

Wireless Combination Lock



Alyssa Kaplan, Emily Logan, Veronica
Mercado, Aiyu Tang

Project Overview

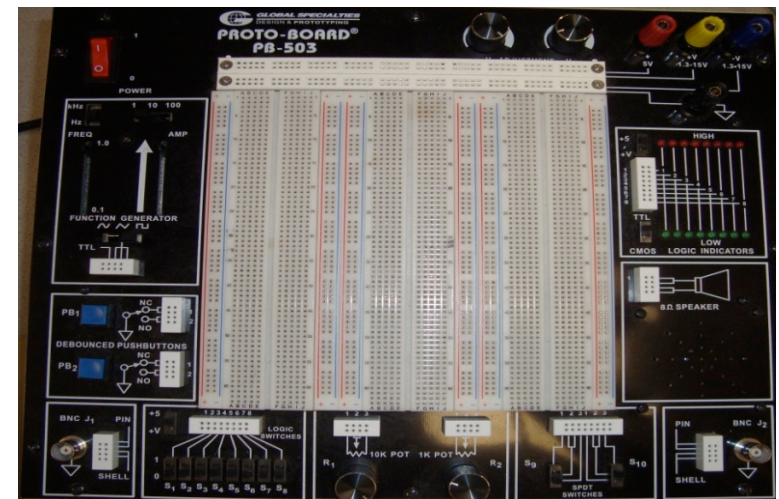
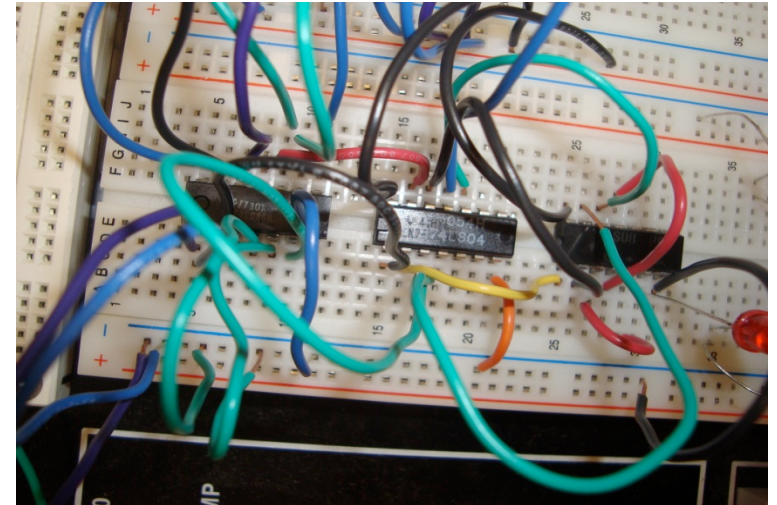
- Create a password
- Send data using an LED
- Receive and convert data into a 4 bit number
- Compare with original code



