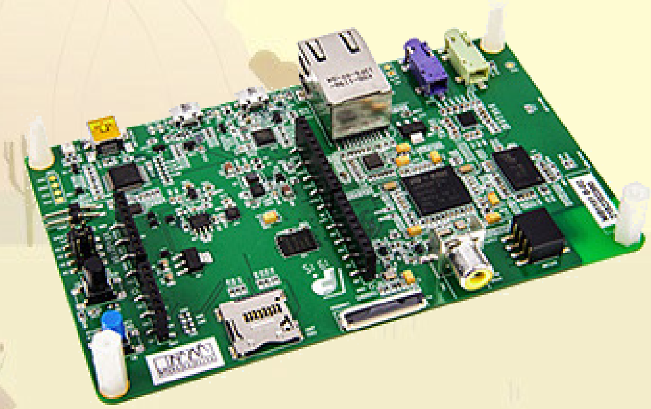
FIESTA PINATA

Praktikum:
Sichere Softwareentwicklung
für Mikrocontroller in vernetzten Energiesystemen



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Game Specification

- Genre: Shoot ‘Em Up
- Countdown
- Score
- Optional Microphone: Shout “Peng” to Shoot
- Different Targets
- Two Game Modes

Targets*

Evil:

+50

Hero:

-70

*similarities to real characters are purely coincidental.

Targets*

Evil:

Hero:

