Immersively.care

Emotion AI in Mental Health

MICHEL KANA, OCT 4, 2022

Agenda

- What is mental health?
- How do we detect emotions using AI?
- How do we detect attention using AI?
- How do we detect heart rate?
- What next?

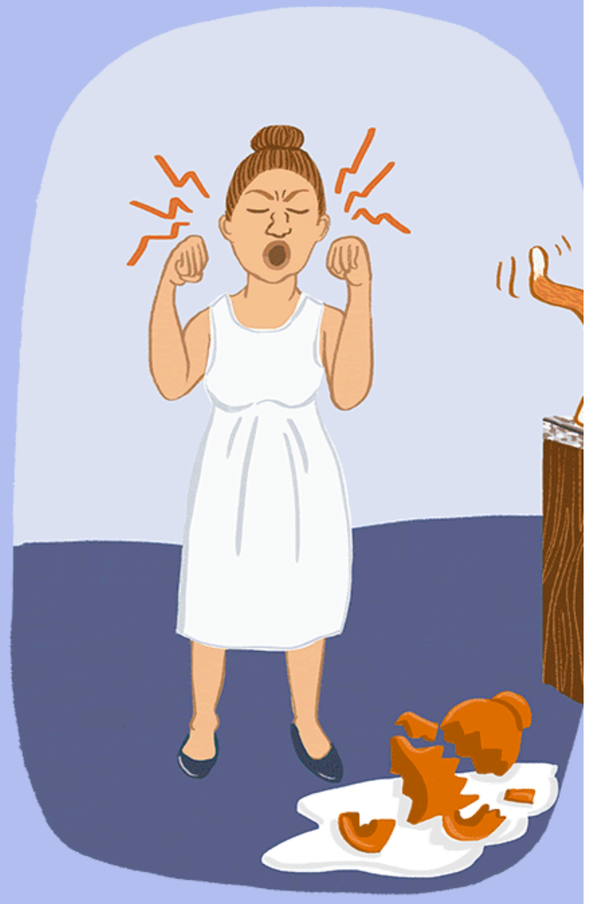
How many have experienced stress during the past 10 days?

What's a Mental Illness?

A mental health condition that has a negative effect on the way an individual...

