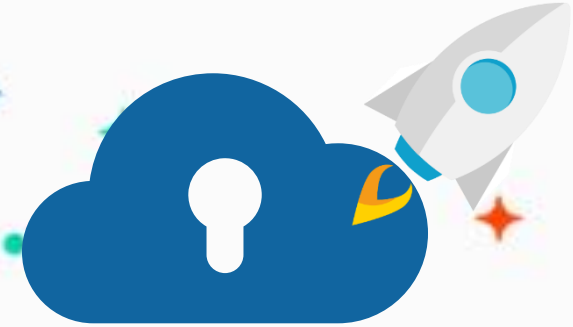

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Lesson 28. Picture Projector

LECTURER:

Lesson Objective

Learning Objectives

1. Learn about the principle of infrared remote control
2. Use smart eyes to control the projector to play different pictures

Possible Difficulties

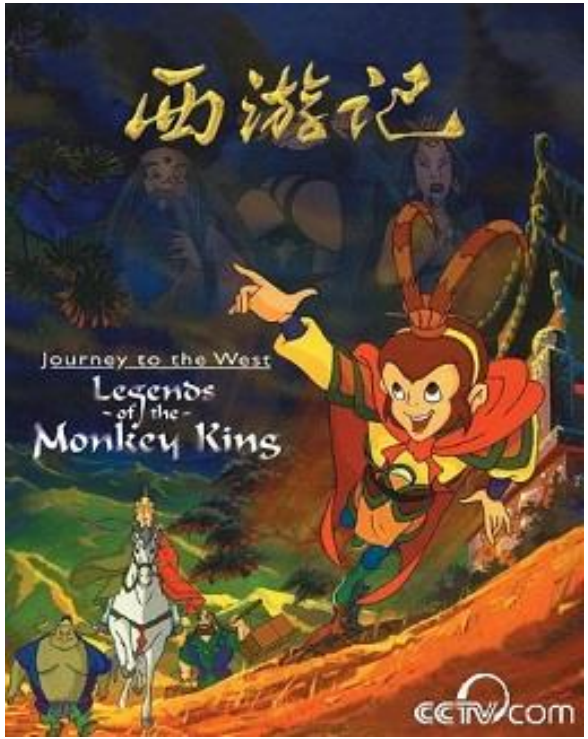
1. Infrared signal and variable setting
2. List value



Background Information



Context Import

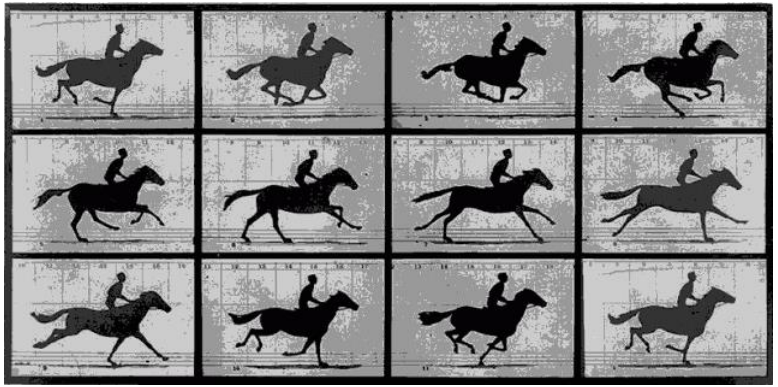


Cartoon: Journey to the West

Which do you prefer, comics or cartoons?

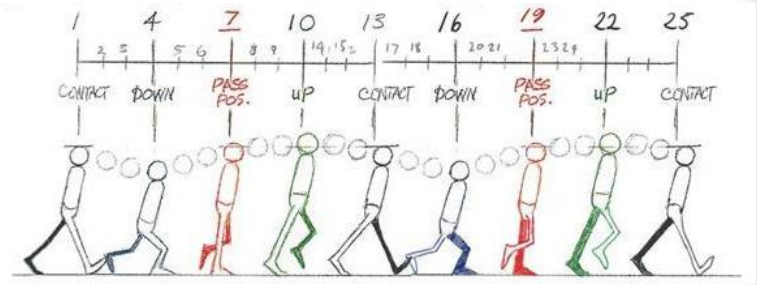
Most people prefer cartoons because they move and have a richer form of expression. But did you know? Cartoons are actually made from comics!

