

# MOOD DEVICES: INTERACTIVE MEDIA AND MENTAL HEALTH

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## ABSTRACT

We introduce Mood Devices, interactive digital media and environments designed to alter the inter-actor's psychological state. In particular, we describe three very different virtual reality (VR) environments: Relaxation Island, the Exploratorium, and the Achievement Room, developed with our partners as part of the EMMA (Engaging Media for Mental Health) project. Relaxation Island is designed to support established relaxation techniques, as part of interventions to assist individuals cope with specific anxieties such as examination stress. The Achievement Room gives users with chronic restricted mobility the opportunity to sing and play in a virtual concert, in front of an audience of avatars programmed to respond to their performance. The aim is to provide a sense of achievement and encourage a more positive attitude. The Exploratorium, as the name suggests, takes a more user-directed approach: It provides an environment that can be explored in an embodied way, with three specific zones designed to elicit widely different moods. All three environments can be run on a range of platforms, from high-end immersive VR, to pocket-sized PDAs and web-based applications. We see such interactive media as providing an important contribution to the future of e-health programmes.

## KEYWORDS

Mood devices, mental health, presence, emotion, relaxation, achievement.

## 1. INTRODUCTION

The main goal of the EMMA (Engaging Media for Mental Health) project, a European Community funded research project (IST-2001-39192), is to study the relationships between presence and emotions. In particular, after analyzing the possible emotional impact of highly compelling synthetic experiences characterized by a high level of presence, the EMMA project is developing "mood devices" designed to induce different forms of mood change and enhancement. The partners in the project are Universidad Politécnica de Valencia (Spain), Universitat Jaume I (Spain), Istituto Auxologico Italiano (Italy), Goldsmiths College of the University of London (United Kingdom), Università di Padova (Italy), and the Interactive Institute Tools for Creativity Studio in Sweden.

In the developed world, many people suffer from what are known as "mood disorders", especially anxiety, panic attacks and depression. These are often debilitating and long lasting problems for those affected, including the sufferers themselves and their families. They often result in recurrent or long-term absence from work, which in turn impacts negatively on individuals, employers, and society as a whole. These conditions may go untreated, or are often alleviated with medication on which individuals may become dependent, which may have undesirable side-effects, and which in themselves impose a financial burden on individuals and/or society.

A body of earlier work had shown that immersive virtual reality can be effective in dealing with a range of psychological problems, from body image disorders, to various phobias and sexual dysfunctions

(Riva et al., 1999). An important aspect of these environments, and apparently the key factor in their effectiveness in addressing psychological maladaptions, is their ability to arouse controllable emotional responses in combination with a strong sense of presence, where presence refers to the feeling of actually being located in the world portrayed by the virtual environment. Using information technology to address psychological problems has several advantages, including an increased sense of empowerment and autonomy of those directly affected, and reduced financial and other demands on employers and society in general.

Our project has the overall aim of investigating the relationship between presence and emotion in the context of mental health applications of information technology. We are designing, developing and testing what we call “mood devices”: technological implementations, on a range of platforms from high end virtual reality to portable devices such as PDAs and mobile phones, which can play a significant part in dealing with common mood disorders such as depression and anxiety.

In the following sections, we describe three very different mood devices: Relaxation Island, the Exploratorium, and the Achievement Room, all developed with our partners as part of the EMMA project. Relaxation Island is designed to support established relaxation techniques, as part of interventions to assist individuals cope with specific anxieties such as examination stress. The Achievement Room gives users with chronic restricted mobility the opportunity to sing and play a musical instrument in a virtual concert, in front of an audience of avatars programmed to respond to their performance. These kinds of individuals are often very depressed and view their life very negatively. The aim of the Achievement Room is to provide a sense of achievement, encourage a more positive attitude and to help the individual out of their depression by the feeling that they have achieved something positive. The Exploratorium, as the name suggests, takes a more user-directed approach: it provides an environment that can be explored in an embodied way, with three specific zones designed to elicit widely different moods. The idea is that the user gets in touch with his/her own feelings and emotions and becomes more aware of them in order to be able to recognise and to some extent control them better. All three environments can be run on a range of platforms, from high-end immersive VR, to pocket-sized PDAs and web-based applications. We see such interactive media as providing an important contribution to the future of e-health programmes.