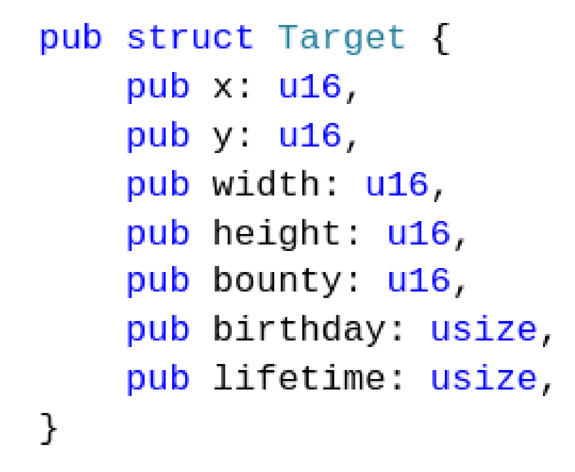
+50

+100

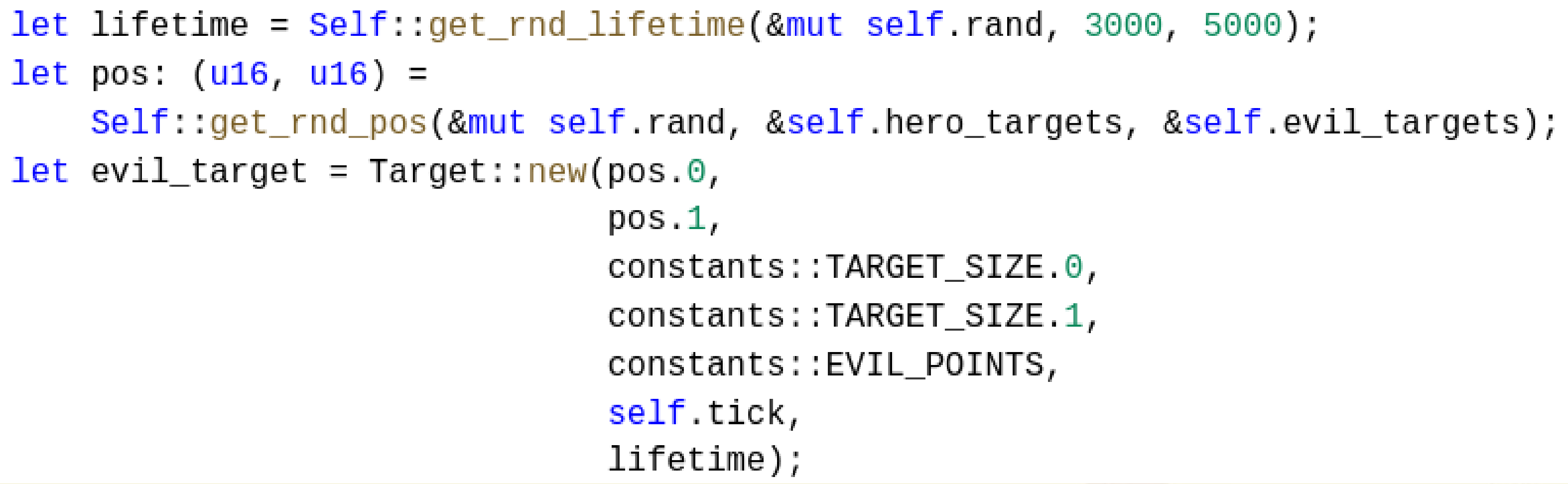
-70

*similarities to real characters are purely coincidental.

Targets



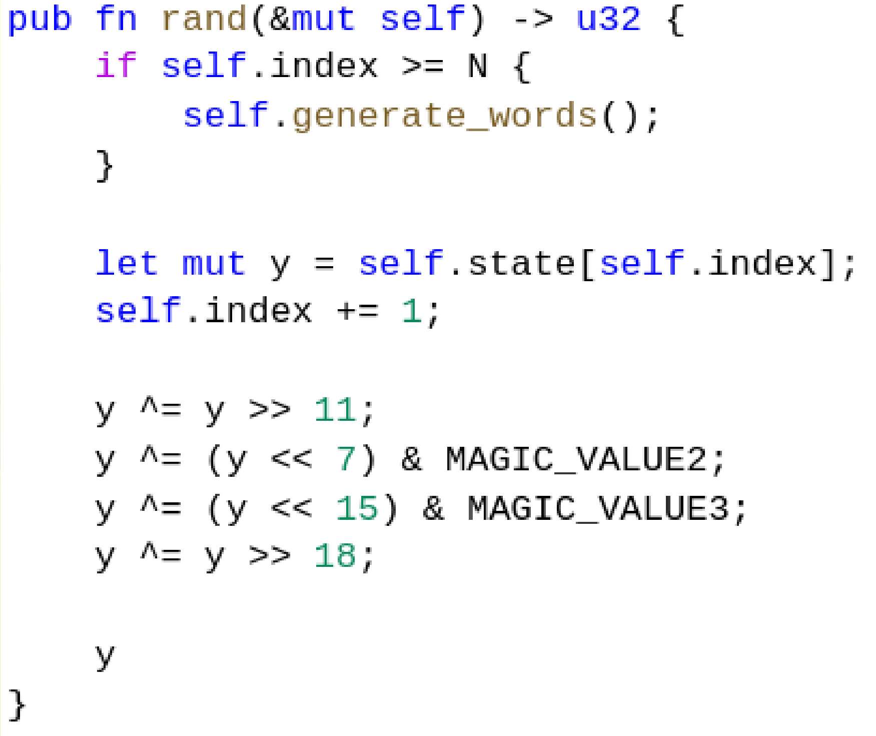
```
pub struct Target {
    pub x: u16,
    pub y: u16,
    pub width: u16,
    pub height: u16,
    pub bounty: u16,
    pub birthday: usize,
    pub lifetime: usize,
}
```



```
let lifetime = Self::get_rnd_lifetime(&mut self.rand, 3000, 5000);
let pos: (u16, u16) =
    Self::get_rnd_pos(&mut self.rand, &self.hero_targets, &self.evil_targets);
let evil_target = Target::new(pos.0,
                              pos.1,
                              constants::TARGET_SIZE.0,
                              constants::TARGET_SIZE.1,
                              constants::EVIL_POINTS,
                              self.tick,
                              lifetime);
```