Context Import



By continuously playing comics, a "persistence of vision" is formed in the human eye, and static objects appear to be moving. Of course, ordinary comics cannot achieve the effect of animation no matter how continuous they are played, because they are not coherent when they are drawn.

Context Import

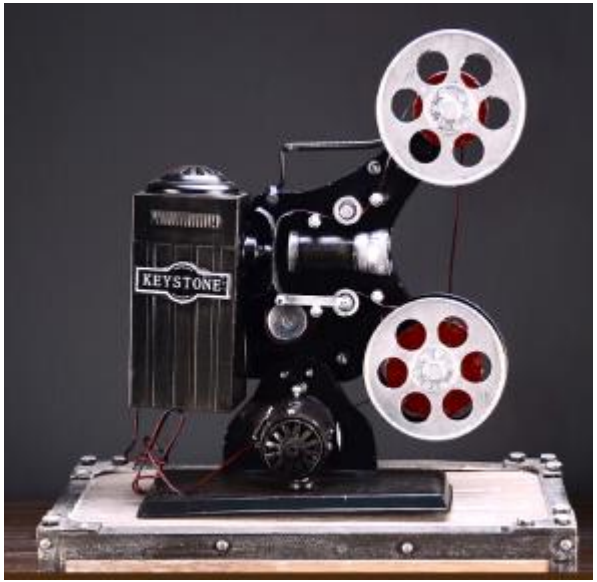


To make the picture look relatively coherent, there is such a standard in the film industry that at least 24 pictures must be played per second, also known as 24 frames per second. In other words, the person who makes the animation needs to split the action that takes place in one second into 24 pictures, so that such pictures can be played continuously to become a cartoon.



Knowledge Introduction

New Knowledge



Compared with animation, movies, a more advanced art form, are also played based on the above principles. Movies are played from the projector through rolls of films at the beginning. At this stage, a complete movie is wanted to be played. It is very complicated, both the sound and the picture have great flaws. Later, people invented the digital projector, and everyone can watch high-quality and stable movies.

New Knowledge

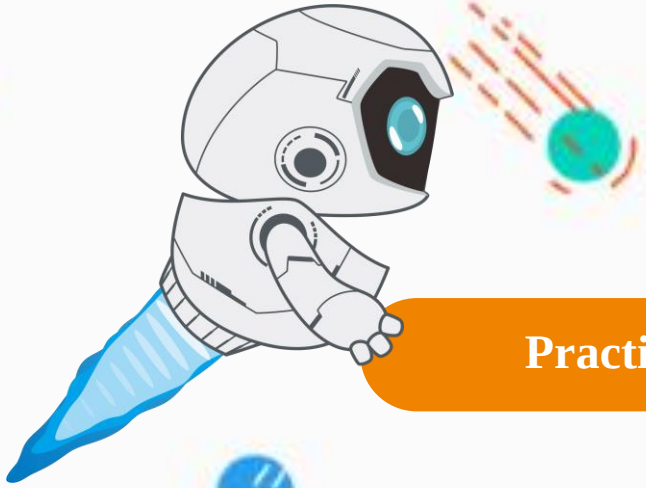


First, through a special camera, the events that happen every second are captured on the film one by one, and then played according to the playback standard. The moving speed of the film is 24 frames per second, which is equivalent to 24 pictures from every second. Light from the projector passes through and is projected onto the screen.

New Knowledge



Since 1927, movies have basically been shot and projected at 24 frames per second. A still picture is called 1 frame, and continuous projection of 24 frames per second can become a coherent picture in human eyes. This is the lower frame rate acceptable to the phenomenon of persistence of vision in humans, and it is also the minimum requirement for sound films to maintain smooth sound in the early years. When the first 120-frame film "Billy Lynn's Long Halftime Walk" was released in 2016 Today, most movies are still released in 24 frames.