## 2. RELAXATION ISLAND

Relaxation Island is designed as a tropical island where the user can relax and get rid of his or her worries. The aim of the island is to provide a virtual realisation of the kind of imagined spatial location used in standard relaxation techniques such as progressive muscular relaxation and breathing techniques (Bernstein and Borkovek, 1973). Normally, how effectively relaxation is achieved probably depends on an individual's ability to imagine relaxing scenarios. With Relaxation Island, we hope to achieve equal or even greater levels of relaxation without relying on imaginative skill. Initial trials suggest that individuals find the Island relaxing, and a more thoroughgoing study is planned with our partners at Goldsmiths College London. This will directly compare relaxation with the island with that obtained through normal imaginal procedures.



Figure 1 Set up of the Relaxation Island

Users arrive by virtual boat on the Island shore. They are given a short introduction to the features of the Island, the interaction device, and ways of interacting with the system and navigating around the island. They can explore the island using a wireless “seashell” with a “pearl” as the navigation tool. The user sits in a chair in front of a large back projected screen (Figure 1). It is important that the screen is large and covers most of the visual field in order to achieve a strong experience of immersion. The application starts with setting up the story of the user arriving on the island by boat. On the beach is a hut that contains a film screen where the user can watch a film about how to use the navigation tool and about the island. The island is an archetypical tropical island with lush vegetation, a waterfall and a long beach and surrounded by mountains. It is possible for the user to explore the island freely at his or her convenience

On the island the user can choose among four different zones to learn different relaxation techniques, beach zone 1, beach zone 2, the waterfall and cloud zone (figure 2). There is heard a calm voice that leads the user through the different exercises at each zone. Beach zone 1 and 2 are located on the beach. Both zones are aimed at teaching the user relaxed breathing. The waterfall zone asks the user to type in words describing problems that worry her. After typing the words the user navigates to the waterfall and sits down on a rock looking down on a little creek that runs past the rock. In the water floats some leaves, and on some of the leaves there are the worry words the user has entered. The user is encouraged to let her worries float away with the leaves. In the cloud zone the user navigates across the sand dunes of the island and lies down on a towel in order to look at the clouds in the sky. The idea behind the exercises in this zone is to teach the user muscle relaxation. The clouds are formed into a human form and the different parts of the body that are in focus for relaxation are highlighted.



*Figure 2 Beach zone 1, beach zone 2, the waterfall and the cloud zone.*

The user navigates around the island with a tool designed as a seashell that has a pearl inside (figure 3). The pearl works as a mini-joystick and when pressed down the user sees a menu to select the different zones, leave the island or to get the introduction sequence. The user navigates around the island by pushing the pearl up, down, left or right.



*Figure 3 The Seashell*

The main environment set up described above teaches the user the basics of the different relaxation techniques. After a few sessions in this environment the user is given a PDA and/or a website address that can also be accessed via a mobile phone. These are used to get reminders of the immersive relaxation experience. The reminders are intended to be used in an emotional situation in real life in order to support relaxation anytime and anyplace. For example, if one has a panic attack in a crowded place one could use the PDA or mobile phone to recapture the memory and mood of the calming environment and one of the exercises in the Relaxation Island. The main goal of these mobile applications is to enable the user of the more comprehensive VR-application to re-experience feelings from the 3D environment independent of time and place. The idea is to bring to mind the feelings that the user experienced in the 3D environment in order to handle the emotional situation at hand. The mobile application uses a combination of pictures, sound effects and small movies to achieve these goals. The pictures consist of screen shots from the 3D environment, and the sound effects are selected pieces from the VR application, including the relaxation exercises. The user is able to choose audio-only presentation, and in this way can recapture the relaxing experience in an unobtrusive way while looking at other things (while walking around town, for example). At such times, the user will simply appear to others as if listening to music on a Walkman.

