CONVERSATIONAL MARK-UP IN EMBODIED AGENTS

TECHNICAL FIELD

[0001] Embodiments of the invention relate to on-the-fly animation of Embodied Agents, such as virtual characters, digital entities, and/or robots. More particularly but not exclusively, embodiments of the invention relate to the automatic application of Markup and/or Elegant Variations to representations of utterances to dynamically animate Embodied Agents.

BACKGROUND ART

[0002] Behaviour Markup Language, or BML, is an XML-based description language for controlling verbal and nonverbal behaviour for "Embodied Conversational Agents". US9205557B2 discloses a method for generating contextual behaviors of a mobile robot. A module for automatically inserting command tags in front of key words is provided. Automatic on-the-fly augmentation and/or modification of communicative utterances by embodied, autonomous agents remains an unsolved problem. Further, animating Embodied Agents in a manner that is realistic and non-repetitive remains an unsolved problem. US9812151B1 discloses generating a BML for a virtual agent during a dialogue with a user. However, Embodied Conversational Agents controlled by BML in the prior art are not autonomous agents, and do not have internal states which may conflict with Markup expressing behaviour.

OBJECT OF INVENTION

[0003] It is an object of the invention to improve conversational mark-up in embodied agents, or to at least provide the public or industry with a useful choice.

SUMMARY

[0003a] In a first aspect, the present disclosure provides a method for animating an Embodied Agent, including the steps of: receiving a Communicative Utterance; processing the Communicative Utterance to generate an Elegant Variation of the Communicative Utterance; processing the Elegant Variation to identify one or more Rules applicable to at least one Target in the Elegant Variation; applying Markup to the representation of the Elegant Variation of the Communicative Utterance according to the one or more Rules, wherein the Markup defines one or more Behaviour Modifiers configured to modify how the Communicative Utterance is expressed; processing the Markup to apply Behaviour Modifiers as the Embodied Agent expresses the Communication Utterance.

[0003b] In a second aspect, the present disclosure provides a method for animating an Embodied Agent, wherein the Embodied Agent is a dynamic system comprising an internal state, configured to drive the Embodied Agent's animation parameters, including the steps of: receiving a Communicative Utterance; processing

the Communicative Utterance to identify one or more Rules applicable to at least one Target in the Communicative Utterance; wherein the effect of the rule is to modulate the internal state of the Embodied Agent.

[0003c] In a third aspect, the present disclosure provides a method for generating an Elegant Variation of a Communicative Utterance for communication by a Embodied Agent, including the steps of: defining a grammar for the Communicative Utterance by embedding the definition of the grammar as an annotated representation of the Communicative Utterance; the annotated representation including: at least one sub-expression nesting a plurality of Alternative Variants; at least one of the Alternative Variants nesting a plurality of Alternative Variants; generating an Elegant Variation from the grammar.

[0003d] In a fourth aspect, the present disclosure provides a method for controlling an expression of a Communicative Utterance by a Embodied Agent, including the steps of receiving a representation of the Communicative Utterance; receiving a plurality of Rules including: Targets to which the rules are to be applied; Conditions which limit application of the rules; Results which define Markup for a modification of the Communicative Utterance and/or a manner of delivery of the Communicative Utterance; applying one or more of the plurality of Rules to generated a Marked-Up communicative utterance; and processing the Marked-Up communicative utterance to control the behaviour of the Embodied Agent as the Embodied Agent expresses the Communicative Utterance.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 shows a system for controlling an expression of a Communication Utterance by an Embodied Agent; and

Figure 2 shows a system for bottom-up and top-down control of Embodied Agent behaviour.

DISCLOSURE OF INVENTION

[0004] A Markup System includes a Rule Processor, and a set of Rules for applying Markup to augment the communication of a Communicative Intent by an Embodied Agent. Markup applied to a Communicative Utterance applies Behaviour Modifiers and/or Elegant Variations to the Communicative Utterances.

[0005] Figure 1 shows a system for controlling an expression of a Communicative Utterance by an Embodied Agent. A representation of a Communicative Intent (which may be a representation of a Communicative