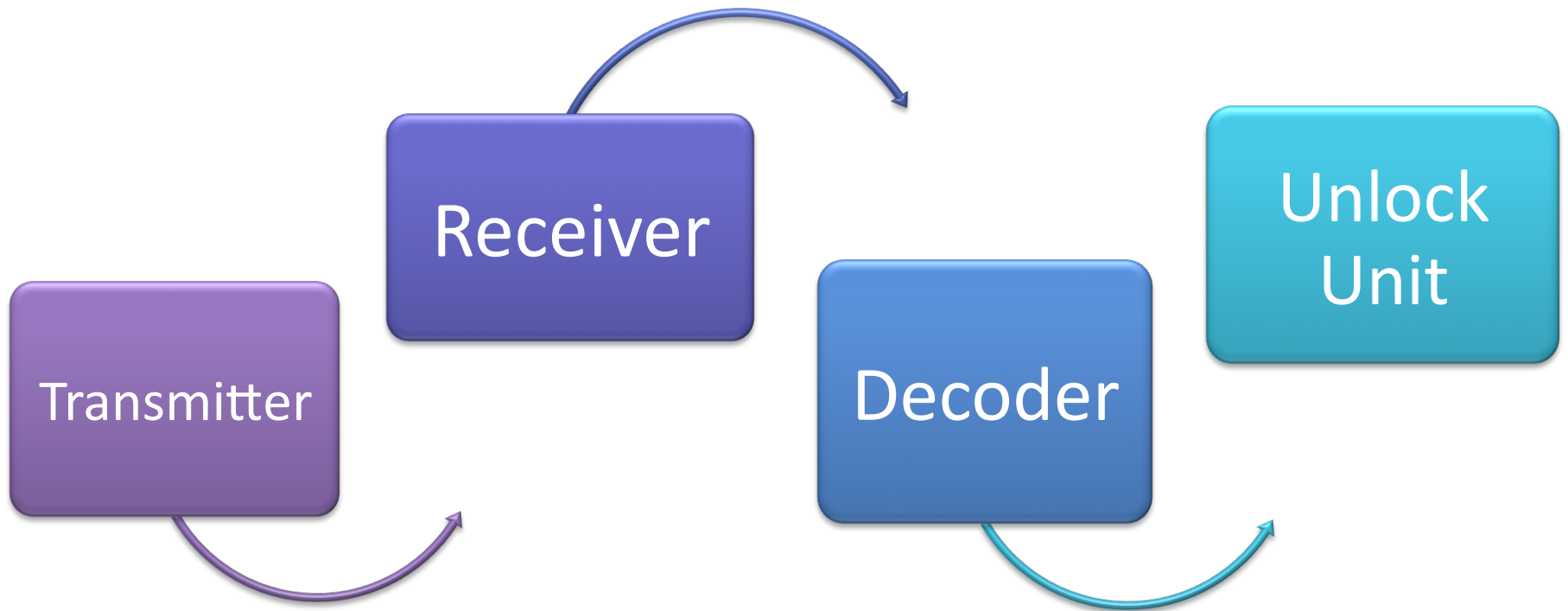
Materials

