



Help4Mood: Design and Affect

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Outline:

1. Background
2. Virtual Agent Design
3. Affect: form and content
4. Results

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Consortium:

1. UNIVERSITY OF EDINBURGH
2. FUNDACIO PRIVADA I2CAT, INTERNET I INNOVACIO DIGITAL A CATALUNYA
3. UNIVERSITATEA BABES BOLYAI
4. FVA SAS DI LOUIS FERRINI & C
5. FUNIVERSIDAD POLITECNICA DE VALENCIA
6. OBS Medical Ltd
7. UNIVERSITAT POLITECNICA DE CATALUNYA
8. HERIOT-WATT UNIVERSITY

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Background

- Depression is a major problem, recovery tracking can be very unreliable, and adherence to treatment is often patchy
- Help4Mood aimed for treatment in the patient's home using unobtrusive actigraphy and daily self-reports
- The project researched the use of animated characters to **engage** patients and emotion modelling to tailor interactions and promote **adherence**

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Actigraphs:

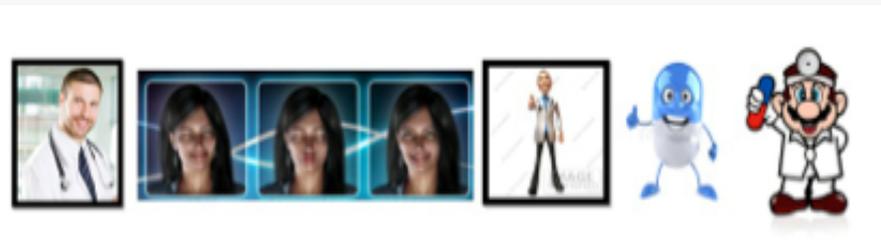


Texas Instruments EZ430-Chronos

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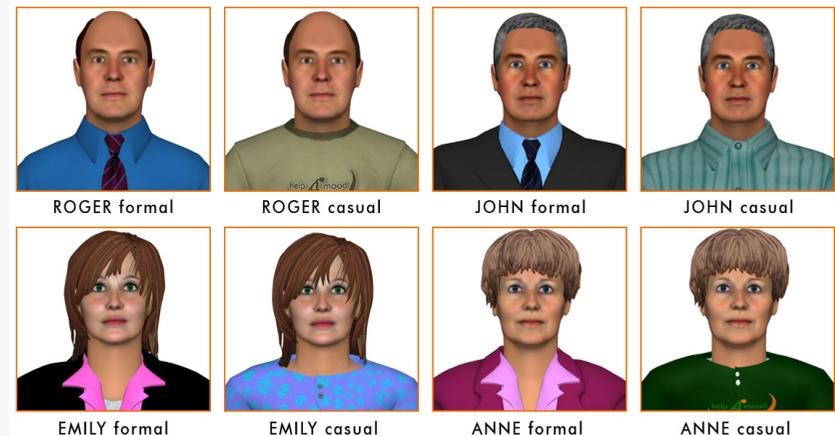
Virtual Agent Design: User Requirements



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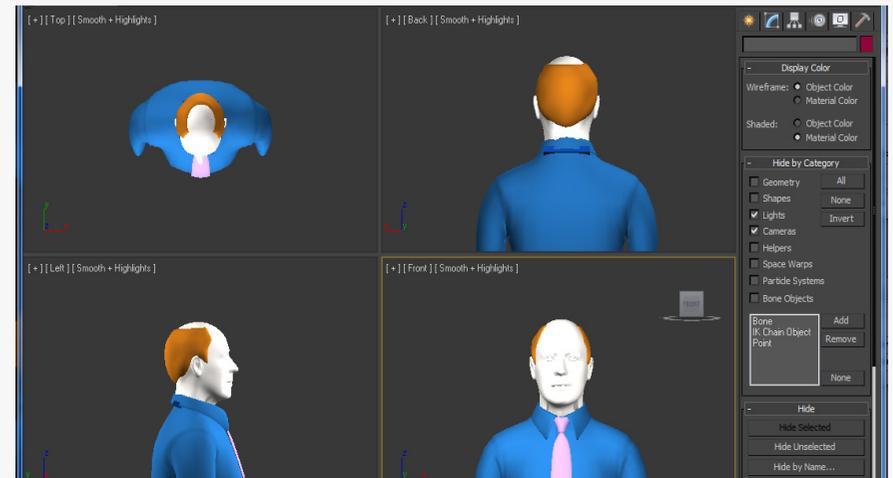
Agent Selection:



