



## BLG 322E – Computer Architecture

### Assignment 3

**Due Date:** 06.05.2020, **Wednesday**, 23.59.

#### QUESTION:

You will design a simple game controller that has four buttons, using the Motorola 68000 processor.

The control buttons are left arrow, right arrow, up arrow, and down arrow. Each button is an interrupt source and uses the vectored interrupt method. Each interrupt source also has an IRQ output and an INTACK input connecting it to the priority interrupt circuit. An interrupt source places its vector address (VAD) on the data bus after receiving an INTACK signal. In your design:

1. Interrupt requests from the left arrow and right arrow are connected to the same priority level of the CPU, but the left arrow has priority over the right arrow.
2. Interrupt requests from the up arrow and down arrow are connected to the same priority level of the CPU, but the up arrow has priority over the down arrow.
3. Interrupts from the horizontal direction arrows (left and right) must have a higher priority level than interrupts from the vertical direction arrows (up and down) in the CPU (*left > right > up > down*).
4. You must use a daisy chain structure to make the interrupt sources that are connected to same level, function as desired (left&right, up&down).
5. Buttons will occupy the lowest possible interrupt priority levels of the CPU.

Design and draw the system with the CPU, four buttons (left arrow, right arrow, up arrow, down arrow), and the necessary logical units. You do not need to draw the internal structure of the daisy chain elements, but you must show their inputs and outputs. You should also specify at which level (0 or 1) the IRQ and INTA signals are active.

**Submission:** You may draw your answer using a computer program or by hand on a sheet of paper. Make sure your answer is legible. You must submit your homework in PDF format through the Ninova system before the due date. Your homework file must include your name and student ID.

Late submissions will not be accepted.

Assignments have to be done individually. In case of any plagiarism, disciplinary regulations of the University will be applied.

**Note:** If you have a question about the homework, you may contact the research assistants of the course ( [unlut@itu.edu.tr](mailto:unlut@itu.edu.tr) ).