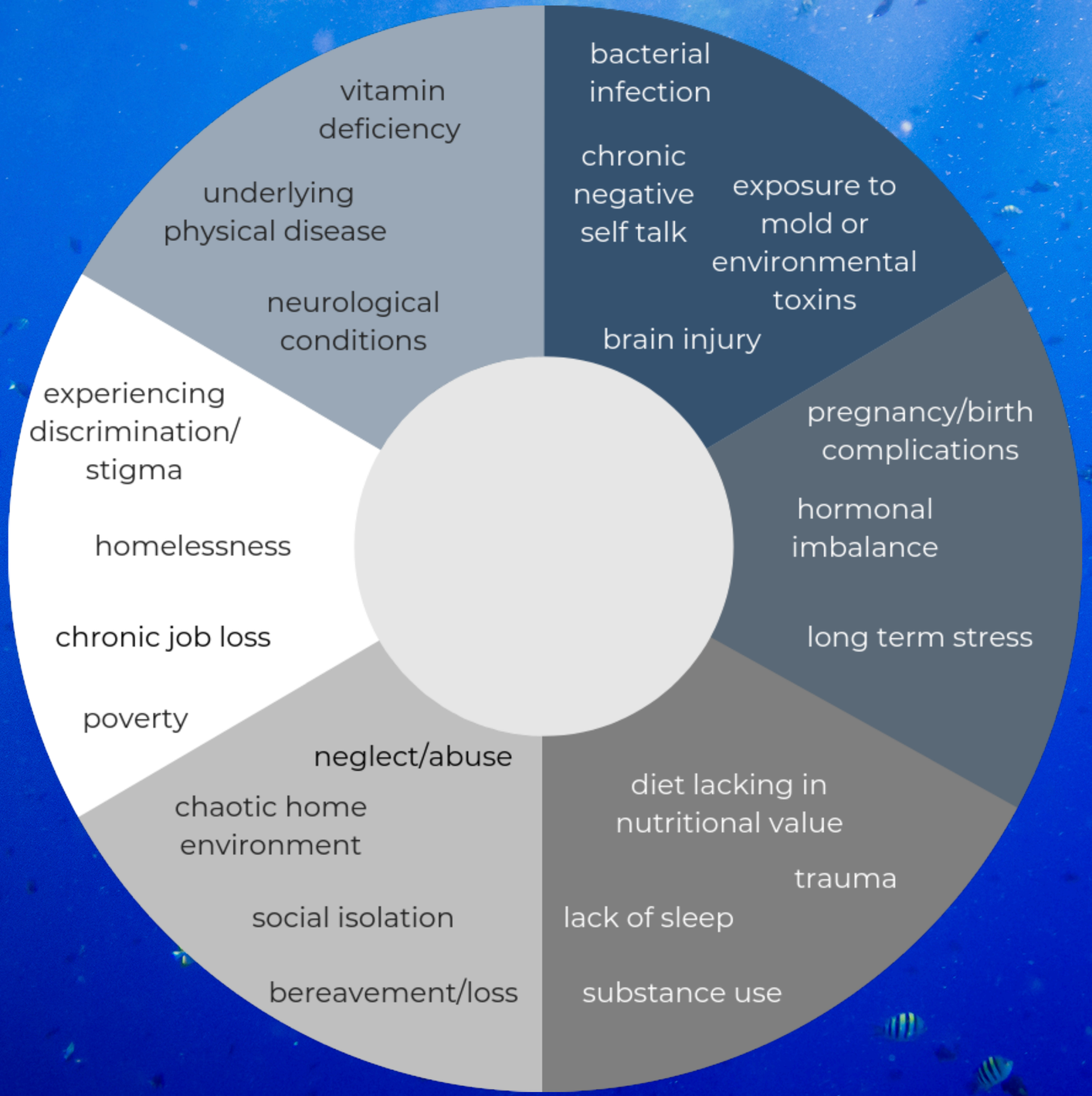
thinks

feels



and behaves

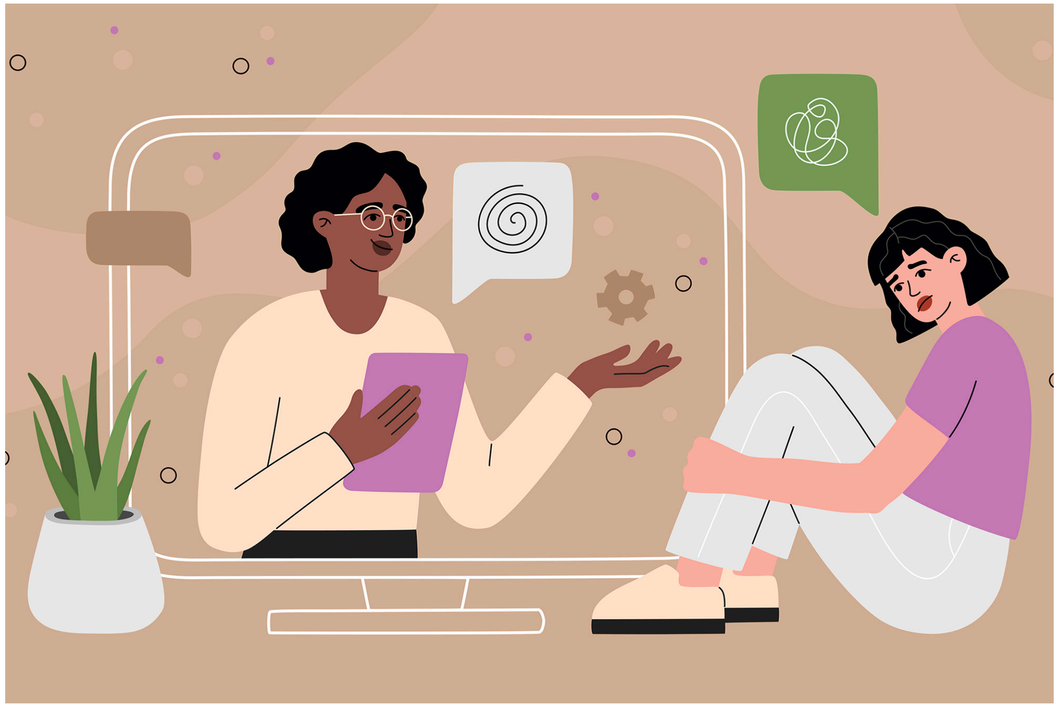
well


bacterial infection
chronic negative self talk
exposure to mold or environmental toxins
brain injury
pregnancy/birth complications
hormonal imbalance
long term stress
diet lacking in nutritional value
trauma
lack of sleep
substance use
neglect/abuse
chaotic home environment
social isolation
bereavement/loss
experiencing discrimination/ stigma
homelessness
chronic job loss
poverty
vitamin deficiency
underlying physical disease
neurological conditions