Randomizer

- Mersenne-Twister
- Seeded with HW-Random-Register



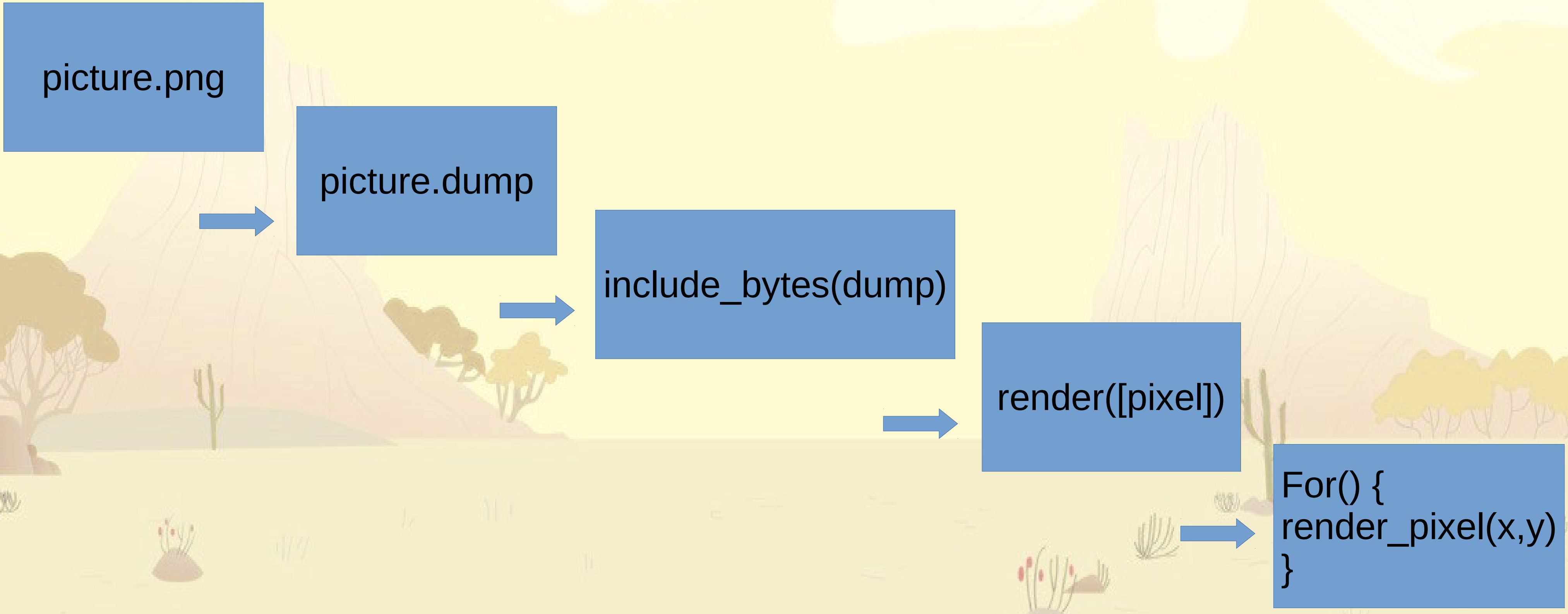
```rust
pub fn rand(&mut self) -> u32 {
    if self.index >= N {
        self.generate_words();
    }

    let mut y = self.state[self.index];
    self.index += 1;

    y ^= y >> 11;
    y ^= (y << 7) & MAGIC_VALUE2;
    y ^= (y << 15) & MAGIC_VALUE3;
    y ^= y >> 18;

    y
}
```

Renderer-Pipeline



picture.png

picture.dump

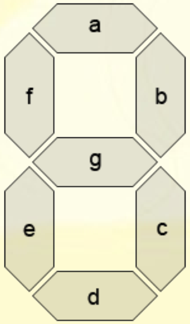
include_bytes(dump)