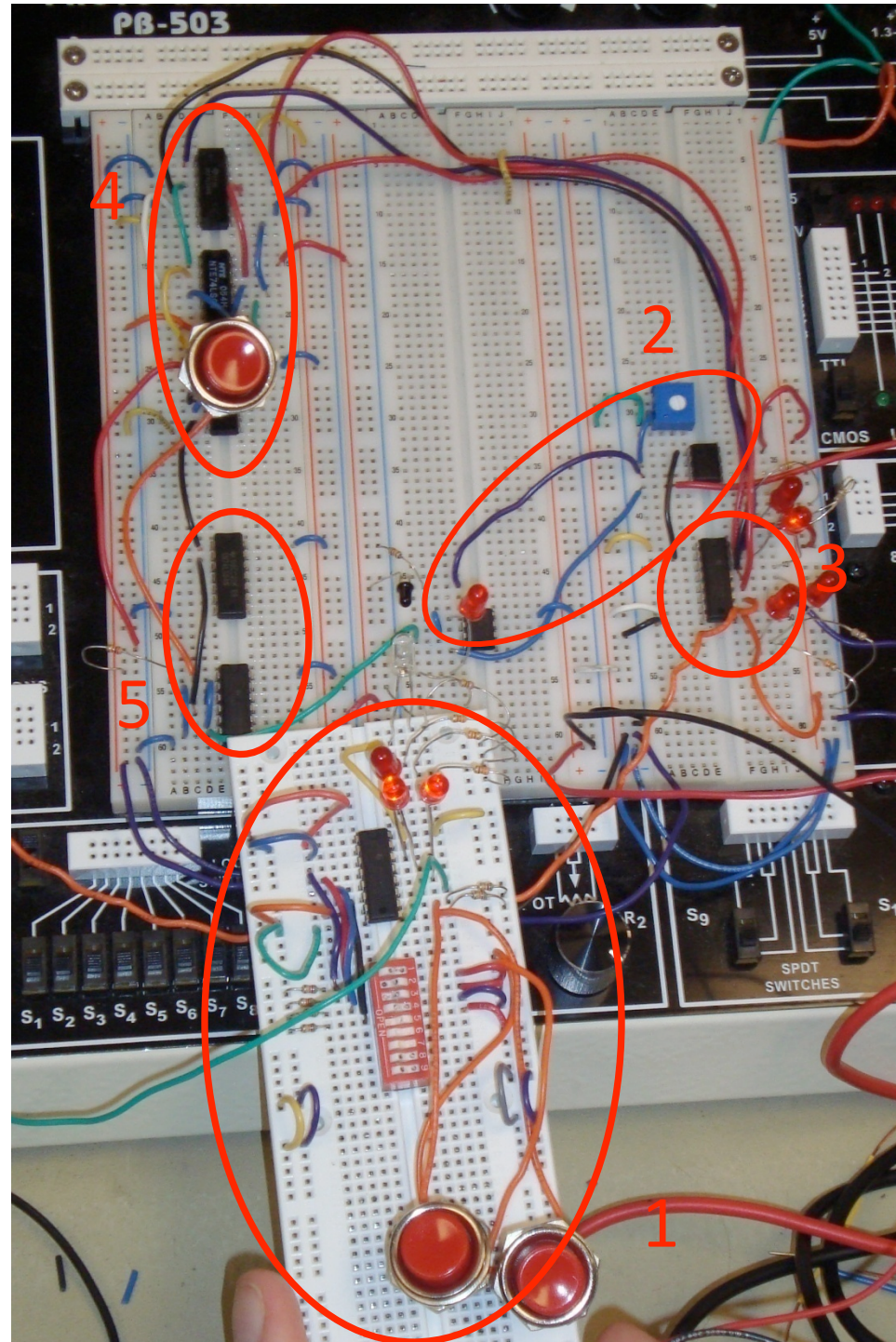
Components used included:

