Interactive augmented reality exposure treatment

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Exposure treatment

- Effective for specific phobias, but...
  - there are some potential drawbacks
  - e.g. some don’t seek or refuse treatment
  - can be challenging and expensive to carry out

- Virtual reality exposure therapy (VRET) addresses some of these concerns
  - Surveys and meta-analyses confirm effectiveness
VRET

- Stimulus control and consistency
- Easy repetitive stimulus delivery
- Create environments that would be difficult to present using other means
- Real-time feedback
- Graduated, systematic exposure
- VRET much-needed addition to traditional therapies
VRET

- Addition of real elements to a virtual environment
  - Hoffman et al.
  - real toy spider - tactile feedback
  - increased the degree of realism, presence, and anxiety
AR exposure therapy
Features of ARET

- more realistic experience compared to fully immersive VR
  - enhanced ecological validity
- afford direct interaction with virtual stimuli
  - clients can use their body to interact with virtual objects
Our approach

- Provide a natural environment
- Advanced tracking technology
  - natural feature tracking
  - less disruptive and more ‘life-like’ environment
  - does not give clues where virtual stimuli might appear
Our approach

- Interactivity
  - Microsoft Kinect
  - environment information
  - user tracking
    - gesture recognition
  - stimuli ‘react’ to the client’s presence and actions
First prototype

OSGART + OPIRA

AR System
- Image Analysis + NFT Marker Tracking
- Hand Recognition + Gesture Recognition
- Spider Animation Selection + 3D AR Rendering

Hand Movement

AR (Camera+Display)

Spider Location and Visual Behavior

Patient
Current system

- Kinect
  - 3D environment
  - hand tracking improved
  - Increased realism
  - More interactivity
Current system

- Limitations
  - 3rd person viewpoint
  - Based on many “assumptions” to make it work
  - No real 3D hand tracking
Work in progress

- Incorporating separate client’s viewpoint
  - More immersive setup
  - First iteration: simple camera
  - Second iteration: 2\textsuperscript{nd} Kinect

- Current challenges
  - Interference
  - Realistic occlusion rendering
Work in progress

- Interface design
Work in progress

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Work in progress

- Expert feedback
  - Functionality more important than design
  - Planning functionality
    - Also together with client
  - More realistic stimuli
    - Movement
    - NZ / AUS spiders
Work in progress

- Studying psychophysiological response to ARET exposure
- Comparison to baseline and neutral stimuli
ISMAR workshop

- Mixed Reality for Health and Wellbeing 2013
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