Coaches
Counselors

Therapists

Psychologists
Psychiatrists




Less anxiety
Greater self-confidence
Better relationships
Regaining emotional balance
Increased assertiveness
Stress relief
Ability to set boundaries
Trauma resolution
JUST A FEW BENEFITS OF COUNSELING

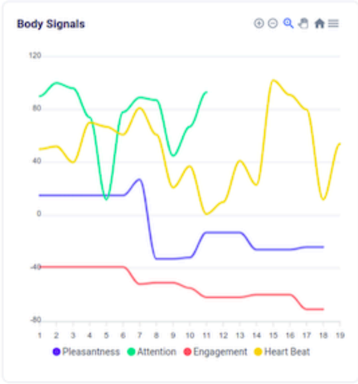
Online VS In Person Therapy

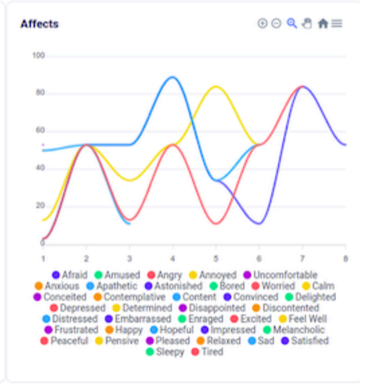

Meeting joined successfully
Joining the session...

Show numeric graph

Show emotions graph

Show affect graph





Which emotions did you experience the most during the past 10 days?

Happiness

satisfaction, contentment, joy

Sadness

disappointment, grief, hopelessness

Fear

anxiety, apprehension, nervousness

Anger

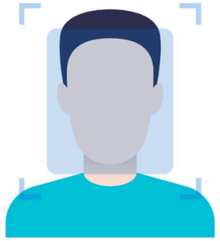
hostility, agitation, frustration

Surprise

unexpected, shock, astonishment

Disgust

disapproval, unpleasentness, contempt

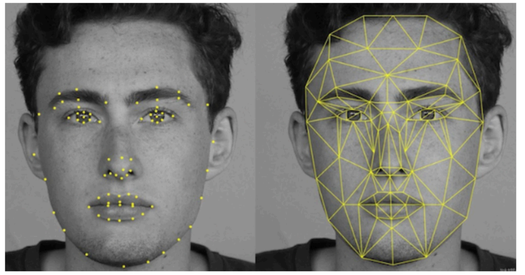


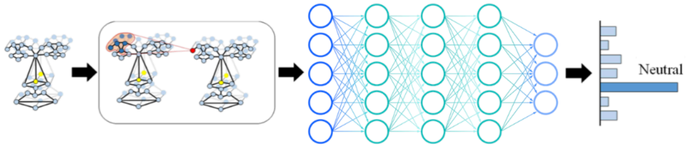
1. Face detection

Each frame of the video stream is processed inside the user's browser. The largest face in front of the camera is detected using machine learning. The photos are never transmitted, stored, or shared.

2. Facial features extraction

Immersively.care extracts facial landmark positions from each facial image, such as the end of the nose or eyebrows, the eyes, and mouth, as well as groups of facial muscles and changes in those positions.