- Breadboard and wires
- Shift Register
- Comparators (Op-Amp)
- Transmitter
- Decoder
- XOR, AND, NOT gates



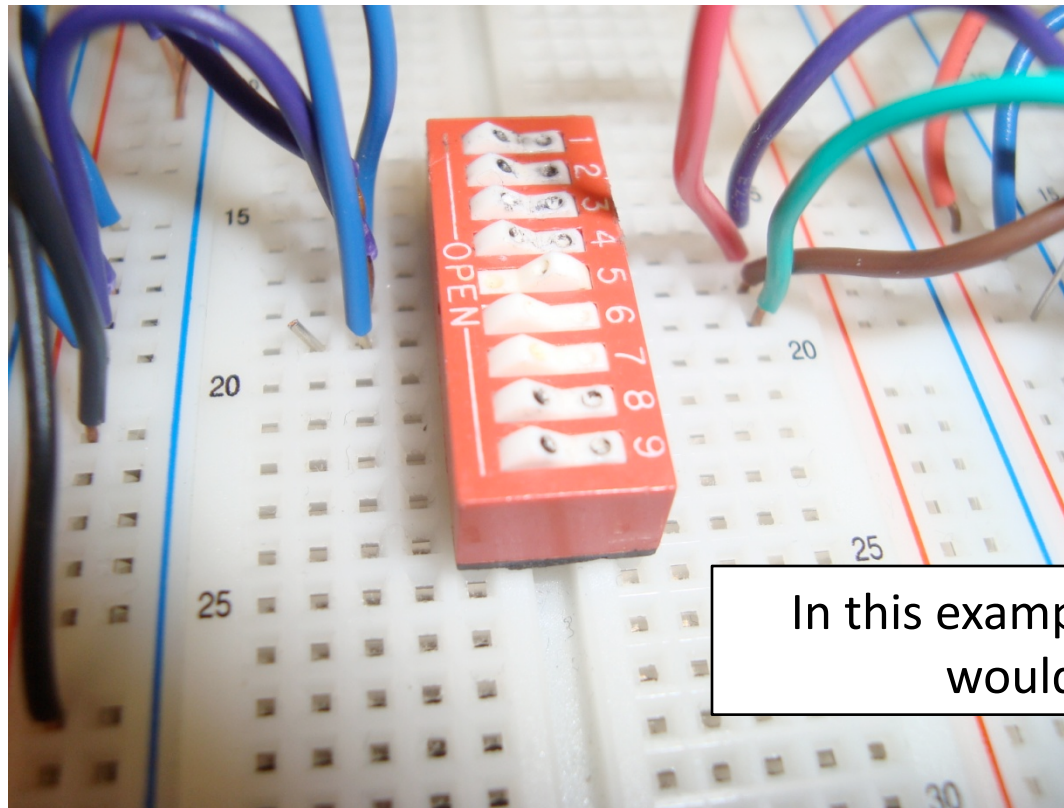
Process





Loading the Code

A switch is used to designate each digit of the password as a 1 or a 0.



In this example, the password would be 1111.

Transmitter- Shift Register and LED

Shift Register- 4 bit memory

Bit- single binary digit; 0 or 1

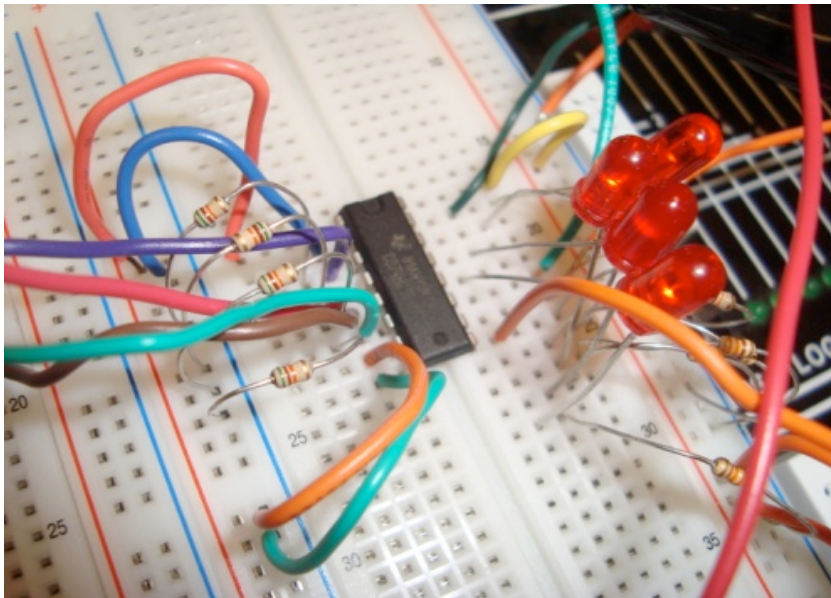
A shift register allows a circuit to shift one bit at a time either left or right one position in time with input from a clock

1 0 0 1

Receiver- Photo Transistor and Op-Amp

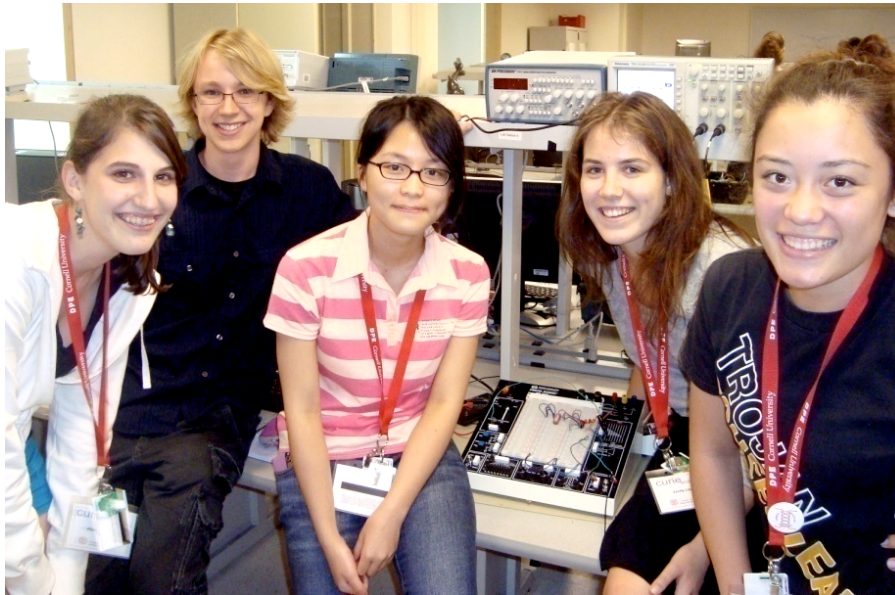
Photo Transistor- converts light into voltage

