Mind the Body
Filling the Gap between Minds and Bodies in Synthetic Characters

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Abstract. Interactive virtual environments (IVEs) are inhabited by synthetic characters that guide and engage children in a wide variety of activities, like playing games or learning new things. To build those environments, we need believable autonomous synthetic characters that are able to think and act in very dynamic environments. These characters have often able minds that are limited by the actions that the body can do. In one hand, we have minds capable of creating interesting non-linear behaviour; on the other hand, we have bodies that are limited by the number of animations they can perform. This usually leads to a large planning effort to anticipate possible situations and define which animations are necessary. When we aim at non-linear narrative and non-deterministic plots, there is an obvious gap between what minds can think and what bodies can do. We propose smart bodies as way to fill this gap between minds and bodies. A smart body extends the notion of standard body since it is enriched with semantic information and can do things on its own. The mind still decides what the character should do, but the body chooses how it is done. Smart bodies, like standard bodies, have a model and a collection of animations which are provided by a graphics engine. But they also have access to knowledge about other elements in the world like locations, interaction information and particular attributes. At this point, the notions of interaction spot and action trigger come into play. Interaction spots are specific positions around smart bodies or items where other smart bodies can do particular interactions. Action triggers define automatic reactions which are triggered by smart bodies when certain actions or interactions occur. We use both these constructs to create abstract references for physical elements, to act as a resource and pre-condition mechanisms, and to simulate physics using rule-based reactions. Smart bodies use all this information to create high-level actions which are used by the minds. Thus, minds operate at a higher level and do not have to deal with low-level body geometry or physics. Smart bodies were used in FearNot!, an anti-bullying application. In FearNot! children experience virtual stories generated in real-time where they can witness (from a third-person perspective) a series of bullying situations towards a character. Clearly, in such an emergent narrative scenario, minds need to work at a higher-level of abstraction without worrying with bodies and how a particular action is carried out at low-level. Smart bodies provided this abstraction layer. We performed a small study to validate our work in FearNot! with positive results. We believe there may be other applications where smart bodies have much to offer, particularly when using unscripted and non-linear narrative approaches.