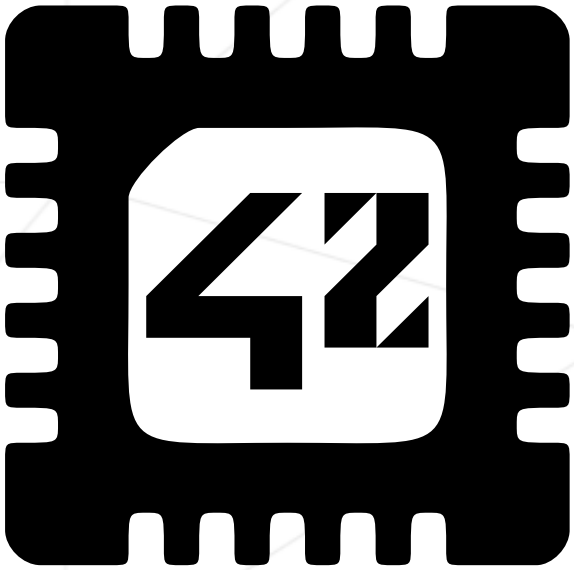

Embedded pool

Rush 00: Multiplayer

contact@42chips.fr

Summary: Introduction to integrated circuit communication

Chapter I

Introduction

`Tennis for Two` is a tennis video game designed in 1958 by William Higinbotham and developed by Robert Dvorak, often considered as the first video game in history.
The game was developed on a dedicated Donner Model 30 analog computer connected to an oscilloscope, which serves as the screen. The concept was presented in 1958 and 1959 during the open house of the Brookhaven National Laboratory.

The game, developed in just a few weeks, was designed to showcase technological advancements to the general public, during the laboratory's open house event.
During the Cold War, Higinbotham wanted to show a more friendly image of the world of research, as minds were still marked by the first nuclear tests of the 1950s.
Using documents on ball trajectory simulations, he created an entertainment concept without any particular academic utility, using an oscilloscope and an analog computer.

The game received a good reception from the local public, where queues formed to access the machine, and it was presented to the public for two consecutive years (source).
Despite the ingenuity of the concept for its time, the game was not used after 1959, as the laboratory decided to replace this attraction with another one during the next open house event and to reuse the parts for other research.

`These exercises are to be done in pairs. You can choose your partner.`

`But the evaluations are individual. You must know and understand all the code submitted!`

Chapter II

General instructions

Unless explicitly stated otherwise, the following instructions will be valid for all assignments.

- The language used for this project is C.
- It is not necessary to code according to the 42 norm.
- The exercises are ordered very precisely from the simplest to the most complex. Under no circumstances will we consider or evaluate a complex exercise if a simpler one is not perfectly successful.
- You must not leave any files other than those explicitly specified by the exercise instructions in your directory during peer evaluation.
- All technical answers to your questions can be found in the `datasheets` or on the Internet. It is up to you to use and abuse these resources to understand how to complete your exercise.
- You must use the datasheet of the microcontroller provided to you and comment on the important parts of your program by indicating where you found the clues in the document, and if necessary, explaining your approach. Don't write long blocks of text, keep it clear.
- Do you have a question? Ask your neighbor to the right or left. You can ask in the dedicated channel on the Piscine's Discord, or as a last resort, ask a staff member.

Chapter III

Mandatory part

	Exercise 00
Howdy cowboy	
Turn-in directory : *ex*00/	
Files to turn in : `Makefile, *.c, *.h`	
Allowed functions : `avr/io.h, util/delay.h, util/twi.h`	
Notes : `n/a`	

The objective of this exercise is to create a speed game where 2 microcontrollers communicate with each other. You should use 2 of your boards.

- Connect the 2 microcontrollers using 2 wires
- The AVR ATmega328P microcontroller has 1 I2C peripheral that you must use in this exercise to communicate with another microcontroller.
- The MCU's I2C must be configured with a frequency of 100kHz.
- You must write a function that decides which microcontroller is the master and which is the slave.
- The MCUs must be able to communicate if one of them restarts.

`The program must be the same for each microcontroller!`

The game is rather simple:

- When both players press the button, the game starts.
- A countdown is displayed on the LEDs.
- The fastest player to press the button at the end of the countdown wins the game.
- Another game can now start.

If a player presses the button before the end of the countdown, they lose the game. You should create a light signal indicating the winner and the loser. Don't forget to comment the rules for grading!

The countdown can be random in duration but must be at least 2 seconds and maximum 10 seconds.

Chapter IV

Bonus

	Exercise 01
Mexican Standoff	
Turn-in directory : $ex01/$	
Files to turn in : `Makefile, *.c, *.h`	
Allowed functions : `avr/io.h, util/delay.h, util/twi.h`	
Notes : `n/a`	

Now that you have 2 players, it's time, if you still have room, to add another one for even more Wild West thrills!
I2C is a bus! It's time to use its capabilities to the fullest!

You can also add whatever you want as long as the mandatory part remains the same. Have fun!

`If you have thought well about how to do your exercise 00, then the modifications should be minimal ;)`