Op Amp- operates as a voltage amplifier



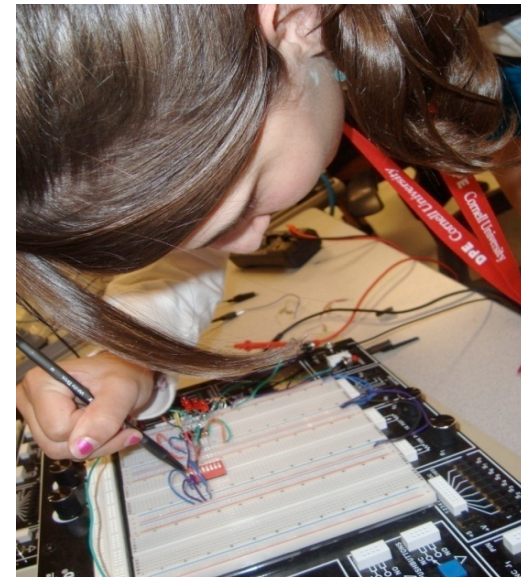
Decoder- Shift Register 2

- Each received bit is stored as memory
- Each bit is compared to the hardwired password



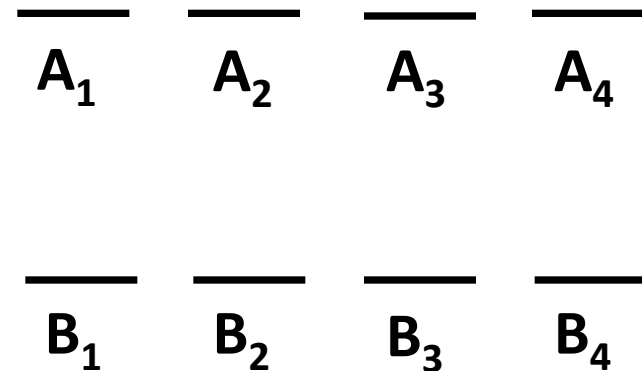
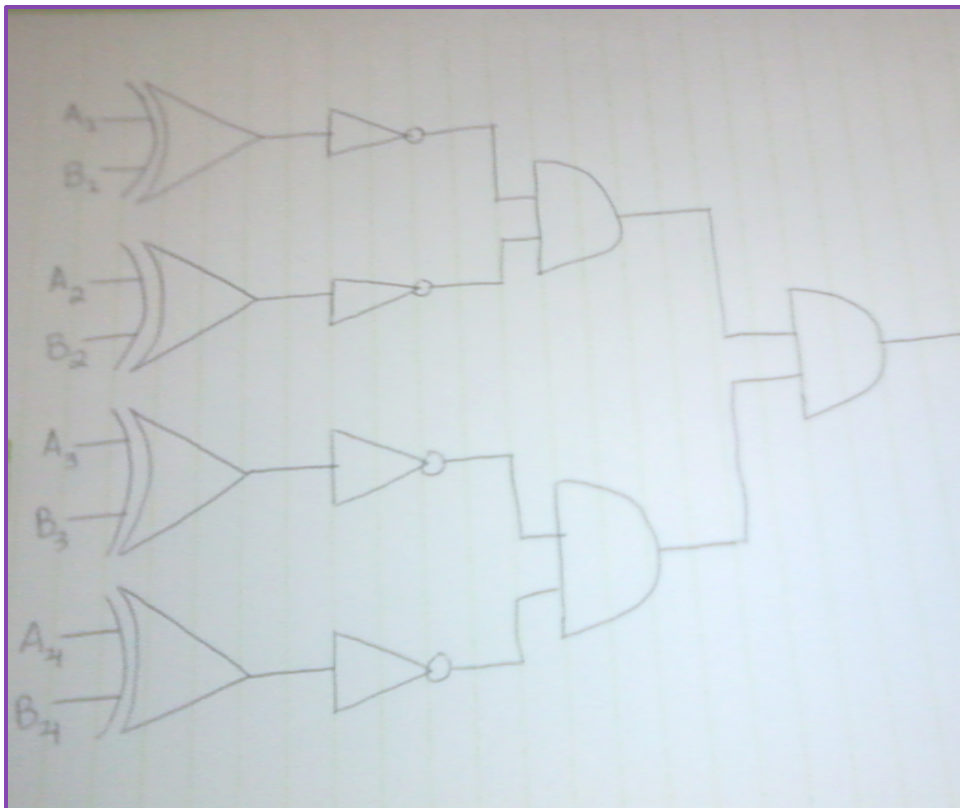
Unlock Unit- Equivalence Checker and Latch Circuit

