

Virtual Reality Application for Stress Therapy: Issues and Challenges

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Abstract: Given that stress has affected many people and is becoming an important issue to address, the development of an application that can help people to relax and therefore reduce stress is becoming important. One of the solutions is the use of virtual reality (VR) in stress therapy. In this paper, we evaluate a virtual reality application developed for stress therapy, and highlighted the issues associated with such application. Based on the issues, we proposed a component framework which can be used to develop a VR application for stress therapy which provides holistic experience to the users.

Keywords: Stress Therapy, Virtual Reality, VR-Based Therapy

I. INTRODUCTION

Virtual reality or VR is a 3D-computer generated environment with the ability to trick one's mind into believing the presented virtual objects as real. Since the first invention of Sensorama, virtual reality has been used in various areas such as engineering (Fernández and Alonso, 2015), medical training (Ruthenbeck and Reynolds, 2015; Selvander and Åsman, 2012), tourism (Guttentag, 2010; Maymand et al., 2012) and education (Jou, 2013). As technology evolves over the years, virtual reality benefits much and consequently expands its application into the field of psychology. In the field of psychology, virtual reality has been used as an alternative tool to treat psychological related problems such as anxiety (Bouchard et al., 2017; Maples-Keller et al., 2017), post-traumatic stress disorder (PTSD) (Menelas et al., 2018; Rizzo et al., 2015) and phobias (Costa, Robb and Nacke, 2014; Suyanto et al., 2017). Result of studies conducted show that, the applications of virtual reality as a psychological therapy tool have promising results. Hence, this encourages researchers to expand the application into the field of stress therapy.

In the field of stress therapy, virtual reality is used as a tool to reduce stress as well as to induce relaxation. A stress therapy that uses virtual reality system as its main tool for the therapy session is known as VR-based stress therapy.

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As compared to conventional stress therapy techniques such as imagination and Cognitive Behaviour Therapy (CBT) which require patients to visualize a calming image on their own, VR-based stress therapy will assist the patients to visualize the calming image through its virtual environment.

A relaxing virtual environment is displayed to the patients through several mediums such as head mounted display (HMD), cave automatic virtual environment (CAVE) or monitor display. Since the calming image is provided to the patients, it is easier for the patients to achieve a state of tranquillity as they do not need to imagine the image themselves. This way, the patients can focus more on the therapy session, hence, increasing the effectiveness of the therapy session.

There are a number of articles which compare the effectiveness between conventional stress therapy techniques and VR-based stress therapy (Mahalil et al., 2014; Soyka et al., 2016; Taneja et al., 2017). The comparisons are made in order to verify the effectiveness of VR-based therapy in reducing stress. Based on the discussions made, it is found that VR-based therapy is effective in reducing stress as well as in encouraging relaxation.

At this point, we acknowledged that VR-based stress therapy is effective to reduce stress. However, based on our observation, there are several issues and challenges that need to be addressed in order to ensure the effectiveness of the VR-based stress therapy application. For this study, we have developed a VR-based application as a prototype to be used for stress therapy. In this paper, we hence present results on evaluation of the VR-based application and summarise the issues and challenges associated with such application.

II. VR APPLICATION FOR STRESS THERAPY

The application consists of a number of virtual environments and background audios. There are five selections for virtual environment: Beach, Waterfall, Garden, Underwater and Jungle. For the audio, three options are provided for the users: Nature, Instrumental and Zikr. The application also consists of a main menu interface that allows the users to make selection on their preferred environments and audios. The application starts with a mind-framing scene where users' attention and mind are directed towards getting ready for the session and aiming to relax.



At the end of the session, another short mind framing script is narrated to the users in order to confirm that the session is indeed making the users feel more relaxed, as well as to prepare the users to get ready to end the session and come back to the real world. The duration for each session is around 6 minutes.

For navigation, we set a few specific pre-defined locations in the virtual environment for the users to teleport to. When users press a trigger button on the device controller, a mini-map is presented to the users to show them the overall view of the environment and all the pre-defined locations that the users can teleport to. The users can also see their current location from the mini-map. By releasing the trigger button, the users will be teleported to the next pre-defined location. At each location, users are free to tilt their head around to view the environment. Samples of an environment and a mini-map used in the application are shown in Figure 1.

The application was designed for working adult who works in a closed office environment or workers who are often face stressful and challenging tasks on a daily basis at work, such as those who work in customer service. Nevertheless, the application can also be used by anyone who wants to lower the stress level and to relax. The application was designed with the concept of bringing the users to another world, away from the stressful environment (for example, office) where they could enjoy the 'alone-and-me time' by gazing at the environment while listening to their preferred audio. They can also work on their self-reflection or simply empty their mind from the issues or problems that stress them out. This concept is similar to the normal 'take a break' moment where we simply go to other places to unwind.



