Follow the White Robot — A Role-Playing Game with a Robot Game Master

Demonstration

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ABSTRACT

We describe a social robot acting as a game master in an interactive tabletop role-playing game. The Robot Game Master (RGM) takes on the role of different characters, which the human players meet during the adventure, as well as of the narrator. The demonstration presents a novel software and hardware platform that allows the robot to (1) proactively lead through the storyline and to (2) react to changes in the ongoing game in real-time, while (3) fostering players' collaborations.

KEYWORDS

Autonomous Agent; Social Robot; Storytelling; Mixed Reality

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1 INTRODUCTION

This demonstration showcases a system incorporating a Robot Game Master (RGM) in a role-playing game combining interactive storytelling and interactive table surfaces. A game master's responsibilities range from narrating the adventure's story, taking on the role of Non-Player Characters (NPCs), and overseeing the rules to integrating the social context of the game's world and keeping everyone entertained and engaged [3]. These represent significant challenges to an autonomous agent as they require the robot to handle different storytelling aspects in real-time, such as presenting choices to the players, retrieving their decisions and reacting accordingly, proactively advancing the narration, or being aware of the players' positions around the table.

In this paper, we present a system satisfying these requirements in the context of a mixed reality (MR) version of the traditional board game *Quest: Zeit der Helden* [13]. To the best of our knowledge, it is the first system combining a social robot, an interactive surface and an interactive role-playing game. Our objective is to explore a novel gaming paradigm and to provide solutions for autonomous agents that need to interact in real-time with a mixed reality and multi-user environment.

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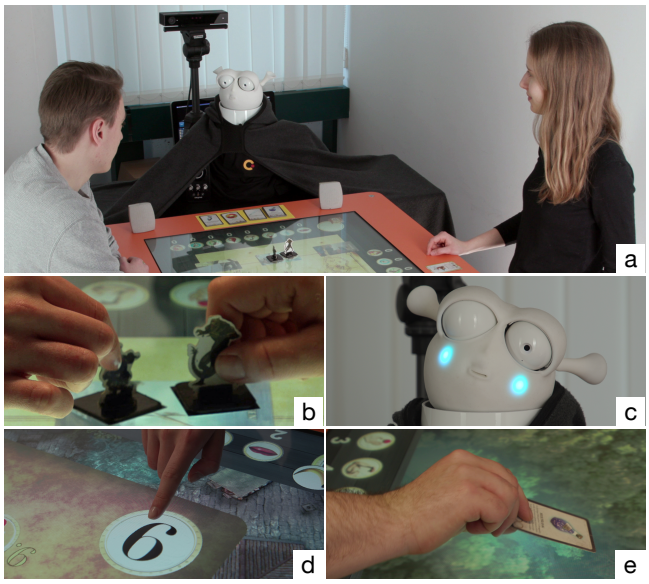

Figure 1: Demonstration setup (a) and details (b-e) of the mixed reality role-playing game mastered by a robot.

2 DEMONSTRATION CONTENT

Two to four human players take part in an adventure narrated by our RGM (see Figure 1a for the setup). Each player is taking the role of a hero with different abilities and powers. The RGM, embodied by a *Reeti* robot [15], is narrating the story as well as impersonating the roles of the characters that the human players meet during the adventure. Players have to make decisions by manipulating their hero's pawn or by placing magic cards (see Figure 1b & 1e). The heroes are starting their journey in a seaport. After a short introduction, the RGM presents the heroes with a choice: visiting the local store or the tavern. The interactive surface displays a map highlighting both places. If the players decide to go to the tavern, the RGM takes on the role of a drunken pirate, by using an aggressive voice, closing one of its eyes, tilting its head, and switching on blue LEDs (see Figure 1c). Then the heroes are provided with two choices: calm the pirate or start a fight. Choosing the first option leads to a charisma test, i.e., a virtual dice roll (see Figure 1d). If the players lose the test, the pirate enrages and injures some heroes. The respective players may interrupt this action and choose to treat their wounds by placing a *Healing Potion* card (see Figure 1e). The demonstration comprises another 10–15 min of such gameplay. An illustrating video can be found on https://youtu.be/z9S6FOoP-5I

