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Computation mechanisms for realization of context-driven robots

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Humans are using memories, twisted or guessed facts and other implicit information asserted or collected to reason about the most appropriate solutions in a given environmental conditions. They are adaptive instead of being reactive and this adaptation is happening through a constant interaction. Unlike humans, robots do not understand context by default and therefore they are mostly reactive. Deterministic chaos is a characteristic of the real world where the existence of living beings depends mostly on their capability to adapt to changes instead of controlling them. Compared to conventional approaches where robots are preprogramed to react on a finite number of environmental occurrences, the contextual awareness can enable modeling of human like adaptation skills. Computational models, as a focus of this talk, could be understood as context to data interpreters that transform (high-level or implicit) information into (low- level or explicit) data, allowing machines to make context-drivendecisions. The basic model contains three main parts. The first part is used to track and collect significant environmental information following the principles of ubiquitous computing. The second part represents formal knowledge about the domain of interest. The model contains also a probabilistic component realized through Bayesian Network ensuring a single solution in a given context. The overall methodology will be presented through three separate examples illustrating the reasoning based on: (i) phenomenon of social capital, (ii) human bodily awareness and (iii) human emotions. The design philosophy is focused here on the effects of the real human reasoning without defining the phenomenon itself.

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