(a)



(b)

**Fig. 1 (a) Screenshot of beach environment
(b) Screenshot of a mini-map**

III. METHODS

One hundred and eight participants (50 male and 58 female) took part in the evaluation study. The age of participants ranges from early twenties to late fifties. Figure 2 shows the breakdown of participants' age. The participants are office workers who are stationed around Selangor. An open call was made to the participants through email and participations were on voluntary basis. Each participant chose his/her preferred environment and background audio. The participants then went through the stress therapy session for 6 minutes. During the session, the participants sat on a comfortable chair. After the session, the participants answered a questionnaire and were also interviewed.

The questionnaire consists of 14 closed ended questions that assess various aspects of the therapy session; users perceived effectiveness of the therapy session (whether they feel relaxed or not), and user evaluation on the environments setting. Each of the questions has an ordinal 5-point Likert type scale (Definitely Agree (5), Agree (4), Neutral (3), Not Really (2), Not at All (1)). Some of the questions used in the questionnaire are shown in Table 1. The questionnaire also includes five open ended questions which ask the users for specific contents/items from the overall experience that made them feel relaxed, as well as suggestions on how to further improve the application in terms of its visual arrangement, audio selection and navigation control.

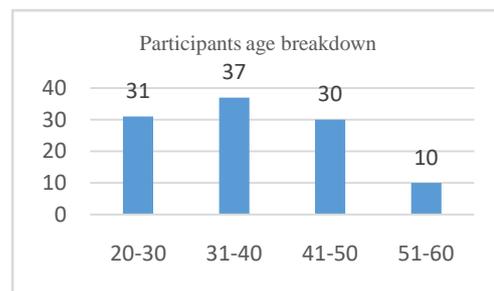


Fig. 2 The distribution of participants' age

Table. 1 Some of the questions asked to the participants

S4:Do you feel relaxed after using this system?
 S6:After using the system, do you think it will help you to focus more on your work?
 S7:Do you think that you are able to forget your worries/problems for a while when using the system?
 S8:Do you think that using the system is a way for you to clear and clarify your thoughts?
 S12:Do you think the virtual environment setting helps you to feel relaxed?
 S13:Do you think the audio provided in virtual environment helps you to feel relaxed?

IV. RESULTS AND DISCUSSION

Findings from the analysis are divided into two categories: results in perceived usefulness of the therapy session and user feedback on the improvement of the overall application.

Results in perceived usefulness

Figure 3 shows the results of the questions listed in Table 1. In general, almost all of the users gave positive response to the session and the experience it invokes for them to feel relaxed. The result demonstrates that the session using virtual reality application helps users to relax.

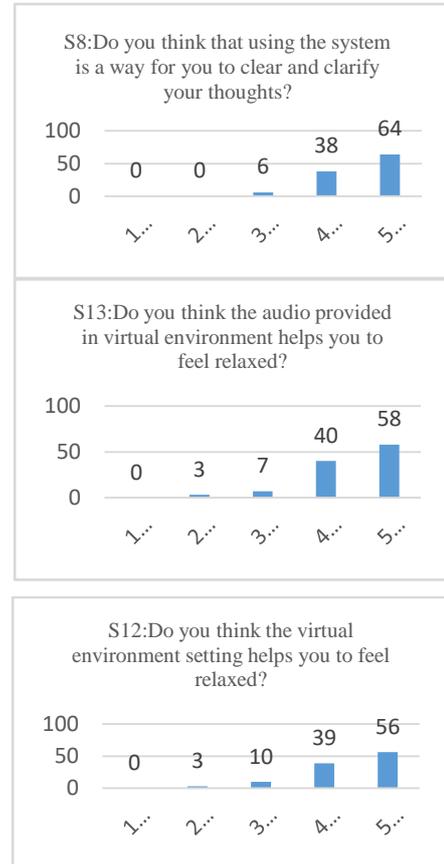
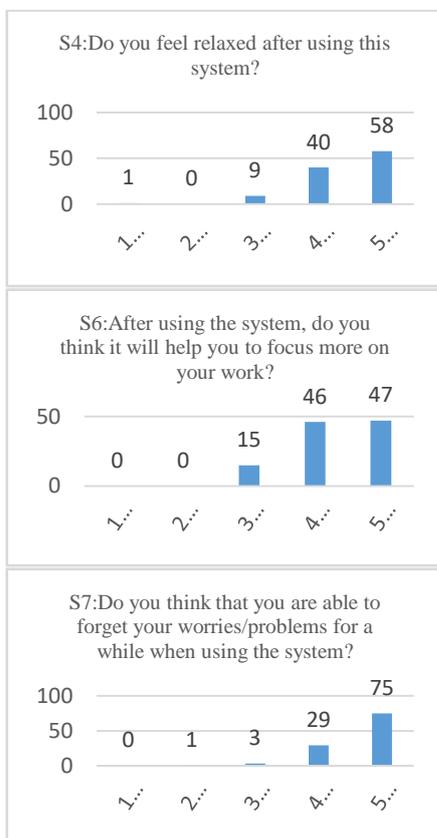


Fig. 3 Results for questions listed in Table 1

Resultson Overall Environment Improvement

Results from the interview session and on the open ended questions revealed few important observations and issues:

Some of the participants cannot tolerate that the 3D objects look a bit ‘cartoony’. They have an expectation that the provided virtual environment would look like a real environment, i.e. like a real video or image. However, most of the participants can tolerate and accept the look of the 3D virtual environment.

