

---

# DIGITAL MEDICINE

## ЦИФРОВА МЕДИЦИНА

<https://doi.org/10.15407/intechsys.2026.02.058>  
UDC 004.58

**H.A. PIDNEBESNA**, PhD (Engineering), Senior Lecturer,  
National Technical University of Ukraine  
“Igor Sikorsky Kyiv Polytechnic Institute”,  
Beresteysky ave., 37, Kyiv, 03056, Ukraine,  
<https://orcid.org/0000-0002-5735-9861>  
pidnebesna@ukr.net

**V.O. SURZHENKO**, Master’s Student,  
National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”,  
Beresteysky ave., 37, Kyiv, 03056, Ukraine  
<https://orcid.org/0009-0003-6521-0471>  
surzhenkoviacheslav@gmail.com

**I.O. KOZIENKO**, private psychologist,  
member of the Ukrainian Transactional Analysis Community NGO “USTA”  
<https://orcid.org/0009-0003-7203-8526>  
kira.wld@gmail.com

---

## APPLICATION OF DIGITAL TECHNOLOGIES TO STABILIZE HUMAN EMOTIONAL STATE

---

*Modern digital technologies can play an important role in supporting mental health, in particular in reducing stress levels and correcting emotional disorders. The paper considers an approach to creating a mobile software application that implements psychological self-help techniques, in particular breathing techniques, grounding, bilateral stimulation and EMDR-like exercises. The methodological basis, structure of functional modules and features of the prototype implementation based on Unity and C# are presented. The advantages of using digital technologies for operational support of the emotional state of users are substantiated.*

**Keywords:** digital technologies, mobile application, emotional state, stress disorders, EMDR, Unity, psychological self-help.

### Introduction

In the modern world, society faces a large list of challenges that affect the psychological state of a person. The level of stress is rapidly increasing under the influence of social, economic, informational and military fac-

---

Cite: Pidnebesna H.A., Surzhenko V.O., Koziienko I.O. Application of Digital Technologies to Stabilize Human Emotional State. *Information Technologies and Systems*. 2 (8). 2026. 58 – 66. <https://doi.org/10.15407/intechsys.2026.02.058>

© Publisher PH “Akademperiodyka” of the NAS of Ukraine, 2025. This is an Open Access article under the CC BY-NC-ND 4.0 license (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

tors. The problem of stabilizing a person's emotional state acquires particular significance in Ukraine, where, due to military operations in the country and various stress factors associated with them, Ukrainians face significant psychological problems [1].

A person's emotional state is directly related to physical and mental health. It significantly affects interpersonal relationships and the ability to make informed decisions, which in turn affects the quality of life of both an individual and, in turn, the country as a whole. The consequences of long-term chronic stress cause negative changes at the transgenerational level, when people who have not personally encountered certain traumatic situations, but are descendants of those who have experienced long-term chronic stress, have an increased susceptibility to psychosomatic diseases, such as type 2 diabetes, hypertension, etc. [2].

The vast majority of Ukrainians have been directly or indirectly affected by the war, which has led to the spread of symptoms of stress, anxiety and PTSD. Therefore, the problem of stabilizing a person's emotional state is currently extremely relevant. However, due to military operations in Ukraine, traditional psychological help is not always available due to limited resources and specialists, and there are also historically psychological barriers to seeking help [3, 4].

An effective solution to this problem is the integration of the latest computer technologies with the tasks of human health care: virtual "therapists" based on AI, feedback systems (biofeedback) help a person control their physiological processes using sensors and computer analysis, etc. [5, 6].

One of the most common areas of implementation of digital technologies is the development and use of software applications for mobile phones. Using a mobile application to stabilize the emotional state is possible in cases where direct communication with a psychologist at the moment is impossible or undesirable from the user's point of view. A person can turn to the application at any convenient time for him. In addition, the application often does not require an Internet connection, since it is downloaded directly to the user's phone. The format of the mobile application allows for the programmatic implementation of various methods and techniques of psychological self-help that have scientific justification and proven effectiveness. That is, the use of digital technologies in the form of a mobile application provides:

- accessibility and autonomy;
- anonymity;
- the possibility of quick self-help;
- integration of scientifically based psychotherapeutic techniques, etc.