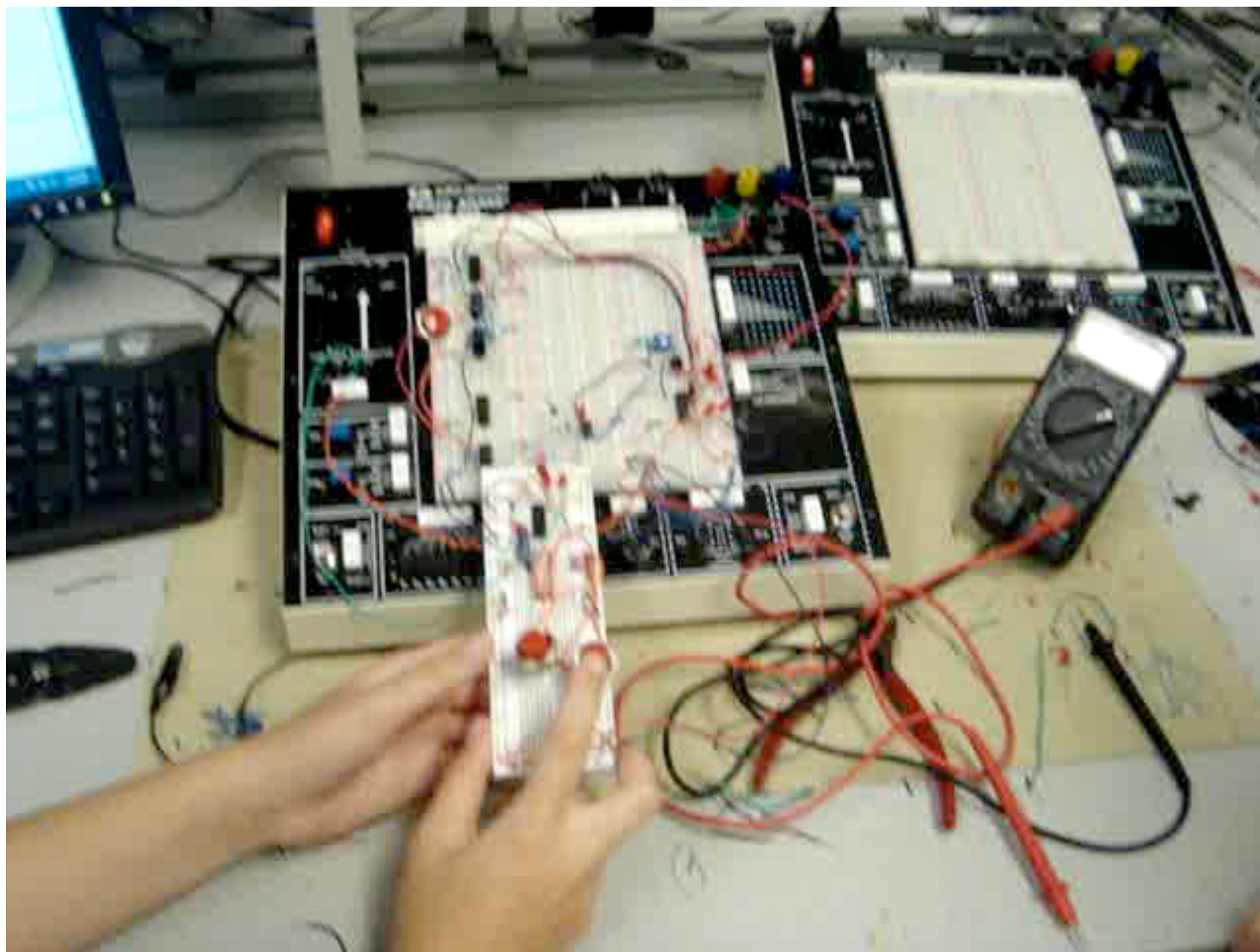
- Bits pass through an equivalence checker
- Latch circuit acts as memory



