Virtual Reality-Based Daily Scrum Meetings

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Virtual Reality-Based Daily Scrum Meetings

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Synonyms

Virtual reality training for daily scrum meetings

Definitions

A daily scrum meeting is a useful, short, and informal communication activity for agile software development teams typically conducted at the same location and time, most likely before lunch. This meeting allows regular exchange of information among software team members starting with reporting the status yesterday activities to today's tasks and ultimately obstacles that they did encounter.

Virtual reality is a technology medium that allows an interface to individuals to interact with sensory rich computer-generated world, which might also include virtual and real individuals where participants could gain virtual experiences on real matters. Social interactions with virtual personas are considered more engaging and fun especially for training in software engineering concepts.

Introduction

Software development is a social endeavor where quality of social interactions among practitioners directly affects the quality and complexity of software development (Yilmaz and O'Connor 2011b). In particular, software development encourages more diverse teams of individuals and highlights the importance of practitioners' soft skills (Yilmaz 2013). These skills usually developed by the experience of practitioners while working on several different teams and interacting software practitioners with various personality traits (Yilmaz and O'Connor 2012). However, it is technically not that easy to encounter these situations if an individual has been working with a single team of professionals for a long period of time.

In this entry, an industrial case study on a virtual reality training environment for human-virtual persona interaction been discussed to reveal ways to train software professionals for daily scrum meetings with 3D virtual characters which have the ability to mimic verbal and non-verbal behaviors and therefore convey distinctive personality characteristics.

Overview

In the last decade, agile development has changed the controversial development approaches by investigating practical ways for continuous requirements gathering and feedback with self-organized and self-directed teams and ultimately seeking mechanisms for fostering sustainable software development. These socio-economic mechanisms promote a sequence of refinement to achieve desired outcomes (Yilmaz et al. 2010). However, agile development activities require more social interaction among practitioners, and therefore, social aspects of software development emerged as an important asset for improving the software development process (Yilmaz and O'Connor 2011a).

Daily Scrum Meetings

Scrum is a simple and flexible software development framework and ultimately an enabler based on teamwork with an iterative progress (i.e., a sprint) to deal with volatile requirements (Schwaber 2004). The process essentially starts with a planning meeting, which continues with daily scrum sessions and it ends with a retrospective meeting. These meetings enable software teams to quickly identify and solve the issues as they arise. In particular, daily scrum meetings, which hold every day of a sprint, provide continuous feedback on project status and an opportunity to fix the problems as they arise. In addition, they are helpful for measuring individual productivity on daily basis. To sum up, daily scrum meetings guide software teams for performance visibility, project control and predictability, and ultimately mitigating several risks they might have faced (Schwaber and Beedle 2002). In addition, these meetings are not only for exchanging information but also raising consciousness among software team members who should make continuous planning through a sprint.

A daily scrum meeting requires a well-functioning social interaction pattern; otherwise, it may have unsuccessful results. In addition, it helps to reveal communication problems in software development teams. Although it is not a deep problem-solving meeting, such a face-to-face gathering among the team members requires effective communication and social interaction skills (Schiel 2011). Daily scrum meetings are more likely to be successful when team members known each other's personality characteristics. Consequently, an individual might likely to predict his or her teammate's reaction when a conflict arises. A software team member should share the understanding of team goals, coordinate their work efforts, share their problems and suggestions for improvement, and lastly, they should have to produce a sense of relatedness (O'Connor and Yilmaz 2015).

However, many practitioners reported that they have worked with a limited amount of software professionals and do not know how to respond individuals when engaging a conflict with unknown personality characteristics. To bridge this gap and orient new scrum team members, we propose a virtual reality-based training environment, which is (i) beneficial for onboarding new personnel and (ii) helpful to train individuals who might like to experience a conflict with a virtual character that was designed to have a divergent personality characteristic.

Virtual Reality

Virtual reality (VR) is a technology of illusion (i.e., computer-generated world) encompasses computer vision, digital image processing techniques, and display tools, which enable participants to interact with a digitally simulated environment that have an ability to fool the human senses as an artificial reality (Burdea and Coiffet 2017). VR aims to convince an individual for being in another realm (i.e., hypothetical environment) by receiving and producing data using a computer system.

To design a fully functional training system, a critical feature for a VR system needs to be equipped with 3D interactive virtual characters which may have mimic a set of gestures based on their embedded personality characteristics. To improve the expressiveness of daily virtual stand-up meetings, we envision that Five Factor (a.k.a. Big Five or ocean) model of personality

traits can be utilized for designing virtual personas to improve their social capabilities and make them useful in agile team training activities (Widiger 2017). Five-factor model considers the personality traits of a virtual character in five basic dimensions (Matthews et al. 2003): (i) openness to experience represents persons who are insightful with skills of imagination, (ii) extroversion represents talkative personas with energetic and assertive characteristics, (iii) agreeableness is a trait that shows cooperative behavior with compassion, (iv) conscientiousness is an organized responsible and consistent personality characteristic that shows a tendency to do any task well in a planned way, and finally, (v) neuroticism is a personality trait which is inclined to have long term negative emotions (e.g. anger, anxiety) while being tense and moody.

