

## Final Design Project

1. Choose three partners for your design team. So, each team has four members. It is up to the team to divide responsibilities.
2. Your project involves the design of Hamming (7,4) ECC encoder and decoder as discussed in lectures. The encoder has a 4-bit input  $\{m_1, m_2, m_3, m_4\}$  which contains the message or information bits of interest and a 7-bit output  $\{m_1, m_2, m_3, m_4, p_1, p_2, p_3\}$  which is the codeword to be transmitted. The decoder attempts the inverse operation. It has a 7-bit codeword input  $\{\hat{m}_1, \hat{m}_2, \hat{m}_3, \hat{m}_4, \hat{p}_1, \hat{p}_2, \hat{p}_3\}$  received from the communication channel and a 5-bit output: 4 decoded message bits  $\{\hat{m}_1, \hat{m}_2, \hat{m}_3, \hat{m}_4\}$  and an additional output bit indicating whether an error has been detected or not.
3. By the end of lab time on Monday, Dec. 5th, each team has to submit logic diagrams for the Hamming encoder and decoder. You are allowed to use all basic gates (AND, OR, NAND, NOR, XOR, INVERTER).
4. You will assemble your design in Matlab Simulink during three lab sessions next week. Demonstrate that your decoder is capable of detecting an error as well as correcting it.
5. Each team must perform all design, assembly, and simulation work. You may consult with Prof. Tran or the TA's, but not other teams.
6. One typed final report must be turned in from each team. The report MUST include the following:
  - Names of team members
  - Detailed explanation of your approach and your design
  - Detailed schematics of the circuits with clear identification of inputs, outputs, and important intermediate points
  - How you demonstrated that your circuits worked
  - Description of contributions of each team member.

Project report due date: **December 13** in Barton 215.

**Reference:** Kuc Chapter 7 and lecture notes.