Some participants expressed their interest in walking or doing some activities while in the virtual environment. For them, the virtual environment feels empty if they were just to spend the session by gazing at the relaxing features like waterfall, beautiful flower or beach provided in the environment.



Virtual Reality Application for Stress Therapy: Issues and Challenges

For navigation, some participants would like to freely explore the environment without being restricted to some pre-defined locations, while some others prefer to rather have a pre-defined path and guided navigation where they can just sit and enjoy the view.

For the audio, most of them enjoyed nature and zikrbackground. They mentioned that the nature audio background (for example the sound of wind, bird chipping and alike) is important in making the overall experience feel real. The zikr helps the participants to relax and re-focus. Some of them even hum the zikr during the session.

For the mind framing session, almost all of them benefit from the session. They find breathing exercise incorporated into the mind framing session is useful in helping them to relax.

Based on findings from section 4.2, we would like to suggest for the components, as shown in Figure 4, should be designed into the virtual reality application for stress therapy. These components when integrated will provide a more holistic experience and provide options that cater to a wider range of audience (different users need and preference).

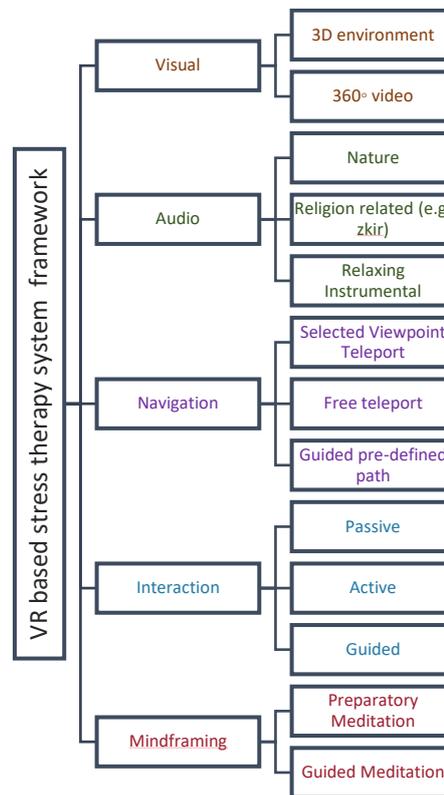


Fig. 4 Proposed component framework for virtual reality application for stress therapy

The five components are visual, audio, interaction, navigation and mindframing. For visual component, 360° video is proposed to address the issue of those who cannot tolerate the ‘cartoony’ look of 3D environment. Whereas for audio component, we proposed three types of audio for the users: nature, audio related to specific religion or belief (for example zikr) and relaxing instrumental music.

Additionally, for navigation, we proposed three types of navigation methods as suggested by the users: selected viewpoint teleport where the users are presented with the best viewpoint in the environment, free teleport where the users are free to go anywhere in the virtual environment, and guided auto-flight navigation following a pre-defined path. In each selected viewpoints and guided auto-flight navigation, users can relax and enjoy the view without struggling to find the ‘perfect’ or ‘relaxing’ spot in virtual environment. Free teleportation mode is proposed to cater to the users who like to ‘explore’. However, one observation note on this method: users can easily get frustrated if they face problems of getting to a specific location, due to them being lost in the environment or the limitation of the teleportation control itself.

Moreover, for interaction, passive interaction refers to users not doing anything in the virtual environment but gazing and viewing the relaxing items provided in the environment. Example of relaxation items are moving water like waterfall or fountain and moving objects like flying birds and butterflies. However, for those who likes to ‘react’ in order to ‘relax’, some activities can be introduced in the environment as a mean to distract their mind from the problems that stresses them out (active interaction). Example of possible activity is fish or bird feeding. Guided interactivity refers to a situation where users are instructed to do specific physical activity at some particular locations or at any time interval during the session. Examples of possible activities for users are clenching their hands for a few times as a form of exercise or doing stretching.

While for mindframing component, preparatory meditation refers to a set up where motivational script is narrated to the users at the beginning and towards the end of the session.

At the beginning of the session, the preparatory meditation prepares the users' mind to accept the session and condition their mind into believing that the session will make them feel relaxed. The preparatory meditation towards the end of the session acts as a confirmatory that the session has indeed made the users relax. However, to some users, they may also benefit from an ongoing motivational script being narrated to them throughout the entire session, this option is suitable for those who requires more motivational support.

V. CONCLUSION

This paper discussed possible findings on issues that are associated with the implementation of virtual reality application for stress therapy. A component design framework is proposed to address the issues. The framework consists of suggestions on how to implement a virtual reality application for stress therapy from five different aspects which are visual, audio, navigation, interaction and mind framing. We propose that the integration of all the components in a virtual reality application designed for stress therapy will create a more holistic experience for the users.

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