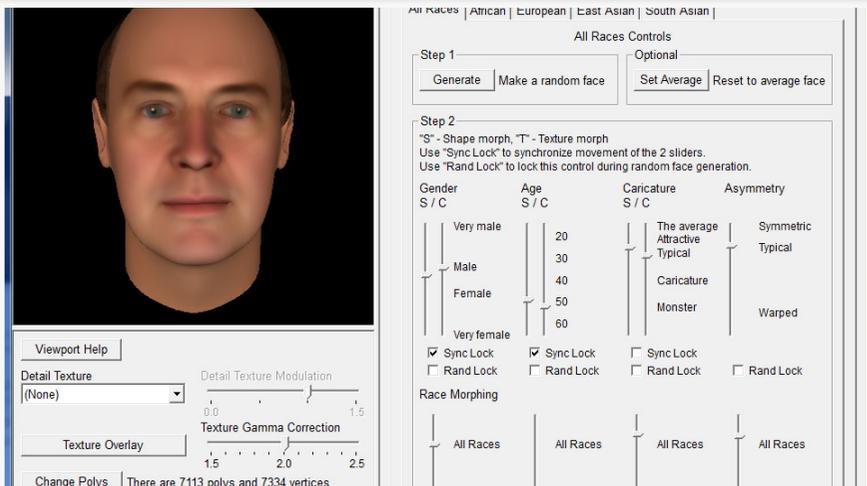
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Emotion Engine: FATiMA

- FearNot Affective Mind Architecture
- Targets empathic agents
- Open source software based on *appraisal theory*
- Evaluates the emotional impact of possible actions

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Appraisal Theory: OCC

- Hierarchical organisation of 22 emotion types (joy, distress, pride, happy-for, etc.).
- Assesses events against goals, standards and attitudes
- Based on **Personality** and **Memory**

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Personality and Memory

- Personality is defined by the particular definition of the set of goals:
 - the set of emotional reaction rules
 - the character's action tendencies
 - the emotional thresholds and decay rates for each of the 22 emotion types defined in OCC.
- FATiMA provides an autobiographic memory mechanism which stores events constructed from actions and emotions that the agents experienced in past interactions
- In Help4Mood the goals, deliberative and reactive rules and the appropriate emotion thresholds and decay values generate mainly *positive* and *neutral* emotions

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No user modelling?:

- Having other-centric emotions such as 'sorry_for' is enough in this case
- If the level of 'sorry_for' is high, we get *I'm sorry to hear that*
- So it's all personality?

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3 Sources of Language:

- Around 130 'prompts' which the VA can speak, with some variations
- 58 types of on-screen string, with gender variations in Romanian
- Buttons

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Language Prompts:

```

<Prompt xml:lang="en-GB">
  First, I would like you to think of something that particularly
  bothered you today. It can be something you did, what someone said, or an
  upsetting thought that kept coming back to you. Have any of those
  things happened?
</Prompt>
<Prompt xml:lang="en-GB">
  First I want you to think of something that really bothered you
  today. It might be something you did, or what someone said, or an
  upsetting thought that kept coming back to you. Have any of those
  things happened?
</Prompt>
<Prompt xml:lang="es-ES">
  Para empezar, piense en algo que le haya molestado durante el día de
  hoy. Puede ser alguna cosa que haya hecho, algo que otra persona haya
  dicho, o algún pensamiento que le haga sentir tristeza de manera
  recurrente. ¿Le ha pasado cualquiera de estas cosas?
</Prompt>
<Prompt xml:lang="es-ES">
  Para empezar, me gustaría que pensara en algo que le haya molestado
  durante el día de hoy. Puede ser alguna cosa que haya hecho, algo que
  otra persona haya dicho, o algún pensamiento que le haga sentir
  tristeza de manera recurrente. ¿Le ha pasado cualquiera de estas
  cosas?
</Prompt>
<Prompt xml:lang="ro-RO"><break strength="medium"/>
  Pentru inceput, vă rog să vă gândiți la ceva care v-a deranjat în
  modifer special azi. Poate fi ceva ce ați făcut, ceva ce a spus
  cineva sau un gând supărător care v-a tot venit în minte.V-ați
  confruntat cu una din aceste situații?
</Prompt>
<Prompt xml:lang="ro-RO">
  Pentru inceput, vă rog să vă gândiți la ceva care v-a supărat
  azi. Poate fi ceva ce ați făcut, ceva ce a spus cineva-break sau un
  gând supărător care v-a tot venit în minte. V-ați confruntat cu una
  din aceste situații?
</Prompt>
  
