Polygraph implementation using Arduino microcontroller board

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1 General

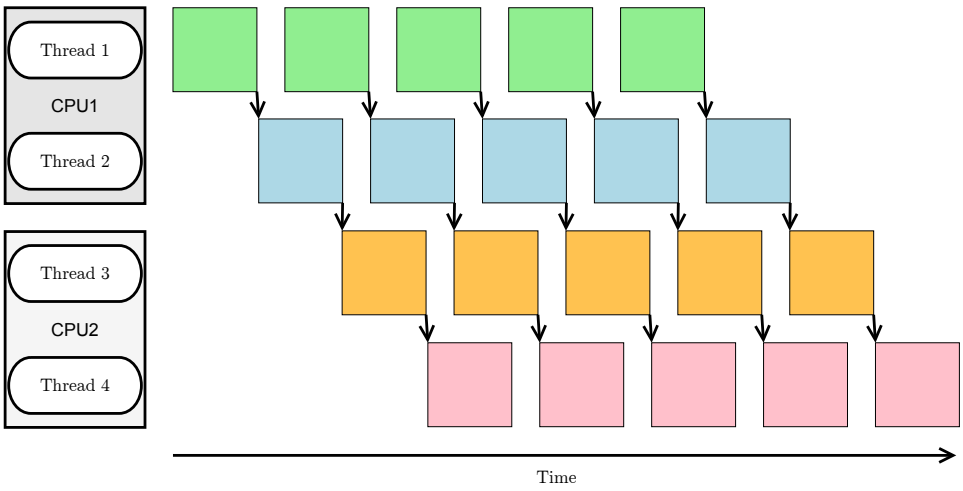

Figure 1: Pipelining

1. Queue name
2. Queue data type

1.1 UI

The design inputs to the user interface were:

1. Low latency response
2. Low overhead.

1.2 Error Handling

1. Create an error case to the command typedef
2. Create an user event which can bubble up to the event structure.

UI which actually handles the error. The user event data

$$e \propto ||\nabla T|| \propto \frac{\partial T}{\partial t}. \tag{1}$$

The proportionality coefficients are calculated using the linear regression model

$$\text{MEAS} = \alpha_1 T_1 + \alpha_2 \frac{\partial T_1}{\partial t} + \alpha_0 \tag{2}$$

$$\text{REF} = \beta_1 T_2 + \beta_2 \frac{\partial T_2}{\partial t} + \beta_0 \tag{3}$$

$$\text{MEAS}_{comp} = \text{MEAS} - \alpha_1 T_1 - \alpha_2 \frac{\partial T_1}{\partial t} \tag{4}$$

$$\text{REF}_{comp} = \text{REF} - \beta_1 T_2 - \beta_2 \frac{\partial T_2}{\partial t}. \tag{5}$$

