Week 7: Memory: flip-flops and counters

Mokxi · one-page lesson plan

OBJECTIVE

A D flip-flop wired to toggle divides a clock by two; four of them count.

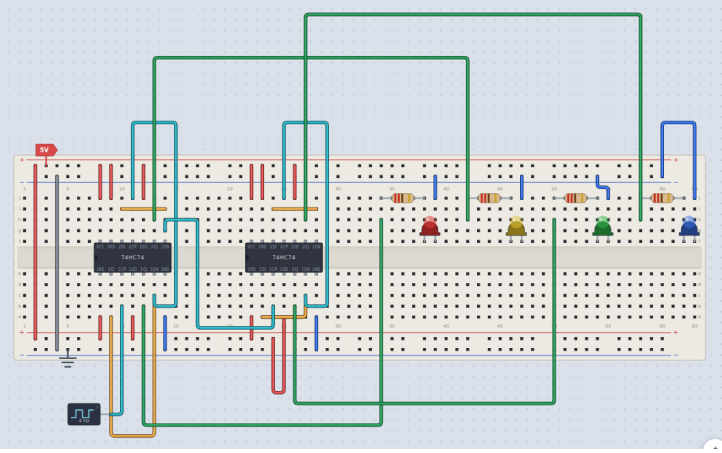
WHAT YOU NEED

74HC74 (two), clock, resistors, LEDs, breadboard

STEPS

- Set the clock to 1 Hz and write the four LEDs down as binary for sixteen steps.
- Then take one stage's clock from Q instead of Q-bar and record what happens to the direction.

THE CIRCUIT



ASSESSMENT IDEA

The sixteen step count sequence, plus a sentence on why the stages do not all change at the same instant and why a real design uses a synchronous counter. Worth saying in class: Mokxi powers a 74HC74 up cleared so a circuit built from toggles starts somewhere known, where a real chip powers up at random and needs a reset.

https://mokxi.com/curriculum#week-7