

Concept of the Microcontroller Lab end of semester project

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1 Tetris

The Flowcharts are appended in the zip file.

1.1 Hardware layout

1.1.1 Buttons: Shift-Register und PB5, PB6

- Shift register Buttons:

PB1	PB2	PB3	PB4
Left	Rotate Counterclockwise	Rotate Clockwise	Right

Left + Right : Fast drop

- PB5: Pause
- PB6: Reset

1.2 Software layout

1.2.1 Playfield:

- Bitmap with 20x10 entries (`uint16_t[20]`)
- Top row: (19, :), bottom row: (0, :)
- Left column: (:, 0), right column: (:, 9)

1. Implementation: The Playfield shall be implemented as an array of **unsigned word**. Each entry in the array represents a row. Each bit in the row stands for block occupied (1) or block free (0).

1.2.2 Initialization

Initializes the timer, the serial terminal and other things.

1.2.3 Game loop:

See: Flowcharts

1.2.4 Tetrominos

1. There are 7 types of gaming blocks, called "Tetrominos"

- I
- T
- L
- J
- S
- Z
- O

2. The active tetromino is described in a struct like this:

```
struct tetromino {  
    char type;  
    unsigned int pos_x;  
    unsigned int pos_y;  
    unsigned int orientation;  
};
```

- `type` describes which form the tetromino takes (i.e. I, L, ...).
- `pos_x`, `pos_y` describes the position on the playing field.
- `orientation` describes the orientation of the tetromino.

3. Once a tetromino can't fall any further, a new one is created at the position (5, 20))

1.2.5 Gravity value

The gravity describes the rate in which the active tetromino descends. It can be accelerated and (temporarily) stopped by turning the tetromino (see "easy spin"). It is reset at the start of each run of the game loop.

1.2.6 Send out

The routine to send out the Playfield. For each cell in the field the character to send out is:

- A whitespace for unoccupied
- A Block (ascii-code: 219) for occupied.