Digital tools, in particular mobile applications, are becoming an effective means of supporting mental health due to the possibilities of interactivity, user adaptation and continuous availability [5].

## Methodological Basis of the Application

Mobile applications for psychological assistance to military personnel and veterans are being developed in different countries of the world, where they understand the importance and relevance of the problem. In Ukraine, this approach is also attracting increasing attention from both psychologists and information technology specialists. Such applications have very different functionality and offer users many different individual techniques [6–8].

The methodology of the prototype we developed is based on a combination of modern psychological self-regulation techniques that have proven effectiveness in reducing stress levels. These include:

- breathing exercises (in particular, the “square breathing” technique),
- grounding methods,
- awareness and assessment of the current emotional state,
- EMDR-like exercises and bilateral stimulation,
- Elements of art therapy,
- techniques of positive psychology, etc.

These techniques are adapted to the digital format, which allows them to be used in the form of interactive exercises with visual support. The phased implementation provides a logical structure of the “therapeutic mini-session”.

The application can also be used to develop self-help skills and self-regulation of the emotional state by the user as a preventive measure or a kind of psychological simulator. The target audience includes a wide range of adults who have experienced stressful traumatic situations.

## Structure and Functional Component of the Application

To create an effective application for stabilizing the emotional state, it is important to introduce several key elements.

- The application should have a convenient, intuitive structure, with a user-friendly interface, so that the user can easily understand and navigate the various components.
- The application should provide basic information about the techniques (psychological techniques), their application, and the mechanisms underlying the reaction to these methods.
- The key aspect (main functional part) is the software implementation of practical methods, simple exercises based on various psychological techniques (breathing, meditation techniques and relaxation, drawing, etc.), which the user can perform himself, and which help reduce the level of stress and anxiety, contribute to the stabilization of his emotional state.
- The application should provide users with statistics, the ability to track their progress.
- The software implementation should be such that it allows easy integration of additional functions and the possibility of updates.

To meet these requirements, the prototype application is organized into a sequential structure of certain functional elements. Each element of this structure provides a logical and consistent way to use the application and allows the user to quickly find and launch the necessary functions.

The prototype of the mobile application is implemented using Unity and C#, which ensures cross-platform and ease of implementation of interactive components.

## **Structure and Functional Component of the Application**

To create an effective application for stabilizing the emotional state, it is important to introduce several key elements.

- The application should have a convenient, intuitive structure, with a user-friendly interface, so that the user can easily understand and navigate the various components.

- The application should provide basic information about the techniques (psychological techniques), their application, and the mechanisms underlying the reaction to these methods.

- The key aspect (main functional part) is the software implementation of practical methods, simple exercises based on various psychological techniques (breathing, meditation techniques and relaxation, drawing, etc.), which the user can perform himself, and which help reduce the level of stress and anxiety, contribute to the stabilization of his emotional state.

- The application should provide users with statistics, the ability to track their progress.

- The software implementation should be such that it allows easy integration of additional functions and the possibility of updates.

To meet these requirements, the prototype application is organized into a sequential structure of certain functional elements. Each element of this structure provides a logical and consistent way to use the application and allows the user to quickly find and launch the necessary functions.

The prototype of the mobile application is implemented using Unity and C#, which ensures cross-platform and ease of implementation of interactive components.

For the effective functioning of the application, the following features have been implemented:

- asynchronous event processing,
- use of animated objects for exercises,
- ability to save data locally without access to the Internet,
- support for an updatable modular structure.

The application architecture is divided into the following modules.

The main menu functions as an interactive hub, providing access to the application components:

- information block,

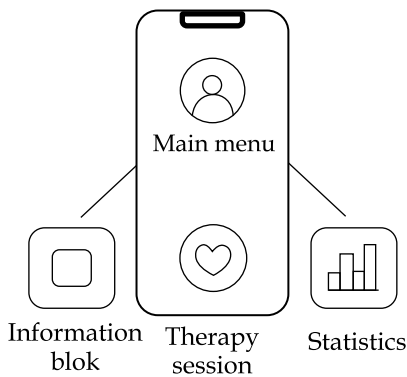


Fig. 1. Application components

- therapeutic session,
- statistics,
- emergency options.