Practice



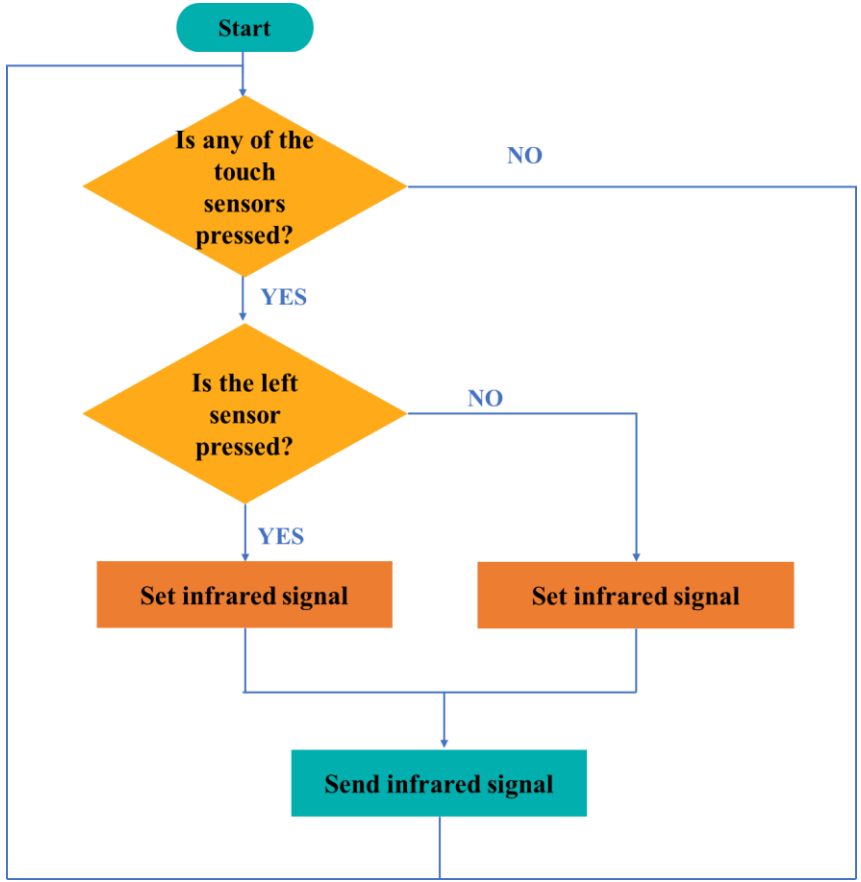


New Knowledge



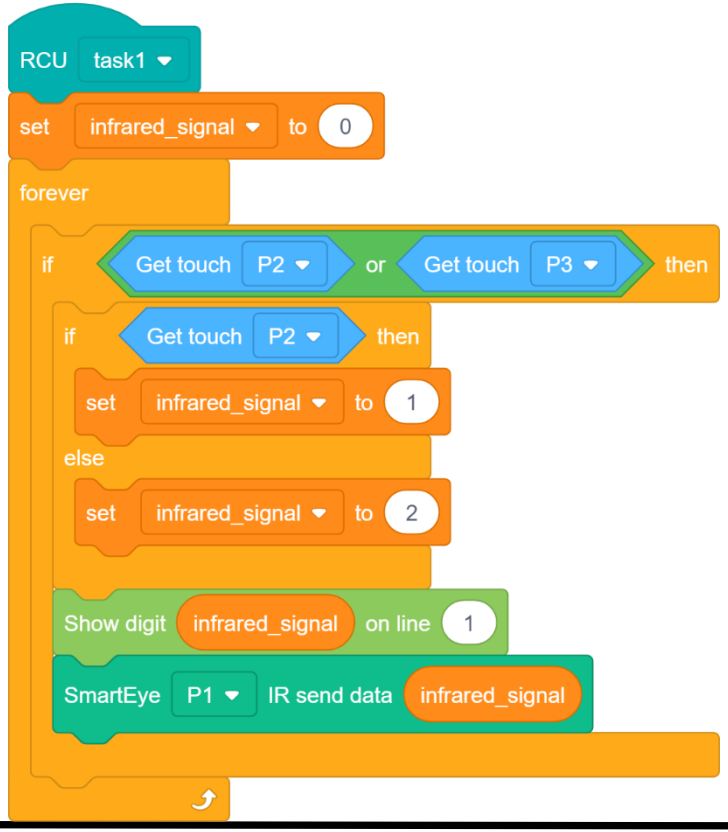
Assemble an infrared remote control projector and remote control according to the building manual, and the next picture can be played after the signal is sent.

Practice | Programming



The flowchart of the remote control part. When pressing different buttons, the smart eye sends two different signals.