3. Classification of facial features as emotion

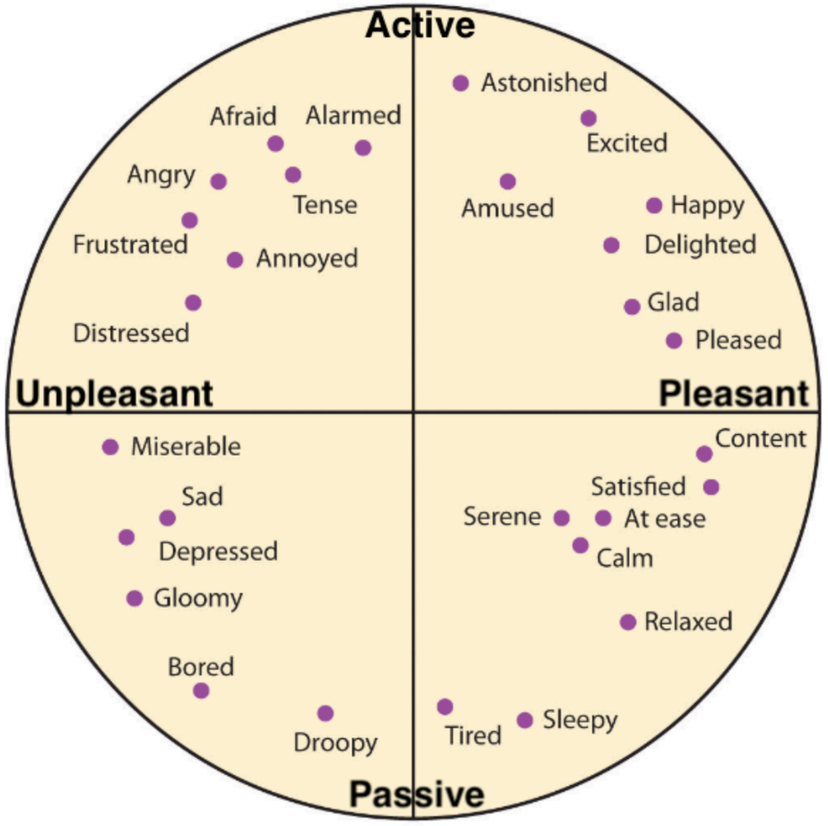
- We employ deep learning that teaches our algorithms the likelihood of facial features being related to seven core emotions – anger, disgust, fear, happiness, sadness, and surprise, plus the baseline neutral expression.
- The algorithms have been pre-trained using large custom datasets with huge amounts of faces, ranging from various geographies, ethnicities, ages, and genders, labeled with the emotions that individuals have experienced.
- During a video call, Immersively.care continuously executes the algorithms on each facial image or succession of images in real-time and displays the three emotions which have the highest probability of prediction.

1. Estimation of emotional pleasantness

- Pleasantness or valence is the affective quality referring to the intrinsic attractiveness of the video call experience, as suggested by the facial expression of attendees.
- Immersively.care uses a deep learning model to predict the degree of pleasantness on a scale of -100% (unpleasant) to 100% (pleasant) in real-time.

2. Estimation of emotional engagement

- Engagement or arousal is defined as the degree of excitement or motivational activation that a participant experiences during a video call.
- Immersively.care uses a deep learning model to predict the degree of engagement on a scale of -100% (passive) to 100% (actively engaged) in real-time.

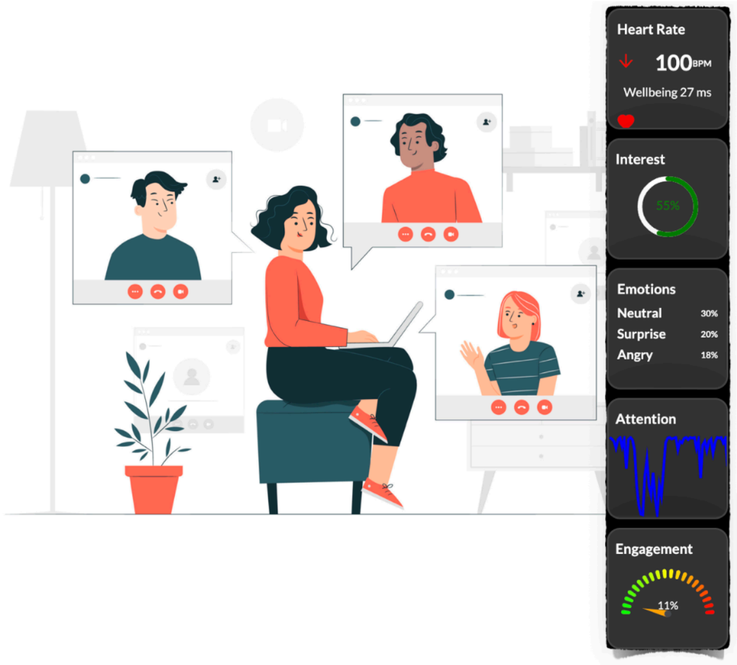


3. Prediction of emotional affect

- An emotional affect represents the underlying experience of feeling, emotion or mood.
- Affects are illustrated using a quadrant of the 2D emotional space that combines how positive or negative the state of mind is (pleasantness), and how passive or active the experience of a video call is (engagement).
- When the degree of pleasantness and engagement are known, Immersively.care determines the corresponding top 3 emotional affects for each participant reliably and in real-time.