Fig. 1 and 2 shows the structure of the mobile application.

The main menu is the main interactive hub, from which the user has access to all functional parts of the application and can choose their further actions.

The information block contains brief explanations of the methods and rules for their use, plays the role of psychoeducation, increasing the effectiveness of self-help.

A separate Statistics block stores the history of sessions and allows you to track the dynamics of the user's emotional state.

The therapeutic session of the application consists of three stages:

- Understanding the stressful situation – to achieve the goal, the user is offered a sequence of well-known techniques that are used in particular when psychologists work with military personnel and veterans;
  - Grounding; breathing; self-assessment of psychological state; work with negative emotions; EMDR-like exercises and bilateral stimulation;
  - Finding internal resources – the next stage in the work;
  - Breathing; assessment; identification of positive emotions; visualization of resource words; EMDR-like exercises and asymmetrical tapping;
  - Consolidation of positive changes occurs through sequential execution of exercises: the “treasure” technique; drawing; EMDR-like exercises and asymmetrical tapping; self-assessment of emotional state; motivational message.

To implement each stage of the session, digital analogues of psychological techniques were used, in particular:

- animation for synchronization of breathing, which greatly facilitates the execution of the exercise and improves the effect;

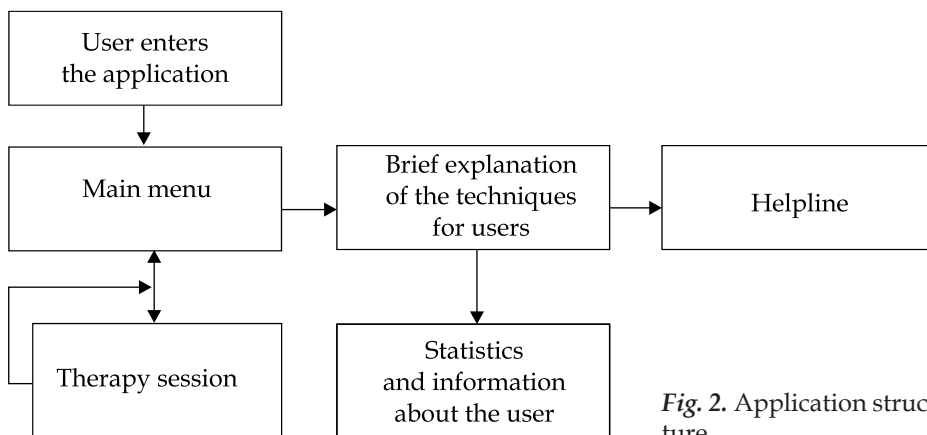


Fig. 2. Application structure

- algorithm for moving dots on the screen for EMDR-like exercises and bilateral stimulation;
- interface for working with negative emotions with the function of “crossing them out”;
- interactive field for drawing, as one of the options for arttherapy;
- interface for defining and saving “resource words”;
- reinforcement of exercises with tapping with variable asymmetry.

Such solutions provide a high level of user engagement and enhance the psychotherapeutic effect, as they activate physiological processes, influencing the parasympathetic nervous system.

### **Prospects for the Development of an Application for stabilizing a Person’s Emotional State**

Further application of modern digital technologies in the development of applications for stabilizing a person’s emotional state involves:

- integration of an AI module for personalizing therapy;
- implementation of adaptation algorithms for selecting exercises and psychological techniques;
- gamification and improvement of the visual component and UX;
- use of biometric data (heartbeat, breathing, etc.) to monitor the user’s physical condition;
- expansion of functional capabilities for statistical analysis;
- expansion of the security system and data encryption;
- the possibility of cloud synchronization (at the user’s request).

Such extensions will increase the efficiency of the application and expand the range of its users.

### **Conclusions**

Mobile digital tools can play a significant role in supporting mental health, especially in the context of growing social challenges. The created prototype effectively combines modern digital technologies with well-known methods of psychological self-help. Its feature is the implementation of a well-thought-out sequence of psychological techniques and exercises that are used in the practice of both Ukrainian and foreign specialists when working with military personnel and veterans. The mobile application is an accessible tool for reducing stress levels and stabilizing the emotional state. This is achieved through interactivity and visual support, adaptability and modularity, and the possibility of autonomous work without the Internet. However, it should be noted that using the application does not replace professional psychotherapy and can only serve as an auxiliary and preventive tool.

