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# ALICIA
## An Architecture for Intelligent Affective Agents

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**Abstract.** One of the most important social ability for effective social interaction with people is the capacity to understand, feel and ultimately express emotions. In this paper we present an architecture, based on the BDI paradigm, employing a three layered approach and coupling an emotion engine which simulates the generation of affective states based on Scherer's component process theory and influences decision making.

## 1 ALICIA's General Architecture

ALICIA's architecture (Fig. 1) is based on the well known BDI (Belief, Desire and Intention) paradigm. The work is also inspired by the classically rational element in the SOAR architecture [1]. Knowledge of the environment is modeled through Dynamic Belief Networks (DBN), emotions are described through Scherer's component process theory of emotions [2].

The architecture is based on a three layer model (i.e. *reactive*, *schematic* and *conceptual* layers) of agent cognition [2, 3]. A fourth layer is added, the physical, which is tailored to the platform on which ALICIA is implemented.

The autonomous agents developed using this architecture are able to appraise emotions as reactions to events and objects in the surrounding and to react through physically triggered fast reactions, schema and planned decisions. The choice of the best future action is influenced by the most relevant emotions felt (emotion mixture approach) as well as by the agent preferences and personality.

Some characteristics of the databases containing beliefs, desires, and intentions facilitate this process of emotional influence. For example the fact of splitting the desires' DB in two parts (desires and aversions) makes it very simple to simulate influences of mood on decision making and affective state's appraisal by pruning the number of desires and aversions which are considered.

This process also works thanks to the fact that desires, as beliefs, intentions, possible behaviors, actions, and plans are sorted so that the more emotionally relevant ones are found first. This approach, thanks also to somatic markers [4], allows for fast decision making, by pruning non emotionally-relevant decision branches, which follows in some way agent's preferences.

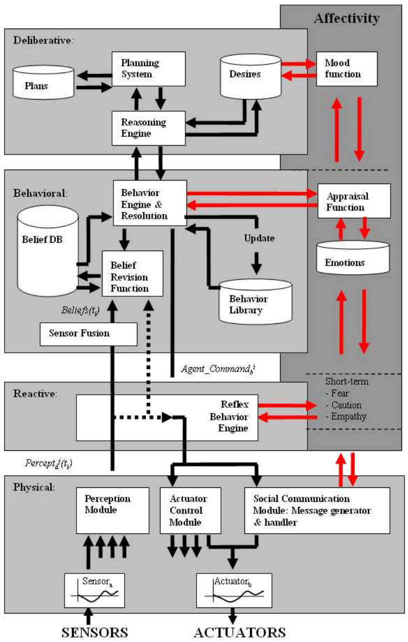


**Fig. 1.** ALICIA's architecture

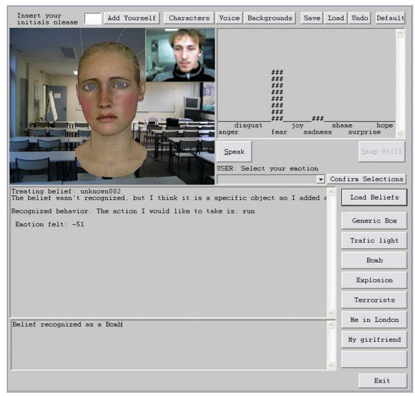


**Fig. 2.** Demo Interface

We have tested the architecture by deploying a software agent (Fig. 2) and simulating inputs describing different, more or less emotionally relevant, situations to test the different level of the architecture. In all these preliminarily proposed scenarios the agent behaved as expected.

The results of these preliminary experiments have shown the importance of adopting an integrative approach when dealing with different sensor modalities. We are therefore currently evolving the architecture by implementing a multimodal sensor fusion system [5].

## References

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