Regression Testing
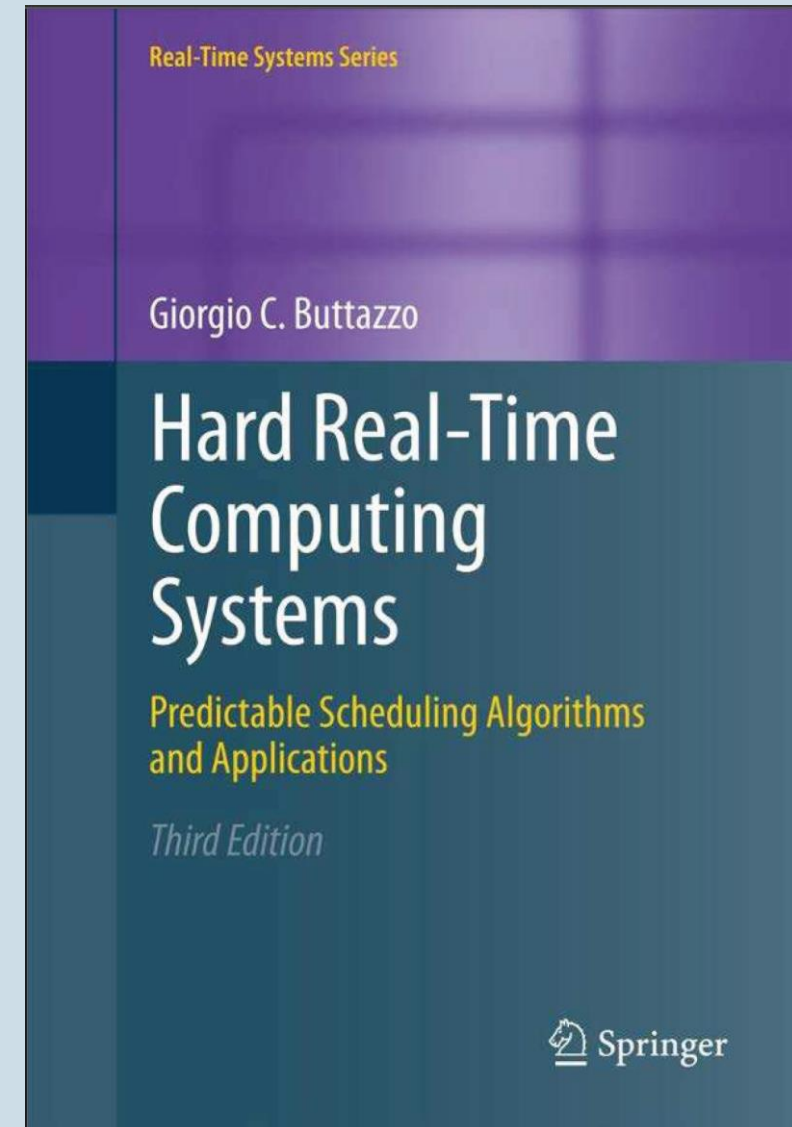# for Real-Time-Constraints

Paweł Wiśniewski, embeff GmbH

Why Realtime-Constraints are important

When time deadlines aren't met bad things can happen

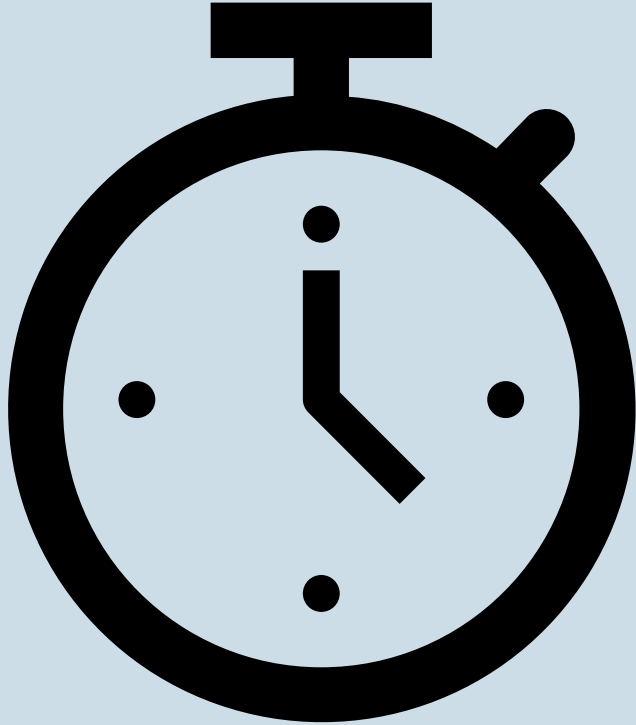- Something gets damaged

- Someone gets injured

- Someone dies

embeff
BETTER EMBEDDED.

What do you need to check time constrains

- Depending on your software you need to calculate it differently

  - Priorities

  - Resources

  - Interrupts

  - …

- You need to know worst-case execution time for software components

Real-Time Systems Series

Giorgio C. Buttazzo

Hard Real-Time Computing Systems

Predictable Scheduling Algorithms and Applications

Third Edition

Springer

How do I find out the execution time

- Static Code Analysis
  Look at assembler and calculate how many cycles the function needs for different inputs

- Measure runtime

  - Use ARM-Cortex *Data Watchpoint and Trace* (DWT)

  - Measure from outside (e.g. toggle pin)

Example

- two functions:

```
float calculate(float input);
bool set_new_value(float input);
```

- time constraints

  - t(calculate) + 2 * t(set_new_value) < 40us

  - t(calculate) < 35us

```
Execution time check
    ${allowed_runtime_calculate} =    35us
    ${allowed_runtime_combined} =    40us

    ${runtime_calculate} =    Do Benchmark    calculate    ${input}
    ${runtime_set_new_value} =    Do Benchmark    set_new_value    ${input}
    ${runtime_combined} =  ${runtime_calculate} +
                           2*${runtime_set_new_value}
IF  ${runtime_combined} > ${allowed_runtime_combined}
 OR ${runtime_compute} > ${allowed_runtime_calculate}
    Report Violation    ${input}
END
```

embeff
BETTER EMBEDDED.

Live Demo

Try it online for yourself

Questions?

Paweł Wiśniewski, embeff GmbH

pawel.wisniewski@embeff.com