#### **DECLARATION**

*Declaration of Competing Interest.* No potential conflict of interest is reported by the authors.

**Funding.** The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

**Use of AI.** The authors declare that Artificial intelligence tools were not used in writing the paper.

**Contribution of the authors.** Pidnebesna H.A. is the author of the main idea and methodology of the article; Surzhenko V.O. is the author of its implementation in the software; Koziienko I.O. provided valuable comments as a psychologist.

## REFERENCES

1. Bogic M, Njoku A, Priebe S. Long-term mental health of war-refugees: a systematic literature review. *BMC Int Health Hum Rights*, 2015, Vol. 15, Article 29. <https://doi.org/10.1186/s12914-015-0064-9>
2. Chaban O.S. War, fear, anxiety, fatigue. We restore ourselves and restore others. Lecture. NNIPZ NMU named after O.O.Vogomolets [Чабан. О.С. Війна, страх, тривога, втома. Відновлюємося самі і відновлюємо інших. Лекція. ННІПЗ НМУ ім. О.О.Богомольця. 2024]. URL: [https://www.youtube.com/watch?v=ts-D\\_-wu9SpY](https://www.youtube.com/watch?v=ts-D_-wu9SpY) [Accessed 10 Sep. 2025]
3. Sokhor H, Yasniy O, Smashna O, Hashimova H. The impact of war and forced displacement on the mental health of children and adolescents (literature review). *Psychosomatic Medicine and General Practice*, 2024, Vol. 9 (1), Article 471. <https://doi.org/10.26766/pmgr.v9i1.471>
4. World Health Organization (WHO). (n.d.). WHO projects to support mental health in Ukraine. URL: <https://www.euro.who.int/en/countries/ukraine> [Accessed 10 Sep. 2025]
5. Lüddecke R., Felnhofer A. Virtual Reality Biofeedback in Health: A Scoping Review. *Appl Psychophysiol Biofeedback*, 2022, Vol. 47, 1–15. <https://doi.org/10.1007/s10484-021-09529-9>
6. Tosti B, Corrado S, Mancone S, Di Libero T, Rodio A, Andrade A, Diotaiuti P. Integrated use of biofeedback and neurofeedback techniques in treating pathological conditions and improving performance: a narrative review. *Front. Neurosci*, 2024, Vol. 18, Article 1358481. <https://doi.org/10.3389/fnins.2024.1358481>
7. Dvornyk M.S. Using mobile apps as a socio-psychological Strategy of rehabilitation. *Psychological Sciences: Problems and Achievements*, 2017, 10, 53–67. URL: [Accessed 10 Sep. 2025]
8. *Diagnostic and Statistical Manual* <https://lib.iitta.gov.ua/id/eprint/709914> of Mental Disorders. Revised 4th ed., American Psychiatric Association, Washington, 915 p.
9. About post-traumatic stress disorder (PTSD). Veterans Affairs Canada. URL: <https://www.veterans.gc.ca/en/mental-and-physical-health/mental-health-and-wellness/understanding-mental-health/about-post-traumatic-stress-disorder-ptsd> [Accessed 10 Sep. 2025]
10. Free choice. “Base” application. [Вільний Вибір | Застосунок «БАЗА»]. URL: <https://www.vvybir.org.ua/products/appbase/>
11. Hussain, F. Unity Game Development Engine: A Technical Survey. *University of Sindh Journal of Information and Communication Technology*, 2020, Vol. 4(2), 73–81. URL: <https://sujo.usindh.edu.pk/index.php/USJICT/article/view/1800> [Accessed 14 May. 2026]
12. C++ just overtook Java as the world’s most popular programming language | TechRadar. URL: <https://www.techradar.com/news/c-just-overtook-java-as-the-worlds-most-popular-programming-language> [Accessed 14 May. 2026]
13. Brewin C.R., Andrews B., Valentine J.D. Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 2000, Vol. 68 (5), 748–766. <https://doi.org/10.1037/0022-006X.68.5.748>