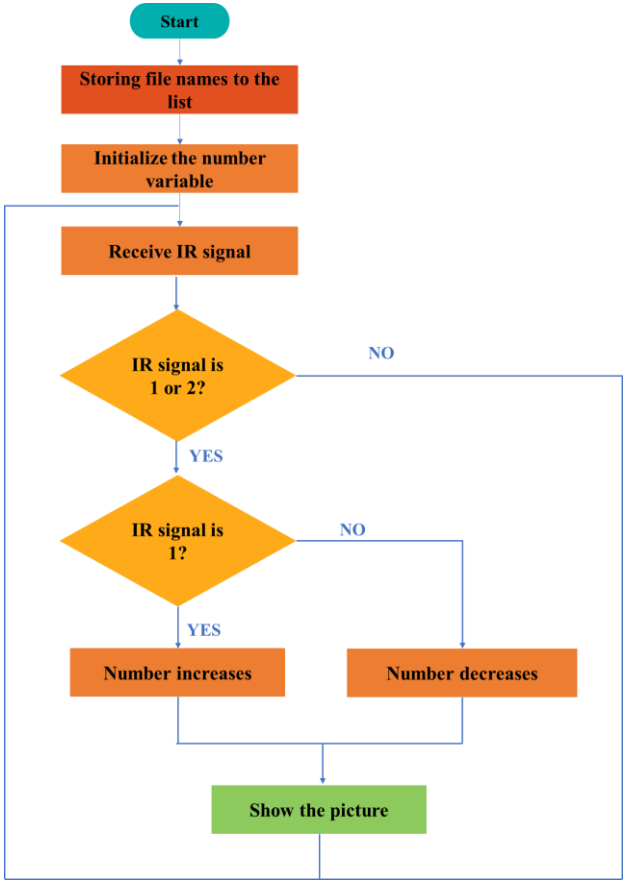
Practice | Programming



Programs of remote control

After pressing any touch sensor, a corresponding infrared signal is sent, where 1 and 2 represent forward and reverse playback.

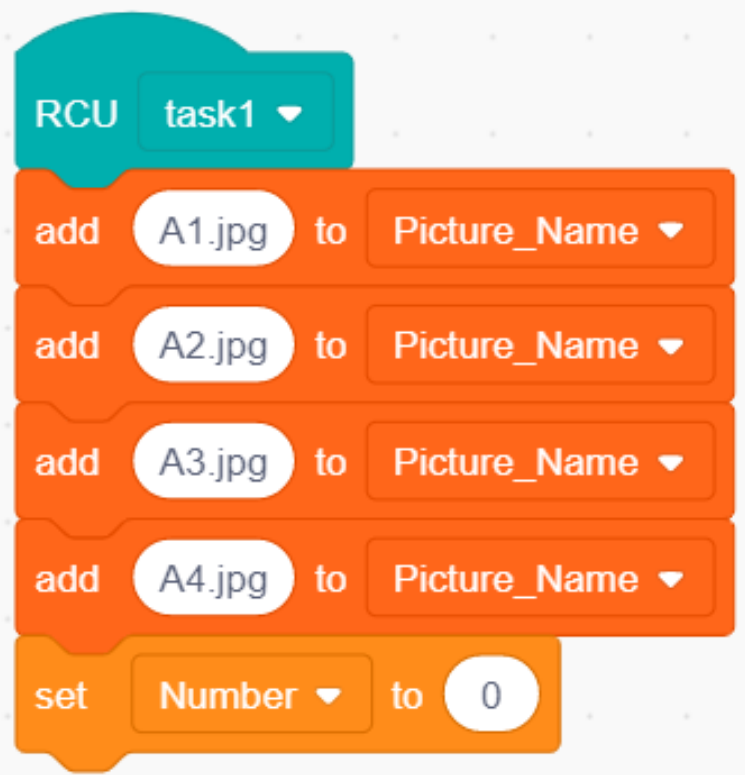
Practice | Programming



The projector part, judged by the signal sent, can play the pictures in order or in reverse order.

The projector program should limit the number of numbers to exceed the list value, and the list number should not be negative or exceed the number of files.

