Lab 05

Part E – Play-Doh Activity

Description

- In this module, you will create your own logic gate symbols using.
- In this course, we have already discussed or will soon discuss the seven basic logic gates and their accepted symbols, truth tables, and CMOS transistor implementations.
  - Fig. 1 below shows the standard accepted symbols for logic gates. Note that they are represented in Play-Doh.
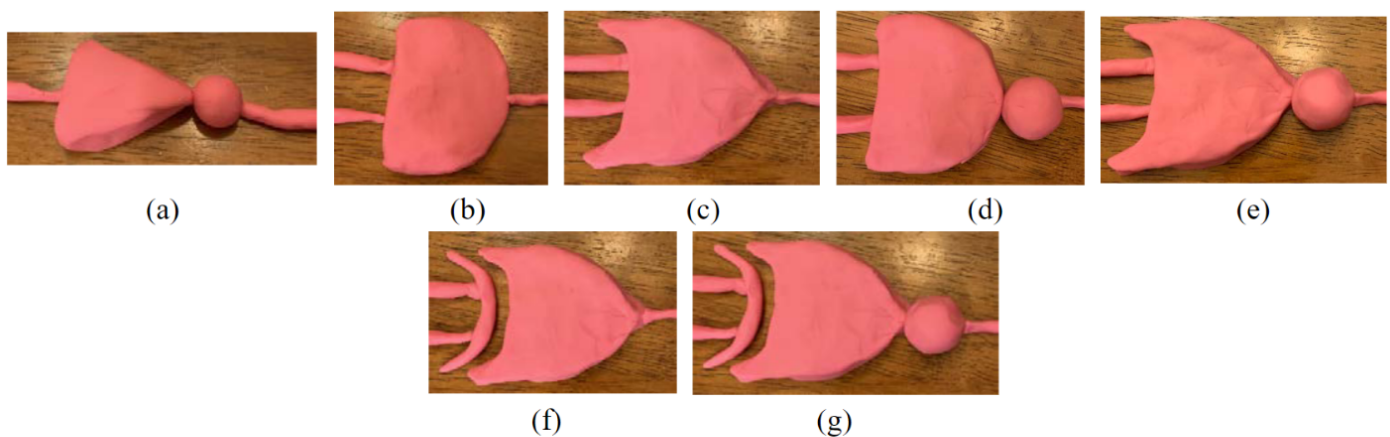

Fig. 1: Play-Doh logic gate symbols (a) NOT gate, (b) AND gate, (c) OR gate, (d) NAND gate, (e) NOR gate, (f) XOR gate, and (g) XNOR gate.

- *How did these symbols become the accepted symbols*, and *why?*
  - Keep this question in mind throughout this activity.
- In this assignment, you will express your creativity and reimagine the accepted logic gate symbols.

Procedure

1. Consider the truth tables and functionality of each gate. Then, using the provided Play-Doh, tinker with novel ways of symbolically representing the logic gates, and take ownership of their visual representations.
2. Once you have created a set of symbols for the seven logic gates that are *sensible* and *aesthetically pleasing* to you, take pictures of each of your novel representations.

Deliverables

- As part of your informal report:
  - A figure or set of figures similar to Fig. 1, created from your pictures of your seven novel symbols for the logic gates.
  - **Select one logic gate to examine more deeply**.
    - For this part of your report, you are *expected* to use *structured text* (i.e., bullets and/or numbered lists).
    - Using sentences for each bullet, state your case for the selected logic gate symbol and the main discussion points for the reflection, as described below in the "In-Depth Gate Analysis" section.
  - In a summary paragraph (not a bulleted list) discuss *how* you have **taken ownership of** and **expressed interest in** logic gate symbol representation through this exercise.
    - Discuss why you examined the gate that you did.
    - Provide an overview sentence or two describing the remaining other novel gates.
    - Self-reflect on how this exercise has opened your eyes to some *new insight* with respect to logic gate functionality or symbols (new or accepted).
- Note: grading for this section of the report is described in the "Grading" section below.

In-Depth Gate Analysis

- Evaluate the ***accepted* logic gate symbol** for the selected gate.
  - Is it *sensible*? That is, does its form help in expressing the gate's functionality (e.g., truth table)?
  - Is it *aesthetically pleasing*? Why? (Note: this is a personal opinion)
- Evaluate and discuss your ***novel* logic gate symbol** for the selected gate.
  - Is it *sensible*? Does its form help in expressing the gate's functionality or is it sensible in another way?
    - Compare and contrast the sensibility of your novel symbol to the accepted symbol. Make the case for how it might be better, and/or how it might be worse.
  - Is it *aesthetically pleasing*? Why? (Note: this is a personal opinion)
    - Compare and contrast the aesthetics of your novel symbol to the accepted symbol. Make the case for how it is aesthetically better, and/or how it is worse, in your view.

Grading

- See the rubric, briefly described here.

- Think of this list as a checklist. Do all of the following:
  - Produce and provide a figure similar to Fig. 1, as described above.
    - Include nice pictures of all 7 of the novel logic gate symbols
      - i.e., the picture should be clear with good resolution
    - Use the same order of the gates as listed in Fig. 1 above (NOT gate as (a), through XNOR gate as (g)).
  - Be sure to size the pictures for an aesthetically pleasing figure (again, similar to Fig. 1).
  - Provide clear and reasonable arguments for each of the following with respect to the selected gate:
    - Sensibility (or lack thereof) for both the accepted and novel symbols
    - Aesthetics (good or bad) for both the accepted and novel symbols
    - Compare and contrast, with reasonable arguments, the sensibility and aesthetics of the novel gate symbol with the accepted gate symbol.
  - Reflect on how you have taken ownership of logic gate symbol representation through this exercise.
  - Reflect on how you have expressed interest in logic gate symbol representation through this exercise.
  - Describe why you decided to further examine the gate that you did.
  - Provide a clear and understandable overview summarizing the other novel gate symbols.
  - Reflect on how this exercise has opened your eyes to some new insight with respect to logic gates.

Outcomes

- Know the seven basic logic gates, their visual representations, their truth tables, and the corresponding Boolean equations.
- Be able to self-reflect and evaluate preconceived ideas, thoughts, and accepted solutions (eKSO 1h).
- Take ownership of, and express interest in logic gate representation (eKSO 1l).