```

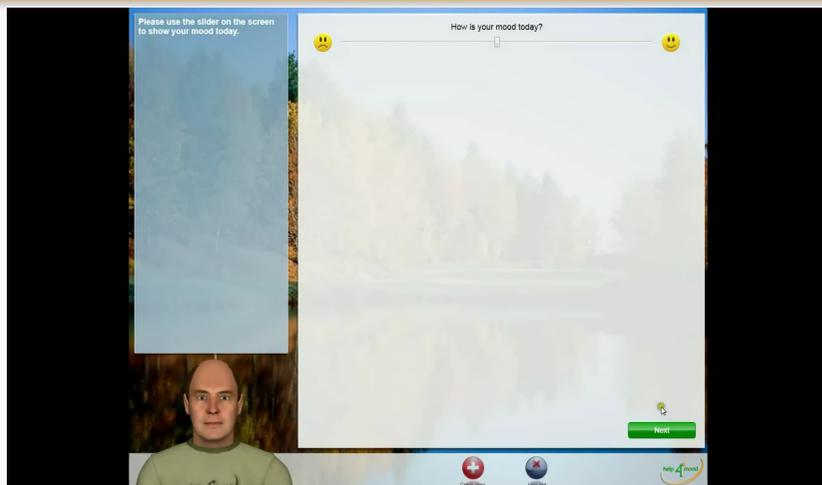
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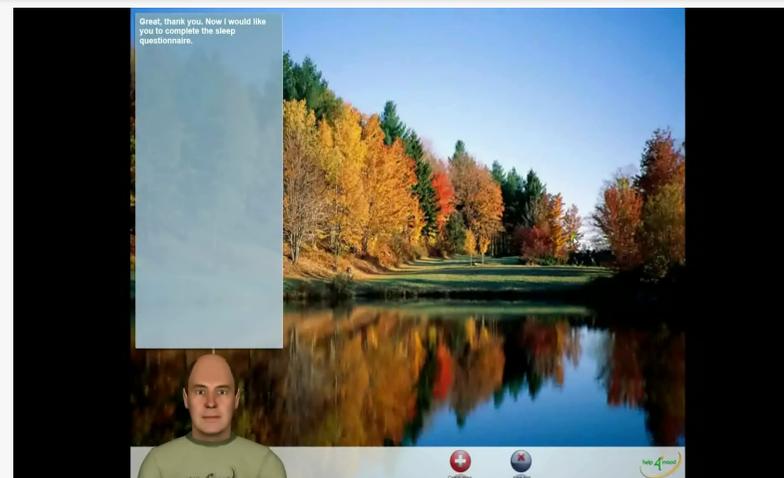
Final System:

- Daily Mood Check
- Weekly Mood Check (PHQ-9)
- Sensors:
 - Actigraphy
 - Sleep Monitoring through under mattress sensor (only in Spain and Romania)
- Negative and Positive Thoughts Questionnaire
- Sleep Questionnaire
- Speech Measurements
- Behavioural Activation
- Relaxation Exercises

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Inclusion criteria:

- Between the ages of 18 and 64 (inclusive)
- Under the supervision of a clinician
- Major Depressive Disorder (MDD) as primary diagnosis
- Beck Depression Inventory II (BDI-II) score between 10 and 30
- If being treated with antidepressant medication, neither dose nor agent should have been changed in the four weeks prior to recruitment

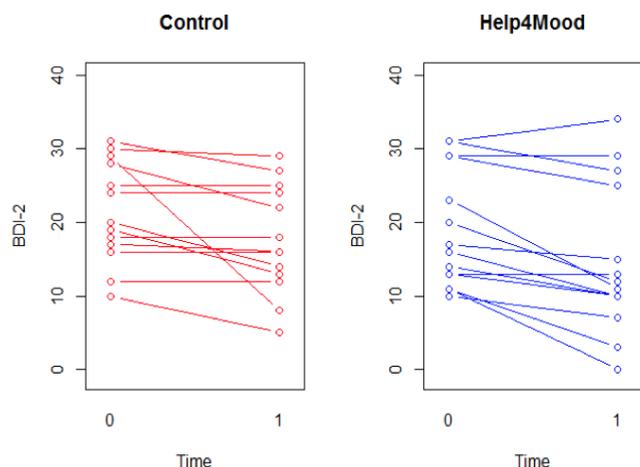
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Summary Results

- 27 patients (target 54)
- More than half used the system on at least 10 occasions and for over 120 minutes during 4 weeks
- Daily monitoring of mood rapidly became onerous but value in other components including the negative thought checking
- Trend to improvement in those with mild to moderate depression, which, if replicated in a larger study, would be clinically meaningful

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The Virtual Agent

- One patient felt the VA was not sufficiently realistic
- Another requested less realism, and would have been happy with a cartoon animal
- Some participants saw arrogance, while others found the VA very empathic:
 - "In the last session, I even touched the screen and thought that I will miss her."
 - "I was looking at his features and reactions when he was moving or looking up the screen, where I had to write something, and I imagined I was speaking to a psychologist. And it was rather comforting."

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