### **3. THE ACHIEVEMENT ROOM**

The Achievement Room is mainly aimed at individuals with chronic restricted mobility. These kinds of individuals are often depressed and lack sensory and emotional stimulation. In the Achievement Room environment the individual gets the opportunity to sing and play guitar in a virtual concert in front of an audience of avatars. The aim of the environment is to provide a sense of achievement and encourage a more positive attitude in the individual. Hopefully the achievement will help the individual to get out of the depression and view life more positively.

The main set up of the Achievement room consists of either a big back projected screen or a head mounted display, where the individual stands in front of the screen or sits in their bed secluded in a room, with a guitar in the hands. On the screen the user sees a stage with a red curtain that is down and behind the curtains there is a large concert hall. The narrative is that the user, having failed once before to become a famous rock-star, now has an opportunity to get a second chance by giving a concert. First of all the user hears a voice tell the background story, what is expected of the user and how to interact in the environment. After this introduction an "agent" explains about this new opportunity and that this is the last chance for the individual to become a famous rock star. The individual finds himself transferred to the virtual stage and gets the opportunity to practice before the actual concert takes place. From a menu the user is able to choose which song to perform. Later, the individual has the experience of standing on stage behind the curtain and hears the sound of the audience arriving and taking their places in the concert hall. A speaker announces the start of the concert and the curtains rises. In front of the user there is a screen where he can read the words of the song that he is going to sing. The concert starts when the user starts to hit the strings of the guitar. The music starts and the user is supposed to continue strumming on the strings at the same time as he is supposed to sing along with the background music.

The audience consists of avatars that are programmed to respond to the individual's performance. During the performance the system checks at certain points if the user is strumming the guitar correctly and if he is singing at the right times. If the user does a good performance the audience respond very positively and if the user fails the audience responds negatively. It is possible for the audience to respond in five different degrees between very good and very bad. After the performance a therapist talks to the user and analyses the concert. If the concert was a failure the user gets the opportunity to practice again and to give another concert.

The interaction in the Achievement Room is mostly through the guitar (figure 4). On the guitar there are strings that the user is supposed to strum as a simulation of playing the guitar. At the side of the guitar there are three buttons, two arrow buttons and one bigger round button. The big button is used to show the menu and to select an alternative, and the arrow buttons are used to navigate in the menu between different menu alternatives.