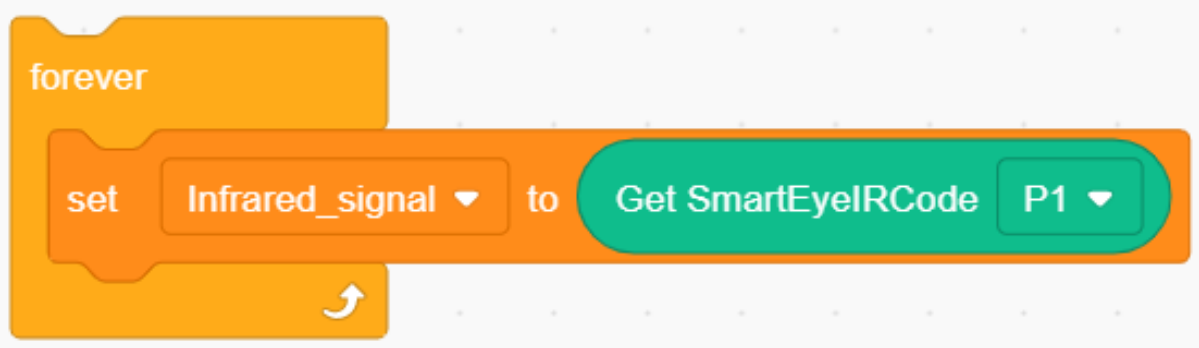
Practice | Programming



Initial setting

The initial setting of the projector is to save the file name of the picture in the list, and at the same time, initialize the numerical value of the serial number.

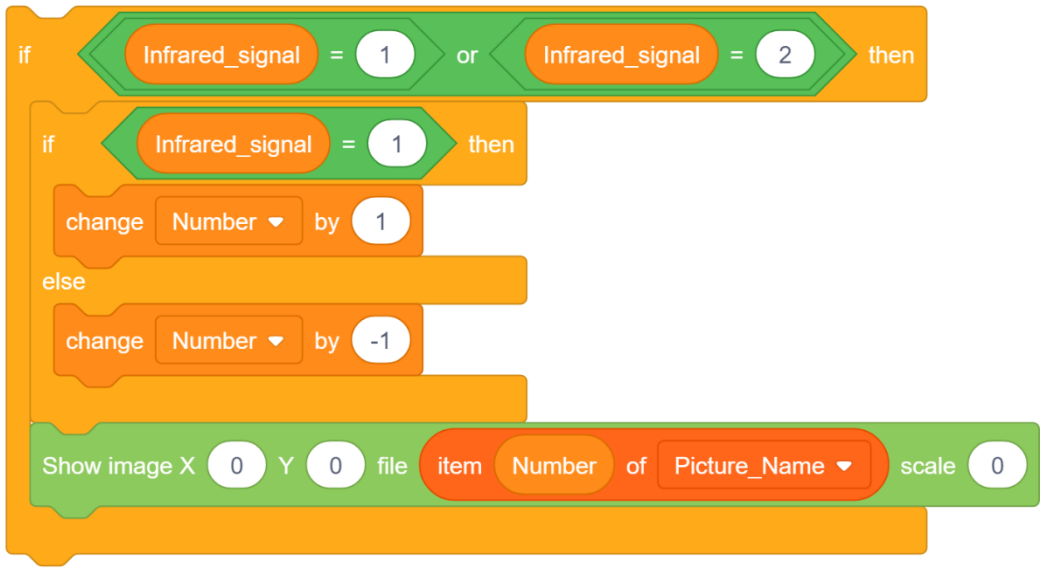
Practice | Programming



Read the data

Read the data received by infrared and store it in the variable.

Practice | Programming



Judgment of the signal

If the received signal is 1, the number will increase, so as to realize the forward sequence playback; if the received signal is 2, the number will decrease, and the playback will be reversed.