Equivalence Checker

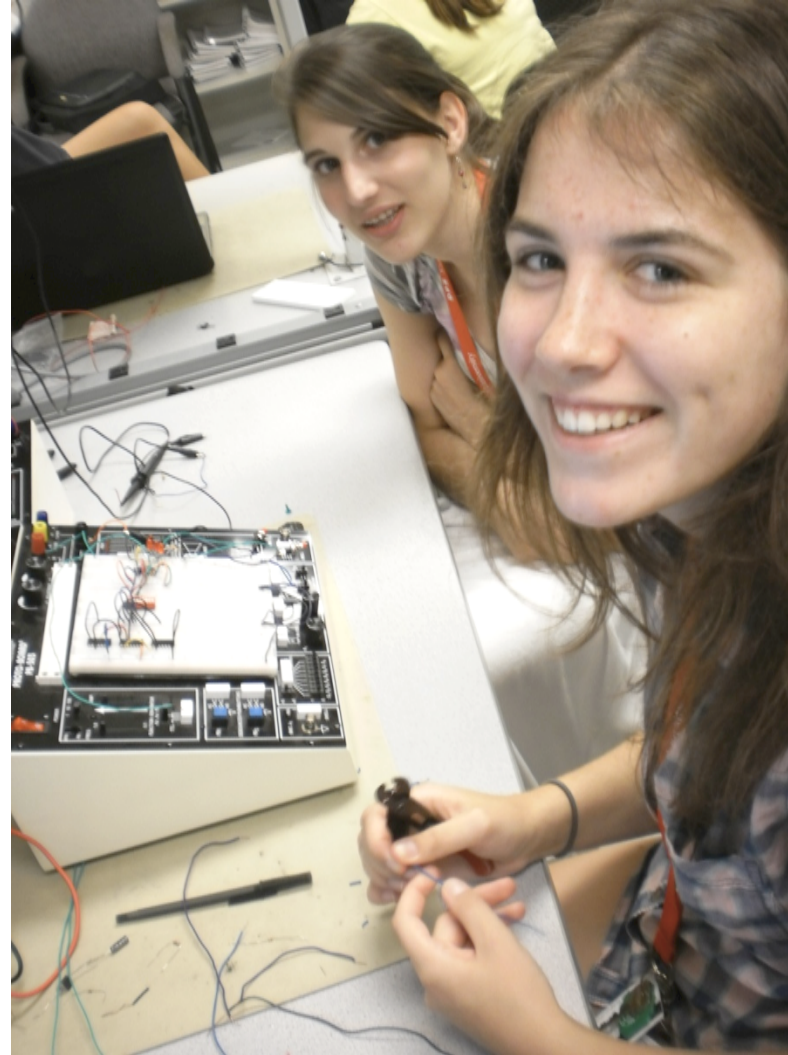
The equivalence checker is made up of 4 XOR gates, 4 NOT gates, and 3 AND gates.





Potential Applications

- Turning on a car motor
- Powering a fan
- Unlocking a physical safe
- Cyber security-
cell phones,
computer
encryption, etc.



Thank You

T.A. Nicholas Kramer

Professor Bruce Land

Professor Xiling Shen

