



Transparency Note: Almagery

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What is a Transparency Note?

An AI system includes not only the technology, but also the people who will use it, the people who will be affected by it, and the environment in which it is deployed. Creating a system that is fit for its intended purpose requires an understanding of how the technology works, what its capabilities and limitations are, and how to achieve the best performance. Microsoft's Transparency Notes are intended to help you understand how our AI technology works, the choices system owners can make that influence system performance and behavior, and the importance of thinking about the whole system, including the technology, the people, and the environment. You can use Transparency Notes when developing or deploying your own system, or share them with the people who will use or be affected by your system.

Microsoft's Transparency Notes are part of a broader effort at Microsoft to put our AI Principles into practice. To find out more, see the [Microsoft AI principles](#).

The basics of Almagery

Introduction

Almagery is an AI-powered multisensory relaxation system designed to reduce anxiety by providing personalized immersive experiences. The system uses AI to create guided imagery based on individual preferences and physiological feedback, incorporating elements like auditory and olfactory stimuli. In a study with 32 participants, Almagery demonstrated significant anxiety reduction in those with moderate to high anxiety levels. The system takes user inputs such as heart rate, self-reported mood, and preferred scenery, and generates a personalized relaxation story, complemented by calming scents and sounds. The output is a tailored multisensory experience that aims to enhance relaxation and reduce stress.

Key terms

Term	Definition
AI	Artificial Intelligence, used here to generate personalized guided imagery.
Biofeedback	Real-time monitoring and feedback of physiological data, such as heart rate.
Guided Imagery	A relaxation technique involving visualization of calming images and scenarios.
Olfactory Stimuli	The use of scents, such as lavender, to enhance relaxation.
Heart Rate Variability (HRV)	A measure of variations in heartbeats, indicating relaxation levels.
EEG	Electroencephalogram, used to measure brain activity related to relaxation.

Capabilities

System behavior

Almagery offers a personalized relaxation experience by integrating AI with traditional mind-body techniques. The system uses user-provided inputs to generate customized guided imagery, complemented by real-time biofeedback and sensory stimuli. The AI-generated narratives are designed to match the user's emotional state and preferences, while auditory and olfactory elements enhance the immersive experience. Ethical considerations include ensuring user comfort and avoiding unintended associations with specific sensory stimuli.

Use cases

Intended uses

Almagery can be used in multiple scenarios. The system's intended uses include:

- **Personal Relaxation:** Helping individuals relax and reduce anxiety through personalized guided imagery sessions.
- **Entertainment:** Providing users with an entertaining tool to manage stress and enhance well-being during breaks.
- **Mindfulness Practices:** Enhancing mindfulness and meditation practices with tailored multisensory experiences.

Considerations when choosing other use cases

We encourage people to leverage Almagery in their innovative solutions or applications. However, here are some considerations when choosing a use case:

- **User Comfort:** Ensure the AI-generated voice and sensory stimuli are comfortable and not perceived as intrusive or unsettling.
- **Customization:** Users might want to customize the AI voice, accent, and style to suit individual preferences.
- **Sensory Sensitivities:** Be mindful of users' potential sensitivities to sounds (e.g., adjust loudness).
- **Maladaptive Memories:** Be mindful of users' potential maladaptive memories associated with particular sounds, objects, sceneries.

Unsupported uses

- **Control and Surveillance:** The system was not designed for monitoring or controlling user behavior.
- **Diagnostic tool:** Almagery is not intended for diagnosing mental health conditions but for providing relaxation support.

Limitations

Almagery's effectiveness depends on proper customization and user comfort with the AI-generated content. The choice of sensory stimuli and narrative style can impact user experience, and it is essential to gather user feedback for continuous improvement. Limitations include the need for further research on the integration of different audio stimuli (e.g, type of voices and sounds) and the potential for varying effectiveness across different populations.

Technical limitations, operational factors and ranges

Technical limitations to consider include the need for reliable physiological sensors and the potential for varied user responses to AI-generated narratives. Operational factors include ensuring a quiet and comfortable environment for users and addressing any technical issues with the hardware or software components.

System performance

System performance is measured by the reduction in anxiety levels and improvement in physiological markers such as HRV and brain activity. Best practices for improving system performance include gathering user feedback to refine AI narratives and customizing sensory stimuli to match user preferences. The system should be tested with diverse user groups to ensure broad applicability and effectiveness.

Best practices for improving system performance

Improving the performance of Almagery involves fine-tuning various components and parameters to ensure the system meets user needs effectively. Here are some best practices:

1. Customization and Personalization

- **Do:** Gather detailed user inputs to customize the AI-generated narratives, including specific preferences for scenery, sounds, and scents.
- **Don't:** Use a one-size-fits-all approach; personalization is key to enhancing user experience and effectiveness.

