Embedded Systems
Professor Thomas Bräunl
Assocaite Lecturer Kieran Quirke-Brown

Tutorial 2 – ALU and CU Design

1. **Review FF, Multiplexer and Adder design and functionality**

2. **Design an ALU with the following operands:**

   0: NOP
   1: Accu = –Accu
   2: Accu = Accu + data
   3: Accu = Accu – data
   4: Accu = Accu * data
   5: Accu = data
   6: BRA = PC := A if Accu is 0
   7: don't care

3. **Design a CU that can do the following:**

   - Increment PC by 1
   - Jump to a given address from the Address register
   - Store PC contents for a subroutine call
   - Return to (stored address + 1) for return from subroutine

4. **Review Functionality of CPU4.**

   - Clock signal
   - Write a machine program to multiply two numbers by repeated addition.
   - The two operands are in memory cells 0xFD and 0xFE
   - Store the result in memory cell 0xFF