Personality in virtual characters are designed in terms of their verbal behaviors such as language usage skills (Mairesse and Walker 2010), nonverbal behaviors (McRorie et al. 2012) such as body language or gestures, and lastly facial expressions (Egges et al. 2004). Lui et al. (2016) suggested that extroversion trait in social virtual characters can be portrayed by higher speech velocity and gesture with wider arms than introvert personas. In particular, personality of a virtual agent can be characterized by a set of internally consistent verbal and nonverbal behaviors (Cerekovic et al. 2014). These agents can be formed to simulate different personalities (i.e., individuals with different verbal and non-verbal behaviors) of software professionals and beneficial for creating a variation of virtual daily scrum meetings.

Industrial Case Study: Applying VR to Daily Scrum Meetings

To enhance the virtual reality-based daily scrum meeting training environment, we initially designed five different personas with which participant can join collaboratively to a set of daily scrum meetings. The five personalities of the virtual software practitioners were based on the Ten-Item Personality Inventory (TIPI) scale (Gosling et al. 2003). Unlike human being, our synthetic humans were having more dominant characteristics. For example, virtual character A was designed as an extrovert who prefer to interact with others using verbal and nonverbal behaviors while Agent B was an argumentative virtual character who might avoid from small talk. The personality traits that utilized were as follows: extroverted, conventional, excited, argumentative, self-disciplined, emotionally unstable, and reserved.

Consequently, initial scenarios were created using recorded and transcribed from a set of real-world daily scrum meetings experienced by a small- to medium-sized software enterprise. The agents were hard-coded with predefined gestures and mimics to create a unique training experience to participants. The VR-based training environment aimed to introduce software practitioners seven well-known mistakes might happen in daily scrum meetings. First scenario was about a virtual character who started to take notes while scrum master initiated the meeting. Among active six virtual characters, two of them began to get annoyed from this situation which ultimately reflected to their nonverbal behavior. Here, participant should be able to recognize what was going on and advised to take notes about the issue. Second scenario was about micromanagement issue in a daily stand-up meeting, which was performed by a virtual personality. The virtual scrum master character started to solve a specific problem that was caused by another persona. While meeting was in progress, two other team members started to perform some gestures in response to that situation. In light of these remarks, the participant should be able to spot the problem and later asked to document the issue. The daily stand-up meeting aims to hold the team together by aligning team member's progress with a sprint goal. In the third scenario, virtual team members articulated some sense of disorientation. Initially, a virtual character started to play with their mobile phone during discussions. Participant could report impediments and ways of collaboration for fixing problems. Consequently, other virtual agents started to act in a noncollaborative manner while the other two were annoyed from this situation. Participant

should be able to identify this problem and might suggest a solution for reorientation.

Figure 1 illustrates the virtual reality-based training environment where participant is situated in different roles depending on selected scenario. Participant can see all verbal and nonverbal behaviors of virtual characters, which are now in embedded code but planned to be arranged using a simple XML-based markup language.

Agile software development requires quick information exchange; however, the daily stand-up meeting sometimes considered as a planning activity where team leader presents a planned feature. The third training session includes a typical scenario initiated with a discussion regarding to a new feature. Accordingly, scrum master started such a conversation and a virtual character with relatively higher conscientiousness trait might likely to annoy from the situation and probably shows some gesture sequences. Participant should realize the problem and report it back with the user interface. Fifthly, this scenario was expanded to include a detailed technical discussion that should not be conducted during a daily stand-up meeting. All virtual characters partially might annoy from the discussion and highly likely to show their irritation by a set of nonverbal behaviors. An agile practitioner should be able to spot such an issue and report it to a team lead when necessary. In the sixth scenario, participant played the role of scrum master in which team members gathered up in their work location instead of holding the meeting near a scrum board. Consequently, virtual characters started talking to each other by showing some gestures. The goal of participant was to direct them to the right meeting place (i.e., in front of scrum board). Finally, a participant entered the scenario where conventional meeting context was affected by some extra discussions introduced by virtual characters. Participant should have to interact with virtual characters and observe unwanted behaviors. In addition, the main goal of the participant was to keep the values of information, concentration, and entertainment of the virtual daily scrum meeting in balance. In particular, individual should steer the conversations to tasks that they have done yesterday and the things they are working for today. Daily stand-up meetings are usually conducted before lunch; therefore, there would be a space to talk about today's tasks that are in progress. In this scenario, participant was called for an early meeting and further exposed to conversations related to constraints, risks, and obstacles. Participant should have to recognize the issue and report this when asked.