Figure 4 Guitar device for the Achievement Room

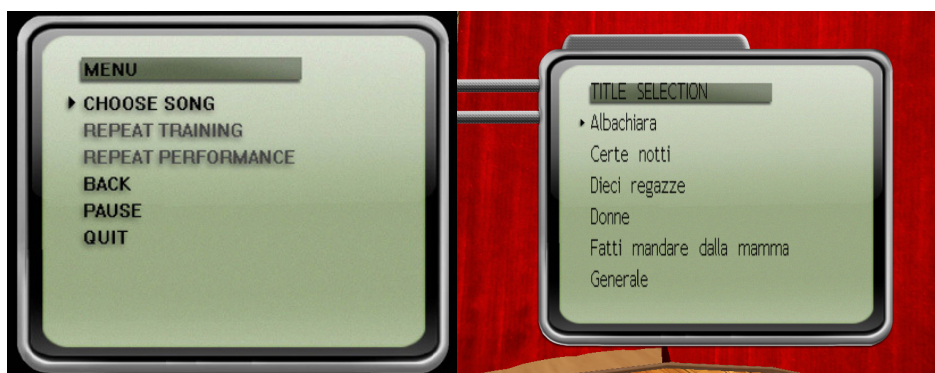


Figure 5 Menus for the Achievement Room

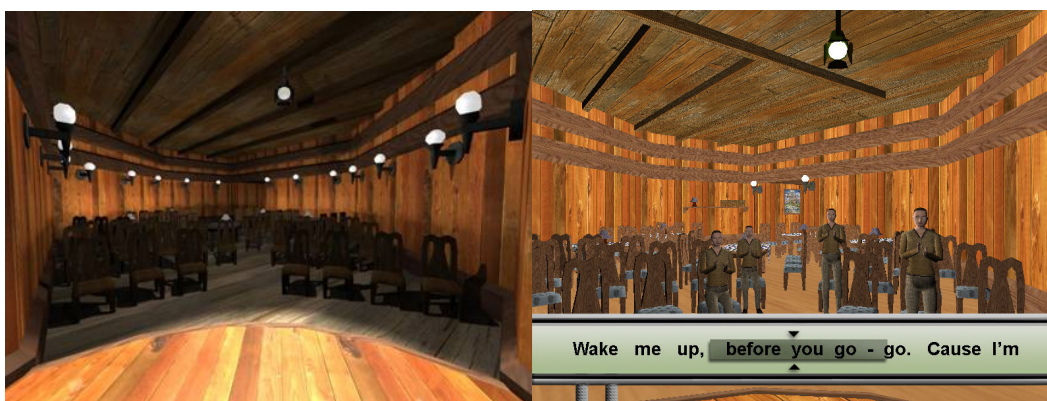


Figure 6 Screen shots from the Achievement Room

A main goal with the Achievement Room, as well as all the environments that are developed within the project, is that the interaction has to be very natural and preferably transparent for the user so that very little attention is needed to control the interaction. As an alternative to the setup described above it is also possible to access the environment on the web. If the user chooses this alternative it would be preferable to use a headmounted display or simple display glasses.

#### 4. THE EXPLORATORIUM

The Exploratorium is intended to offer a virtual environment within which immersants can explore both places and feelings. It could be viewed as an environment for the user to learn, experience and enhance her own emotions and feelings. The "narrative" it implements is structural/architectural rather than linear/story telling. What happens there depends on what the immersants do in terms of navigation; if they don't do anything, nothing will happen. Different areas of the Exploratorium present different experiences: scary, normally busy, or very calm. At the same time, the Exploratorium as a whole is fundamentally safe, a self-contained play area. Immersants can, if they wish, experience the more challenging parts or remain in the more relaxing ones. They are free to explore the different areas, under their own control.

The goal of the Exploratorium is to stimulate curiosity, leading to exploration and a consequent sense of control and empowerment, at the same time as the user experiences, explores and investigates her own feelings and emotions. We have chosen to limit interaction to navigation. Immersants are not able to select or move objects in the space, only to move around using the "body joystick" (see below) as navigation device. We thus emphasise exploration, and it is important that the Exploratorium should evoke enough curiosity in immersants so that they become self-motivated to explore.

It is possible to navigate in the Exploratorium using a variety of devices, such as joysticks, wands, and so on, but the design is more specifically intended for use with the Body Joystick. The Body Joystick concept uses a vest, worn by the immersant, which includes sensors for both body orientation and chest expansion in breathing. It was inspired by the powerful immersive artwork *Osmose* of Char Davies (Davies, 1998). We have adapted the navigation idea by making the vest lightweight and wireless, and we do not use a Head Mounted Display but rather a large back projection screen (see Figure 7).



Figure 7. The Body Joystick in use.