2. Adjusting Sensory Stimuli

- **Do:** Allow users to choose from a range of auditory and olfactory stimuli to match their preferences and avoid sensory overload.
- **Don't:** Overload the system with too many stimuli at once, as this can cause discomfort and reduce the effectiveness of the relaxation experience.

3. Optimizing AI Narratives

- **Do:** Continuously refine the AI-generated stories based on user feedback. Use natural, soothing voices and adjust the prosody rate to enhance relaxation.
- **Don't:** Ignore user feedback regarding the AI voice and narrative content. Ensure the stories are calming and avoid any elements that could be perceived as unsettling.

4. Monitoring Physiological Data

- **Do:** Use real-time biofeedback to adjust the relaxation experience dynamically. Ensure sensors are accurately capturing data and are comfortable for users.

- **Don't:** Rely solely on real-time physiological changes without considering explicit user inputs.

5. Tradeoff Management

- **Do:** Clearly explain the tradeoffs between different system parameters, such as the balance between immersion and user comfort. Adjust settings to prioritize user safety and comfort.
- **Don't:** Compromise user comfort for the sake of immersion. Always prioritize the user's well-being and relaxation over technical performance.

6. Ethical, Cultural and Background Sensitivity

- **Do:** Be mindful of cultural differences and ethical considerations when designing AI narratives and choosing sensory stimuli. Screen user inputs for potential triggers or traumatic associations. Allow users to exclude certain stimuli or scenarios that could evoke maladaptive memories or emotional distress. Ensure content is inclusive and respectful.
- **Don't:** Assume that all users will respond similarly to the same stimuli or narratives. Don't include content that could be triggering or traumatic without proper user consent and customization options. Always prioritize mental health and safety in the design of AI-generated narratives and sensory experiences. Consider the diverse backgrounds and sensitivities of the user population.

Evaluation of Almagery

Evaluation methods

The evaluation involved a randomized between-subjects experiment with 32 participants, assessing the system's impact on anxiety and physiological changes. Participants' demographics, anxiety levels, mood, and sleep quality were collected through questionnaires, and physiological data were monitored using wearable sensors. More details about the evaluation can be found in our paper: Amores, J. et al, "Almagery: A Multisensory Approach to Anxiety Reduction with AI, Olfactory Stimuli, and Biofeedback-Enhanced Guided Imagery". In *Affective Computing and Intelligent Interaction, ACII 2024*.

Evaluation results

The evaluation showed that Almagery significantly reduced anxiety levels, especially in participants with moderate to high anxiety. The system also improved HRV, indicating a deeper relaxation state. User feedback was generally positive, highlighting the system's potential for anxiety reduction.

Fairness considerations

The system's evaluation included disaggregated analysis to ensure performance consistency across different demographic groups. Ongoing research is necessary to address potential biases and ensure equitable effectiveness for all users. Mitigation strategies include continuous user feedback and adjustments to the AI-generated content to avoid stereotyping or demeaning outputs. The system is currently agnostic of the demographic group.

Safety Evaluation and Red-Teaming

We collaborated with the AI Red Team at Microsoft to assess safety risks posed by Almagery in both average and adversarial user scenarios. The user study was conducted in July 2023, thus the model we had access was an older GA model (gpt-4-32k), with 32,768 output tokens, with training data (up to) Sep 2021. The prompts generated at that time were all safe and supervised in real-time by the experimenter, who was at control to stop the experience at any time. The system was re-evaluated on June 2024 from the responsible AI perspective using the OpenAI model GPT-4-Turbo to ensure it doesn't generate harmful content ensuring the safety of users. The assessment was done in predetermined risk categories (violence, self-harm, and sexual content) with automated scoring followed by thorough manual reviews of the model responses. The results with other models may vary.

Evaluating and integrating Almagery for your use

Best practices include ensuring appropriate human oversight, and customizing the system to match user preferences and contexts. Users responsible for oversight should understand the system's intended uses and be able to effectively interpret and intervene when necessary. For instance, providing users with options to customize AI voice and sensory stimuli can enhance comfort and effectiveness.

Integrating user feedback into system improvements and conducting ongoing evaluations with diverse user groups will help maintain the system's reliability and effectiveness in various contexts.

Disclaimer

The user will be interacting with an AI system that generates and reads text, and only supports English. Almagery's outputs do not reflect the opinions of Microsoft and may include factual errors. The system does not provide medical or clinical opinions and is not designed to replace the role of qualified medical professionals in appropriately identifying assessing diagnosing or managing medical conditions. This system is only intended to be used in research setting after conducting the appropriate ethics reviews.

Learn more about responsible AI

[Microsoft AI principles](#)

[Microsoft responsible AI resources](#)

[Microsoft Azure Learning courses on responsible AI](#)

Learn more about Almagery

<https://aimagery.github.io>

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