1.2.1 Time derivative

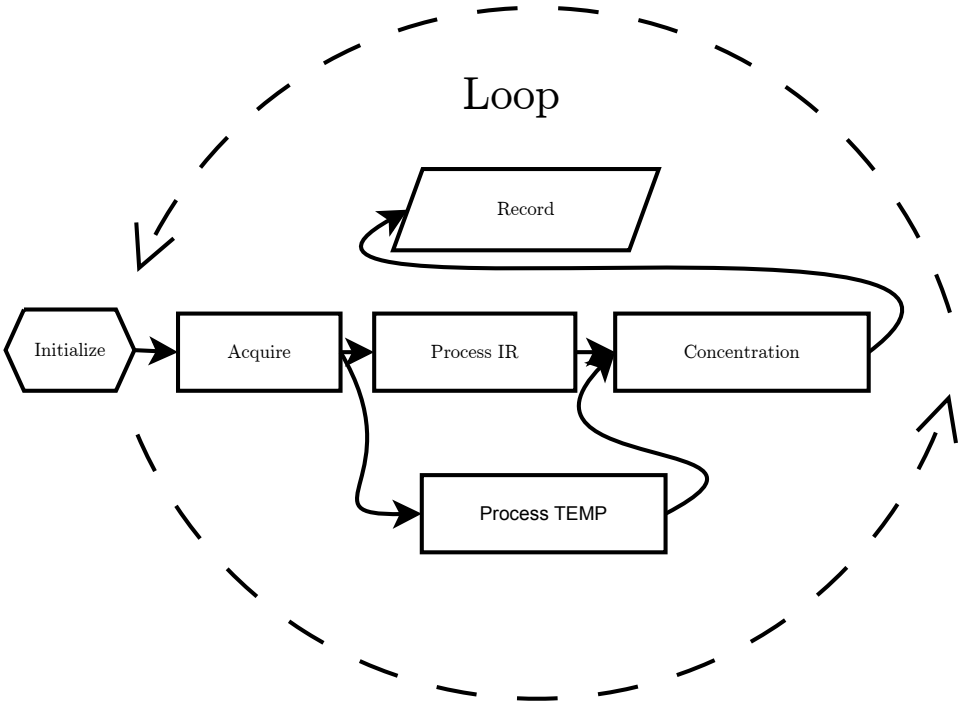

Figure 2: Program dataflow chart. Arrows indicate direction of data flow, not dependance or sequentiality.

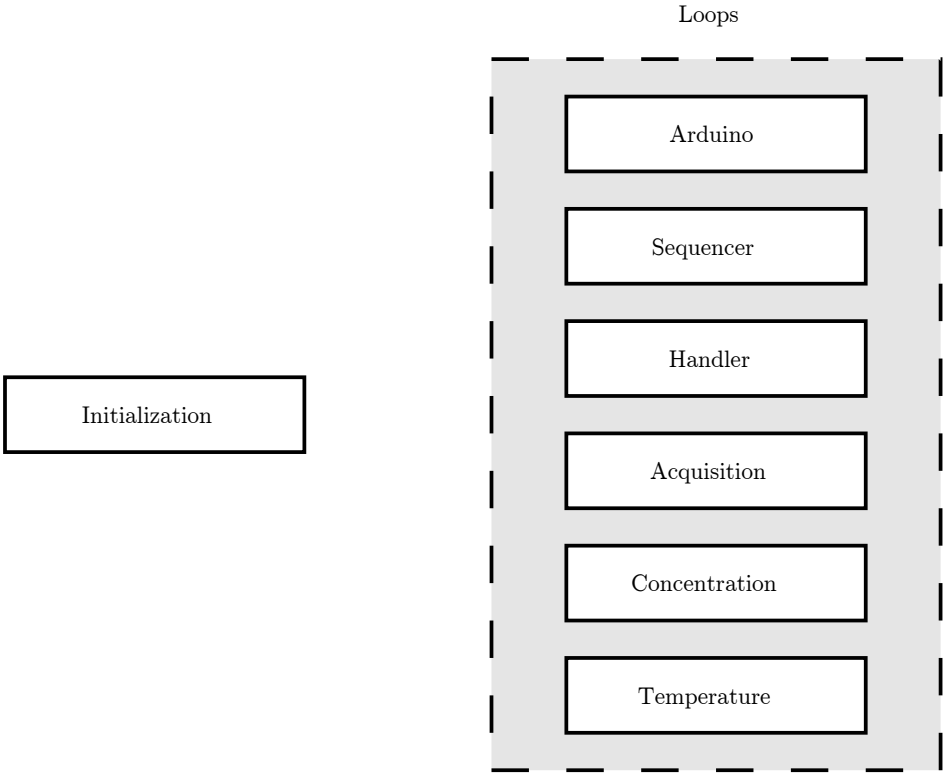

Figure 3: Block diagram functional components

Appendices

A Directory listing

```
mims-project        Root directory
├── data            Contains sensor-configurations.ini
├── docs            Documents related to the sensor hardware
├── helpers         Some helpfull functions
├── test            Unit & other tests
├── typedefs        Controls and clusters used by the program
├── utilities       Functions for performing more complex tasks
└── main.vi         The main program
```