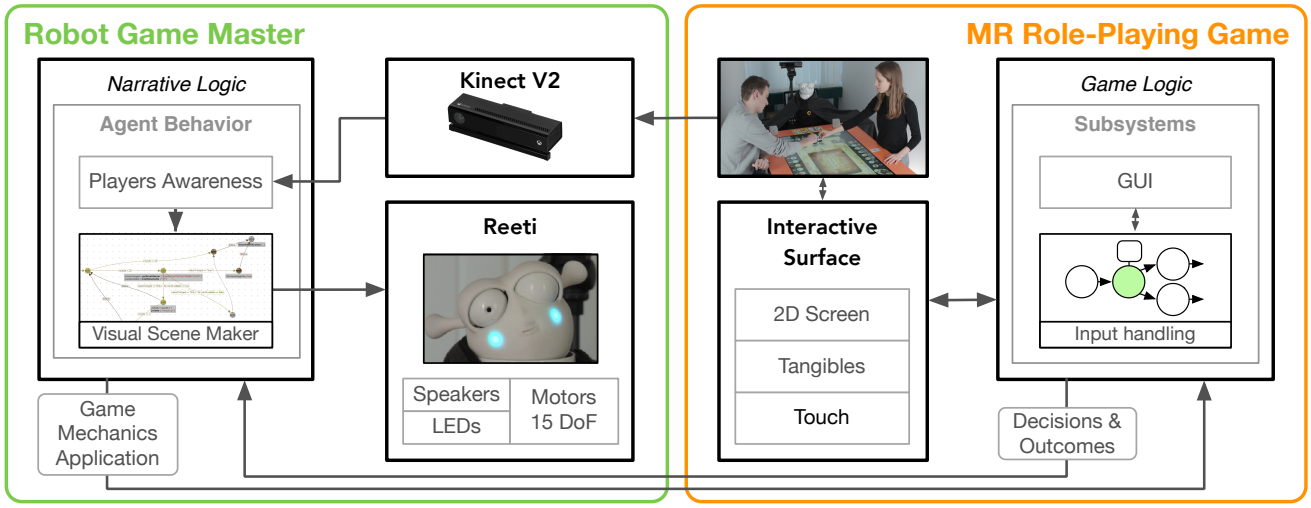

Figure 2: System overview: The *narrative logic* module selects appropriate verbal- and non-verbal robot behaviours proactively as well as based on player actions. The latter, requires instructions for the application of game mechanics to be sent to the MR game via network, which uses the interactive table to realize respective interactions. The results of their application, i.e., player decisions and random event outcomes, are communicated back to proceed the narrative accordingly.

3 RATIONALE

The major advantage of transferring a tabletop game to a mixed reality tabletop game, such as [1, 4, 9–11], is that the social situation of traditional tabletop games is preserved, while the automatic detection of the human players' actions is facilitated. This recognition is paramount to reason about the game's context in order to proactively advance in the story as well as to react in a believable manner [16]. At the same time, contributions on storytelling agents demonstrated that the physical presence of the agent can increase the attention of listeners [2], and that their believability can be increased by multi-modal communication [6]. Social robots have already been successfully used as co-players in collaborative educational games, e.g. [14], or as protagonists of an interactive story for children [7]. Consequently, the combination social robots and mixed reality tabletop role-playing games should provide a novel interesting gaming paradigm.

4 SYSTEM ARCHITECTURE

As illustrated by Figure 2, the system consists of two main components: i) the Robot Game Master modules and ii) the mixed reality role-playing game, both interconnected via a TCP/IP network. The robot's *narrative logic* is implemented with the *Visual Scene Maker* (VSM) framework [5] by means of a state machine to model narration relevant game transitions as well as suitable reactions to player decisions and random event outcomes. Associated scripts for each state contain verbal and non-verbal behaviour of the RGM, such as the audio playback of pre-recorded character's lines, the display of facial expressions, or the mood-colouring of LEDs in the cheeks. The VSM facilitates proactive behaviour (e.g., state changes triggered by timers) as well as reactive behaviour (e.g., state changes triggered by interrupts). The robot's *player awareness* module uses the *Kinect V2* sensor to track the player's positions around the table. It allows the robot to turn its head towards them during narration and interaction phases. If the storyline requires the players to act or decide, instructions for the concrete application of game mechanics are sent to the MR game via network. For instance, to present the choice of visiting the local store or the tavern or to conduct a charisma test (dice roll). The MR game system uses the open source real-time interactive system *Simulator X* [8] to realize respective interactions. The *game logic* subsystem thereto maps the received high-level instructions to multimedia content, interface elements, and low-level input handling. A 55 inch *MultiTaction MT cell* [12] is used to present this content and to detect touch positions as well as positions and orientations of pawns and cards tagged with fiducial markers. Once all interactions related to the currently presented game mechanics are interpreted, narration relevant player decisions (e.g., where to go) and random event outcomes (e.g., dice roll results) are communicated back to the *narrative logic* module to proceed the narrative accordingly.

5 CONCLUSION

This contribution described the successful integration of a novel gaming paradigm combining social robotics, mixed reality and tabletop role-playing games. We believe this combination is opening interesting perspectives to future entertainment applications by adding another social dimension. It also provides a unique research platform to explore solutions for autonomous agents that interact in real-time in a multi-user environment, in a non security-critical scenario. In our ongoing work, we evaluate the benefit of this novel combination on the players' perceived social presence as well as on the perceived game immersion.

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