Vrije Universiteit Brussel

Proposal bachelor thesis

Title: Programming the Clothes of the Future.
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Advisor: Christophe Scholliers
Includes preparation course: ~~Yes~~ / No (Select the correct option)

Context

Due to the miniaturization of hardware chips it has become feasible to equip clothes with a wide variety of sensors and actuators. These sensors can monitor traditional health indicators such as the hearth rate and body temperature but can also measure less traditional parameters such the pressure on the clothes or the angle in which your arms are bend. Actuators consists of small leds but can also be more advanced things such as massaging devices. The architecture of these new form of clothes is basically a small distributed system. Programming such distributed systems is a complex endeavor where many things can go wrong. This thesis proposal consist of writing a domain specific programming language for programable clothes.

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This thesis proposal consists of the *extension* of a small scheme compiler [1] with a set of distributed programming language primitives to exchange values between the distributed microcontrollers. The student will be provide with a concrete scheme compiler and receive information on how to configure it for the ATMEAG8 platform. These minimum set of communication primitives that are expected to be implemented are send (!), receive (?), internal choice (+) and external choice (&). These primitives are loosely based on the set of primitives found in CSP [2]. For example, in order to define a function that first sends a message ‘getData to another process p and then waits until the data is received the following code could be used:

```
(define (ReceiveSensorData p)
        (! p ‘getData)
        (? p))
```

Besides the communication primitives the student will be encouraged to add other primitives to implement a concrete use-case. In a first stage the student will try out the language on a small distributed embedded system. Afterwards, clothes will be provided and a use-case will be implemented.

[1] http://matt.might.net/articles/compiling-scheme-to-c/
[2] http://en.wikipedia.org/wiki/Communicating_sequential_processes