EECS 140/141
Lab 5
Implementing a SOP Expression on Prototyping board

Mahmood A. Hameed
April 26th, 2014
Recap last lab

• Installed the following circuits
  – Power input
  – Input switch
  – Output LED display

• Performed first board test
  – The LED display components are negative logic
Bypass capacitors

- Used to prevent IC damage due to voltage fluctuations
- \( C = 0.01 \) micro farad
Install Bypass capacitors

- Unpolarized capacitors; orientation does not matter
- Solder 3 bypass capacitors C2-C4
IC sockets

• Three units of 16-pin IC sockets
• You may have more than this in your bag of parts
Install IC sockets

- Notch on socket should face bypass capacitor
- Solder three IC sockets
Order of soldering

• IC sockets
• Place ICs (orientation matters!)
  – Note the notch on the IC
• Caution: if any confusion, check with GTA before you place IC.
• Headers (coming up)
7400 series ICs

- All these are 14-pin devices and should be inserted close to the bypass caps.
- There will be two open socket pins away from the bypass cap.
Install ICs into sockets

- 74LS04 (hex inverters) in the bottom socket
- 74LS21 (AND gates) in the middle row
- 74LS32 (OR gates) in the top left socket
- Cut out (or notch) in the IC should face the bypass capacitors
Power and ground bus

• Cut two units of 25 pins each from your header strip.
Install power and ground bus

- Insert 25-pin headers and when firmly in place, solder
- The power bus will be used to provide Vcc to ICs or logic ‘1’ level
- The ground bus will be used to ground the ICs or logic ‘0’ level
IC connection header

• Cut six units of 8 pins each from header strip
Install IC connection headers

- Install all 6 IC connection headers (just one shown)
Interconnection headers

• Cut three units of 5 pins each from header strip
Install interconnection headers

• Used to duplicate IC pins
Implement SOP expression

- \( f = A \cdot \overline{B} \cdot C \cdot D + A \cdot B \cdot \overline{C} \cdot D \)
- Use the switch circuit to provide all 4 inputs
- Use LED display for output \( f \)
- Use connection wires to form the desired logic circuit
- Use IC data sheet attached on lab wiki for pin out information
- Test your design by going through the truth-table for your expression