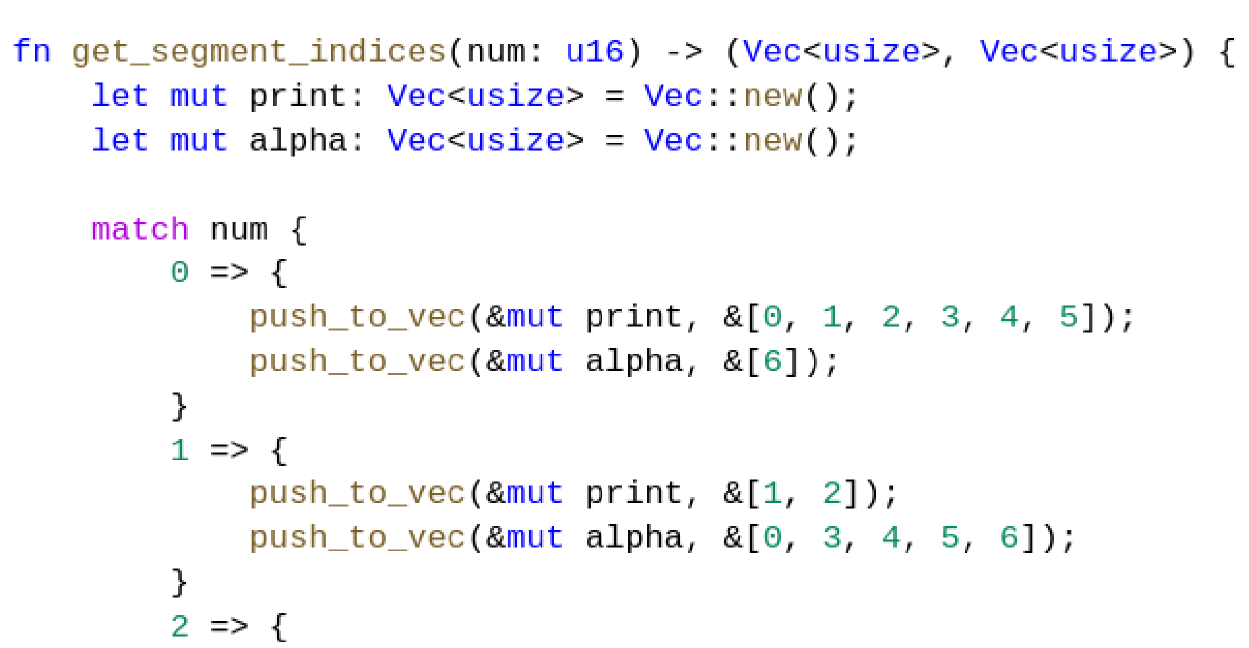
render([pixel])

```
For() {
render_pixel(x,y)
}
```

Seven Segments

- Factory-Methods:
  - new_vertical(x, y, size)
  - new_horizontal(x, y, size)
- Binary → BCD → match

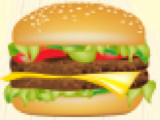




```
fn get_segment_indices(num: u16) -> (Vec<usize>, Vec<usize>) {
    let mut print: Vec<usize> = Vec::new();
    let mut alpha: Vec<usize> = Vec::new();

    match num {
        0 => {
            push_to_vec(&mut print, &[0, 1, 2, 3, 4, 5]);
            push_to_vec(&mut alpha, &[6]);
        }
        1 => {
            push_to_vec(&mut print, &[1, 2]);
            push_to_vec(&mut alpha, &[0, 3, 4, 5, 6]);
        }
        2 => {
```

Additional Game Features

- Two different Game Modes
  - Hunt the
  -  Hunt the
- Click to Start Game & Play Again
- Mute Button
- Highscore of Game Instance

Game Demo

FIESTA PINATA
STM32F746G-DISCO
MB1191B
www.st.com/stm32f7-discovery
Micro Right
Micro Left
CAMERA
ETHERNET

Danke für eure Aufmerksamkeit!