1. Gase and facial posture detection

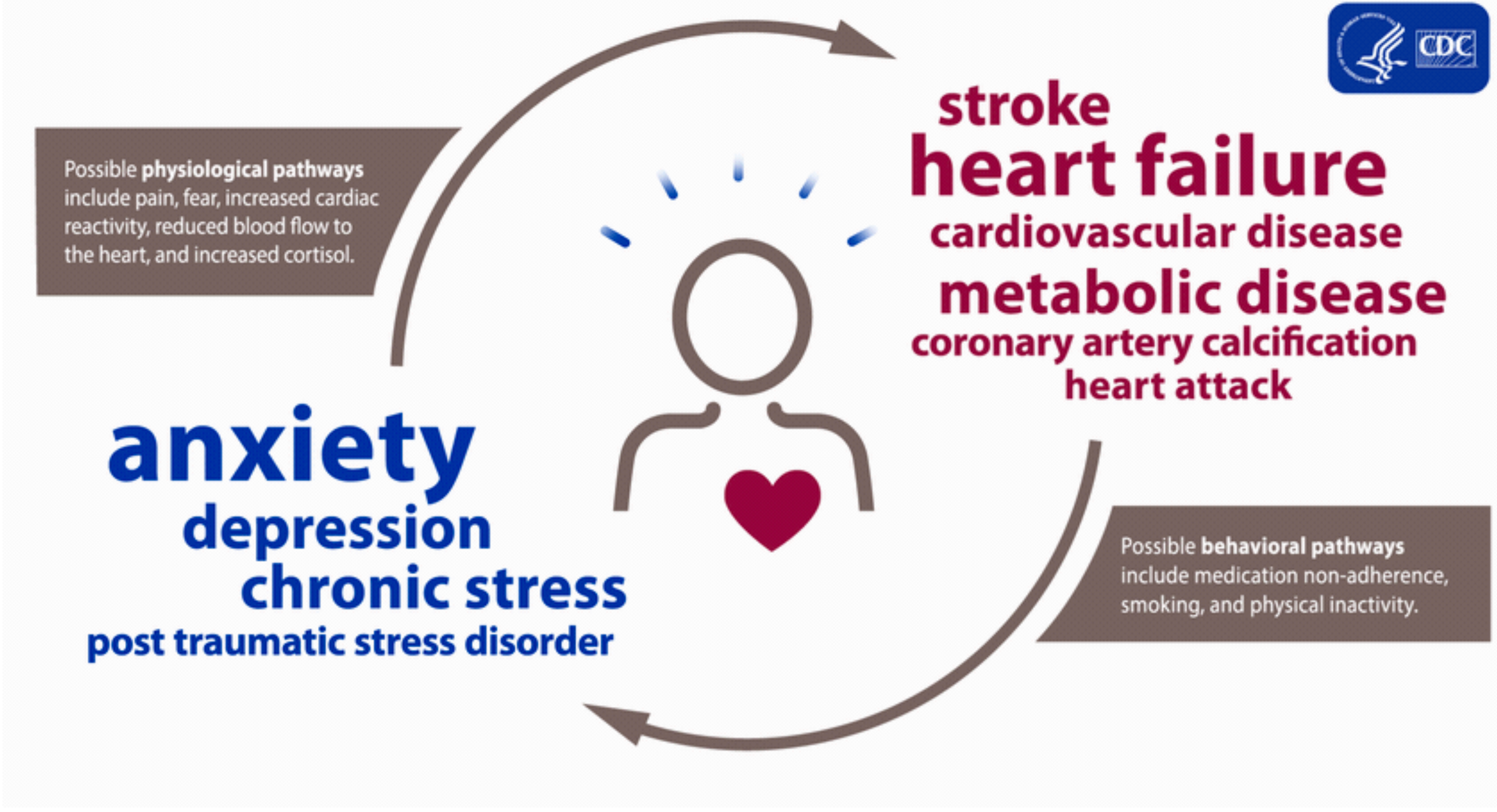
Immersively.care integrates deep learning models for head pose tracking, eye gaze direction, eyes closure, and other facial features mapped to the hidden variable of visual attention during a video call. The pre-trained models return a value close to 100% to represent attention, or close to 0% to represent distraction.