During the study, these seven scenarios were arranged for participants in the form of a set of VR-based daily stand-up meetings. To investigate scenarios simulated in the VR environment, six software practitioners played all seven scenarios using a Oculus Rift Headset with a pair of Oculus Touch controllers. They were asked to spot a daily scrum meeting issue based on their hands-on
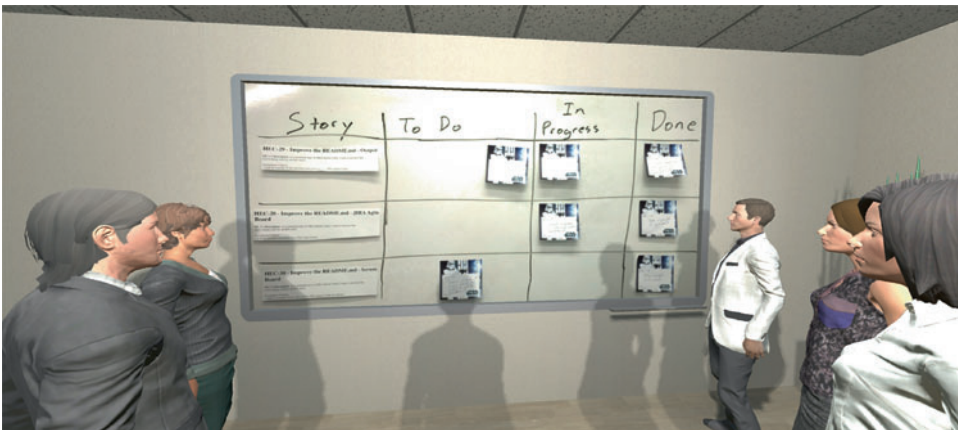
Virtual Reality-Based Daily Scrum Meetings, Fig. 1   A daily scrum meeting environment in virtual reality

Virtual Reality-Based Daily Scrum Meetings, Table 1 The issues spotted by experienced software practitioners in virtual daily scrum meetings

Practitioner	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7
P1	Found	–	–	Found	Found	–	Found
P2	Found	Found	Found	Found	–	Found	Found
P3	–	–	Found	–	–	–	Found
P4	Found	Found	–	Found	–	Found	Found
P5	Found	Found	–	Found	–	Found	–
P6	–	–	Found	Found	Found	Found	–

experience. The scenario based issues that participants found were shown in Table 1.

Overall, these results indicate that all issues can be visible which were found either one of the participants. Participant one cannot find the daily scrum meeting issue for scenario 2, 3, and 6. Participant two scored six out of seven which is the highest score among all participants while participant three was the one with the lowest found value (i.e., two). Participant four found five issues, participant five and six could be able to report four issues. Not surprisingly, perhaps, participant three was a novice software engineering with less than 1 year of development experience, and participant 2 was a scrum master. Consequently, these preliminary results further highlight the potential benefits of a VR-based software development training.

Limitations

We have initially observed that VR has significantly helped to improve the learning experience for daily scrum meetings in an agile development team. Since the study was also limited to hardware (i.e., a single Oculus Rift was used), it was not possible to conduct concurrent assessments. In addition, it was observed that first time virtual reality users have some stress while experimenting virtual daily scrum meetings. A participant was a bit nervous to experience VR technology and concurrently responding to virtual characters with timely and appropriate responses. Therefore, an assistant observer was used for guidance. After passing the orientation phase, it seems all participants were somehow

immersed. To create more realistic daily scrum meetings, a participant suggested that 3D environment should be more detailed with additional background office noises. In addition, another participant suggested that scrum board should be visualized with realistic data and all scenarios should belong to a single project, which would make it more easier to follow. However, these limitations may be improved in further studies.

Conclusion

This entry discussed a virtual reality environment to train software practitioners on daily scrum meetings. The goal was to create a virtual environment with virtual characters to enhance the learning experience of software professionals. Although research has been conducted to transform text-based learning to an interactive form, virtual reality offers an engaging and interactive experience especially by integrating virtual characters that act like human participants. The virtualization of information to use in training is an emerging field in virtual reality applications. Virtual characters with human like gestures and behaviors make a training system interactive and ultimately more engaging for participants. A virtual ecosystem may assist individuals to improve their learning efforts. Based on Scrum rules that an agile team member should follow, seven different situations were simulated by virtual characters in a 3D virtual reality environment. Although the current study was based on a small sample of participants, the findings suggested that VR-based simulations could be helpful for training software practitioners. In other words, this

study strengthens the idea that a scenario-based virtual reality training benefits software practitioners. There is a potential to gain virtual experience on various software development activities. Further research could also be conducted to determine the effectiveness of virtual characters in education and training in software engineering.

Although virtual reality is an emerging medium within a wide range of potential applications, it still has some reachability issues. However, there are massive amounts of investments in VR ecosystems by technology giants such as Google, Apple, HTC, etc. Therefore, this problem will be overcome with these massive investments. Finally, training in a virtual reality environment with virtual characters can be considered as an enjoyable experience particularly for technology enthusiast, like majority of the software practitioners.

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