University of Illinois at Urbana-Champaign
Dept. of Electrical and Computer Engineering

ECE 220: Computer Systems & Programming

LC-3 Input and Output (I/O) Registers

1

Unsynchronized I/O Fails in the Classroom

How does I/O work in the classroom?

1. You blurt out a question.
2. The professor stops and looks around.
3. The professor makes an intelligent response. For example:
    "Eh? What? Huh? Was there a question?"
4. Then the professor goes back to writing.

The problem? No synchronization!

2

I/O Requires Synchronization to Succeed

So you try again…
1. You raise your hand.
2. Eventually, the professor notices.
3. The professor asks, "Yes?"
4. You ask your question.
5. The professor says it's a good question.
6. And assigns it as a homework problem.
7. Then the professor goes back to writing.

3

Handshaking in Hardware Similar to Q/A in Class

In a classroom, we use
◦ our hand to indicate status (have a question), and
◦ our voice to deliver data (the question).

When hardware devices
◦ lack a common clock,
◦ they **need synchronization to communicate**.

The simplest form is **handshaking**.

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