2. Interest and sentiment detection

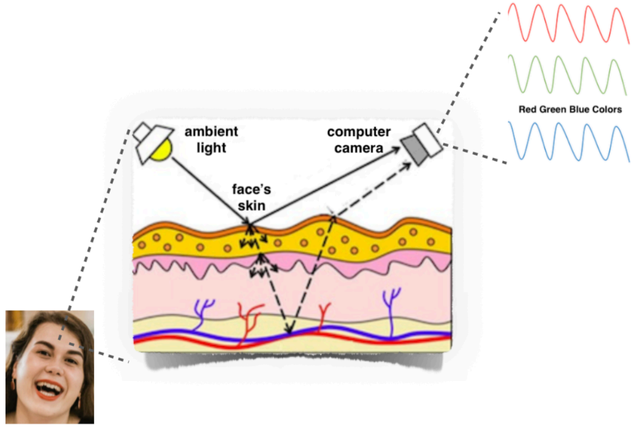
Comprehensive facial features, arousal, valence, emotions, and affects are used to estimate the level of interest and sentiment, as expressed by a participant in relation to what is being said or presented during the video encounter, in real-time.

Is your heart rate linked to your mental state?


Possible **physiological pathways** include pain, fear, increased cardiac reactivity, reduced blood flow to the heart, and increased cortisol.
anxiety
depression
chronic stress
post traumatic stress disorder
stroke
heart failure
cardiovascular disease
metabolic disease
coronary artery calcification
heart attack
Possible **behavioral pathways** include medication non-adherence, smoking, and physical inactivity.

1. Light analysis

Immersively.care uses machine learning algorithms to detect regions of interest in your face where light reflections are the most relevant to compute health data. Ambient light penetrates the skin and reflects off blood vessels in the skin of your face back to your computer's camera during a video call.

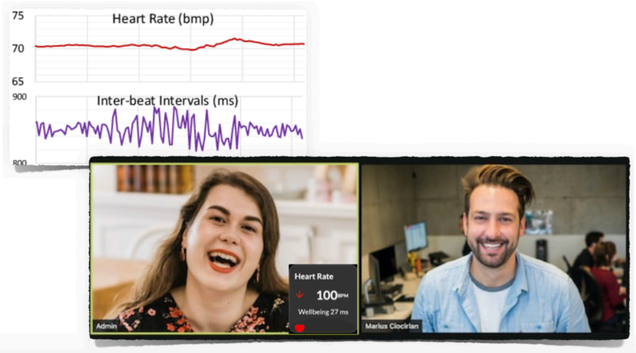


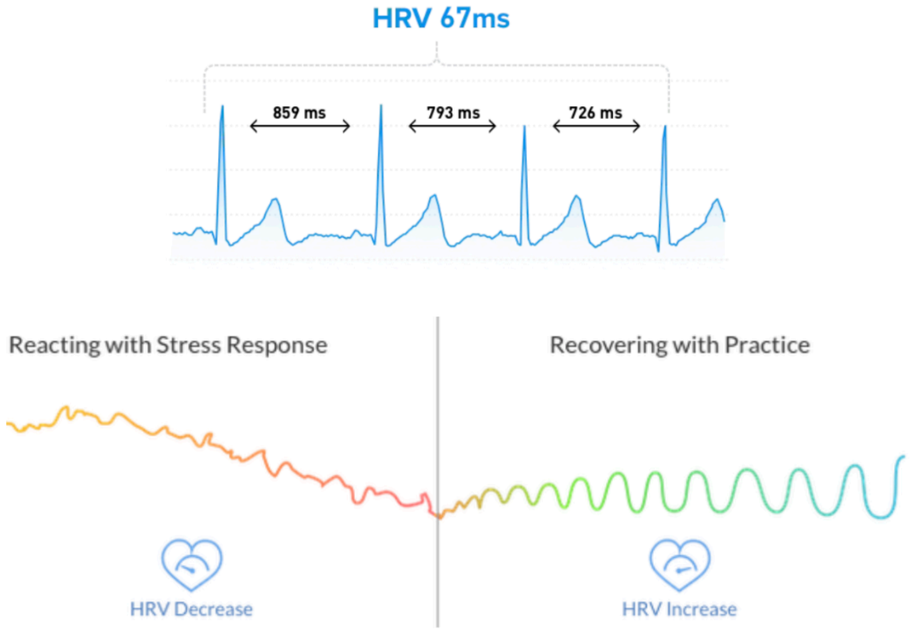
2. Face detection and colors extraction

Immersively.care uses computer vision algorithms to compute the variance of red, green, and blue light reflection changes from the skin of the face. Noises due to poor light conditions and head movements are filtered using signal processing techniques.