Practice | Programming



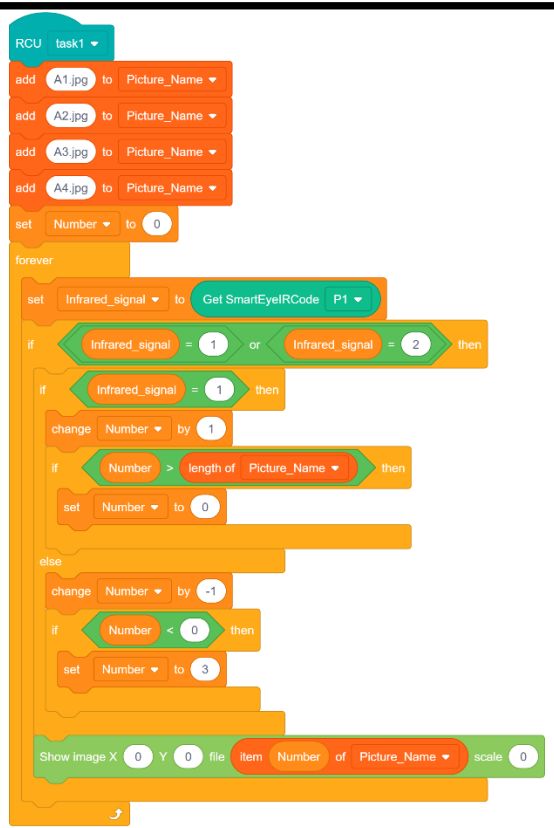
Restrictions on numbers

Lists do not support numeric values outside the range, so limit numbered values.

When playing in forward order, limit the number to not exceed the number of list items.

When playing in reverse order, the number must not be negative.

Practice | Programming

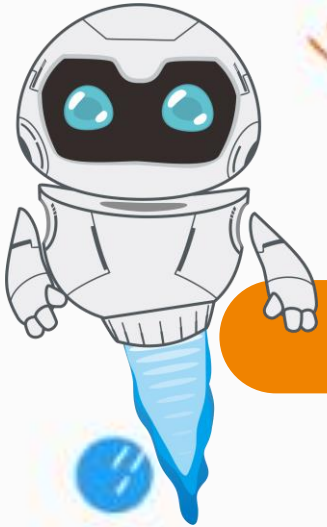


Integrate programs

Integrate the projector programs according to the flowchart.

Practice | Programming





Results

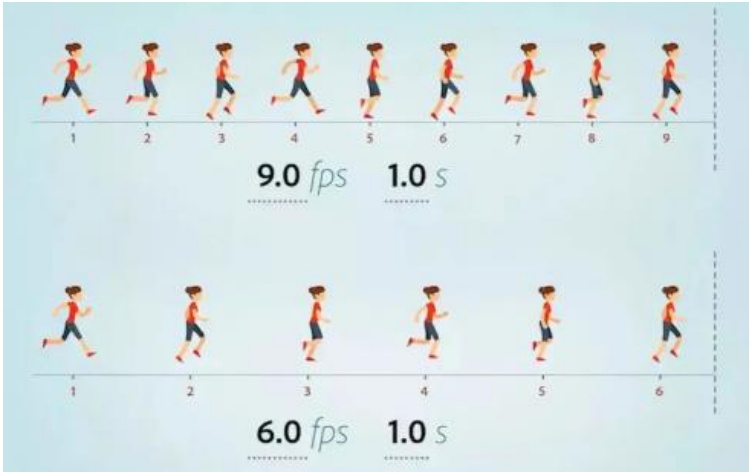
Program Optimization

This lesson realizes the function of switching pictures by pressing the button, sending/receiving infrared information through the smart eye, and controlling the played pictures.

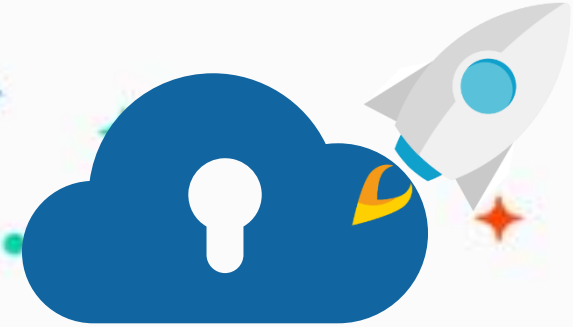
Next, modify the program and add other pictures to play.

Requirements: Add one or two pictures to achieve the same function.

Further Reading



Early silent movies had stipulated a frame rate of 16 to 24 frames per second, and the projector could also change the frame rate in the theater by adjusting the rheostat. To minimize perceived flicker, projectors employ dual-blade and triple-blade shutters, so each frame is displayed two or three times, increasing the flicker rate to 48 or 72 Hz and reducing eye strain. Thomas Edison said that 46 frames per second was the minimum the eye needed to perceive motion: "Anything short of it would tire the eyes." In the mid to late 1920s, frame rates for silent films increased to between 20 and 26 frames.



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Thanks!

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