The space is arranged in such a way that it relates metaphorically to mood or feeling state. The idea is that immersants can navigate between different zones within the Exploratorium and encounter surroundings that suggest, and even provoke, particular emotional states. The Exploratorium differs from most virtual environments in that it emphasises the vertical dimension of navigation as well as the horizontal. In addition to visual features, the Exploratorium contains sound effects and music appropriate to each part. Upward movement thus suggests improving or lightening mood, whereas downward movement corresponds to deteriorating or darkening mood. This rather obvious linking can be theoretically supported by, for example, the Experiential Realism of Lakoff and Johnson (e.g. 1980, 1999). The user should be able to move between zones to experience different states, and using the body joystick should emphasise or amplify the changes as well as the sense of control over those changes. The Exploratorium is conceived as an environment in which to learn about oneself and one's body.

The Exploratorium consists of three “zones” arranged vertically, very loosely based on Dante’s Divine Comedy: Purgatorio (central zone), Paradiso (top zone) and Inferno (lower zone). See Figure 8.



Figure 8. The three zones of Exploratorium; Paradiso, Purgatorio and Inferno

The immersant slips on the vest, and it is fastened across the chest. A small sensor and wire across the front detects expansion and contraction of the chest during intake and expulsion of air while breathing. Breathing in and holding the breath will result in the immersant moving up in the virtual space of the Exploratorium. Breathing out and holding will cause the immersant to move down. Normal breathing will maintain the immersant at a steady vertical position. Movement on the horizontal plane is controlled by balance. If the immersant leans forward she will move forward in virtual space; leaning backwards results in backward movement. The immersant can turn right by leaning to the right, and left by leaning to the left.

As with Relaxation Island, the PDA and web-based versions of the Exploratorium are used as reminders of the actual immersive environment and can be used in emotional situations in everyday life.

## 5. CONCLUSIONS: MOOD DEVICES FOR MENTAL HEALTH

We have developed three different kinds of mood devices, that are aimed at different target groups and that induce different kinds of emotion. A pilot study of the Relaxation Island shows that the environment clearly induces relaxation and that the user considers it positive to do the exercises on the island. The pilot study shows also that the environment triggers daydreaming of similar personal relaxed experiences. A thoroughgoing comparison of the island with standard relaxation techniques is planned by our partners at Goldsmiths College London. A pilot study of the Exploratorium shows that the three different zones are able to induce the expected emotions and feelings, and we hope to carry out more detailed and longer-term trials in the near future. The Achievement Room will be tested in treatment trials by our partners at Istituto Auxologico Italiano, Milano.

New information technologies, such as virtual and augmented reality, bring with them numerous characteristics that can affect and evoke emotions and mood states, though the evocation of a sense of presence. It may even be possible to feel a higher degree of presence in a virtual than the real world (Waterworth, Riva and Waterworth, 2003). One reason for this is that in a virtual world the user can be secluded and that he does not have to worry about dangers from the outside world. In a virtual world it is possible to shut out information that is not relevant for the situation. These characteristics, combined with the design of new interaction and navigation tools, make such technology very useful in treating different kinds of mental health problem. The new kinds of interaction and navigation devices described above, such as the Vest, the Seashell and the Guitar, make the interaction and navigation natural so that the user acts largely unconsciously and directs most of their attention to the portrayed reality.

Today's hectic lifestyle, with everybody being available "anytime and anywhere" through the use of portable information technology, puts a lot of pressure on human beings. It seems probable that such availability is one of the causes of today's psychological problems, which is expensive both for society and the individual. Society has to pay in the form of rehabilitation and lost work labour, while the individual has to pay in the form of lost salary and bad health which also entails a decreased life quality. But the same "anytime, anywhere" availability can be used in positive ways, by using technology to remind people of positive states and strategies of mind.

## ACKNOWLEDGEMENTS

We acknowledge the assistance of all our EMMA partners. Relaxation Island was designed in close cooperation with Goldsmiths College, London, and the Achievement Room is likewise a combined effort with Istituto Auxologico Italiano, Milano. Parts of Purgatorio, in the Exploratorium, were modelled by the group at Universidad Politécnica de Valencia. The physical models for the SeaShell and the Guitar were built by members of the Institute for Design, Umeå University, Sweden.

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