3. Heart rate detection

Because light reflection varies by blood volume changes, peak values correspond to heartbeats. Immersively.care uses those peaks to compute inter-beat intervals. The elapsed time between two consecutive peaks is a direct measure of heart rate in real-time.



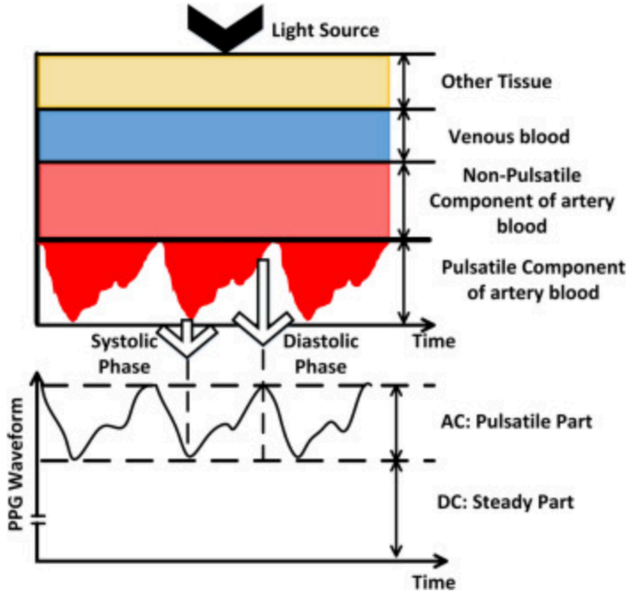


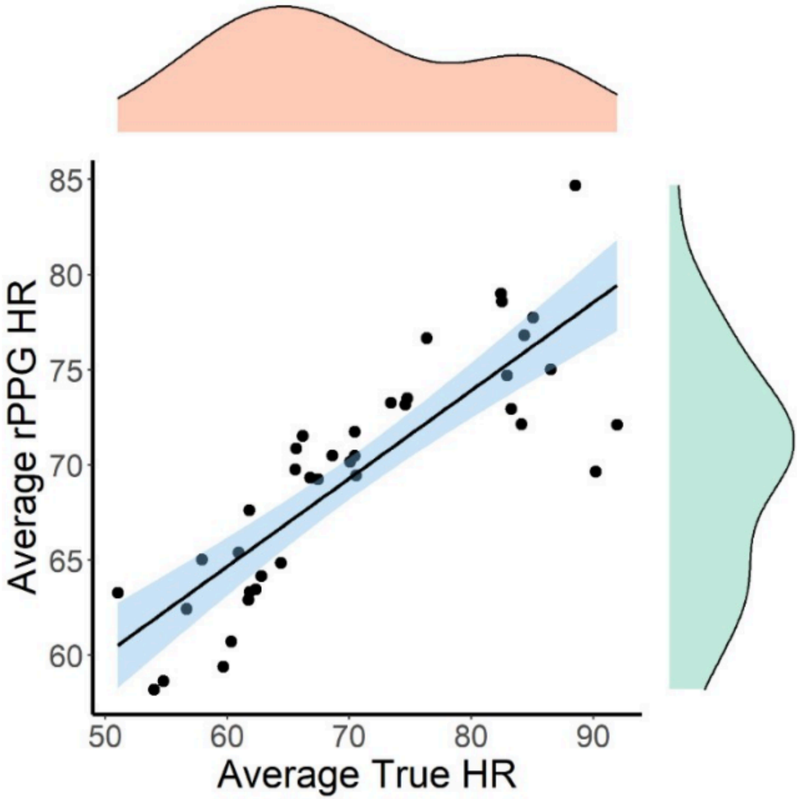
4. Wellbeing level calculation

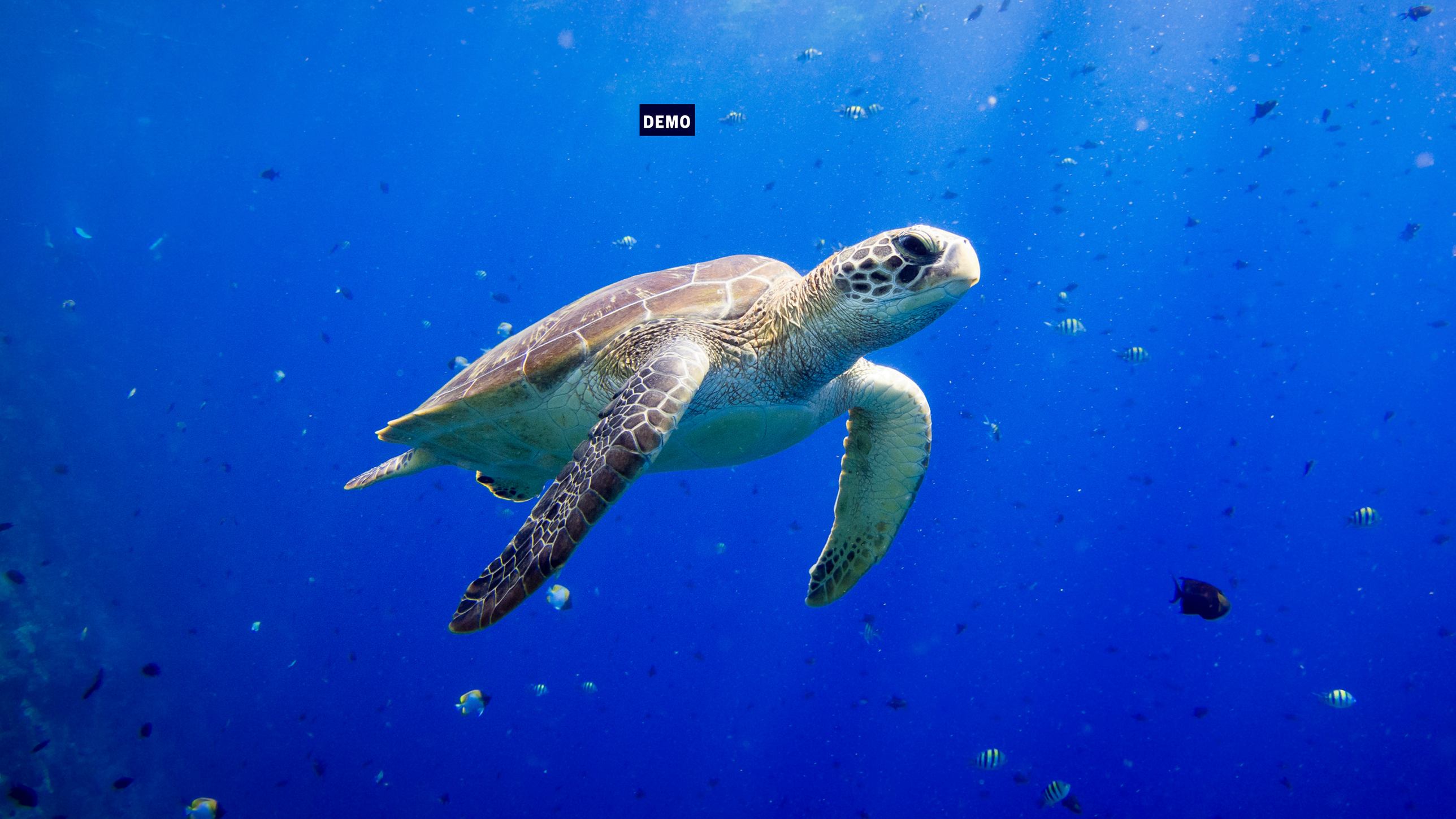
Immersively.care estimates wellbeing using heart rate variability, which is literally the variance in time between the beats of your heart over a period. This metric offers a noninvasive way to signal imbalances or states of the resilience of your autonomic nervous system in real time. If the system is in a more relaxed state, the variation between beats may be higher.

5. Advanced health data measurement (upcoming)

Immersively.care implements the Baevsky Stress Index to calculate users' stress levels using inter-beat intervals.
We also apply advanced mathematical transformations and deep learning on the amplitude of light reflection on the human face to estimate blood pressure, oxygen saturation, and breathing rate.




Average rPPG HR
85
80
75
70
65
60
50
60
70
80
90
Average True HR


DEMO

Thank you

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