14. Van der Kolk B.A. *The body keeps the score: Brain, mind, and body in the healing of trauma*. Viking, eBook, 464 p.
15. Ekman, P. An argument for basic emotions. *Cognition and Emotion*, 1992, Vol. 6(3–4), 169–200. <https://doi.org/10.1080/02699939208411068>
16. Shuliakova M., & Ratsyborynska-Polyakova H. The impact of chronic stress on the human body and the role of psychoeducation in reducing its mental manifestations. *Psychosomatic Medicine and General Practice*, 2024, Vol. 9 (1), Article 490. <https://doi.org/10.26766/pmgp.v9i1.490>
17. Antuna-Cambor C., Gomez-Salas F., Burgos-Julian F., Gonzalez-Vazquez A., Juarros-Basterretxea J. and Rodriguez-Diaz F. Emotional Regulation as a Transdiagnostic Process of Emotional Disorders in Therapy: A Systematic Review and Meta-Analysis. *Clin Psychol Psychother*, 2024, Vol. 31, Article e2997. <https://doi.org/10.1002/cpp.2997>
18. Brown R.P., Gerbarg P.L. Sudarshan Kriya Yogic breathing in the treatment of stress, anxiety, and depression: Part II – Clinical applications and guidelines. *Journal of Alternative and Complementary Medicine*, 2005, Vol. 11 (1), 211–217. <https://doi.org/10.1089/acm.2005.11.711>

Received 20.09.2025

Accepted 05.05.2026

Published 01.06.2026

Г.А. ПІДНЕБЕСНА, канд. техн. наук, старш. викладач,  
Нац. техн. ун-т України «Київський політехнічний інститут  
імені Ігоря Сікорського»,  
Берестейський просп., 37, м. Київ, 03056, Україна;  
<https://orcid.org/0000-0002-5735-9861>  
pidnebesna@ukr.net

В.О. СУРЖЕНКО, студент магістратури,  
Нац. техн. ун-т України «Київський політехнічний інститут імені Ігоря  
Сікорського»,  
Берестейський просп., 37, м. Київ, 03056, Україна  
<https://orcid.org/0009-0003-6521-0471>  
srzhenkoviacheslav@gmail.com

І.О. КОЗІЄНКО, приватний психолог,  
член спілки української спільноти транзакційного аналізу ГО «УСТА»  
<https://orcid.org/0009-0003-7203-8526>  
kira.wld@gmail.com

## ЗАСТОСУВАННЯ ЦИФРОВИХ ТЕХНОЛОГІЙ ДЛЯ СТАБІЛІЗАЦІЇ ЕМОЦІЙНОГО СТАНУ ЛЮДИНИ

**Вступ.** Сучасні цифрові технології можуть відігравати важливу роль у підтримці психічного здоров'я, зокрема у зменшенні рівня стресу та корекції емоційних розладів. У статті розглянуто підхід до створення мобільного програмного застосунку, в якому реалізовані методики психологічної самодопомоги, зокрема техніки дихання, заземлення, білатеральної стимуляції та EMDR-подібних вправ.

**Мета.** Дослідити задачу розроблення мобільного програмного застосунку, в якому будуть реалізовані методики психологічної самодопомоги, зокрема техніки дихання, заземлення, білатеральної стимуляції тощо.

**Методи.** Реалізовано інтеграцію новітніх комп'ютерних технологій з задачами охорони здоров'я людини, а саме – віртуальні «терапевти» на основі ШІ, системи зворотного зв'язку (*biofeedback*), які допомагають людині контролювати свої фізіологічні процеси з допомогою датчиків і комп'ютерного аналізу тощо.

**Результати.** Наведено методологічну основу, структуру функційних модулів і особливості реалізації прототипу на базі *Unity* та *C#*. Обґрунтовано переваги використання цифрових технологій для оперативної підтримки емоційного стану користувачів.

**Висновки.** Створений прототип ефективно поєднує сучасні цифрові технології із відомими методами психологічної самопомоги. Його особливістю є реалізація продуманої послідовності психологічних технік та вправ, які використовуються в практиці як українських, так і закордонних спеціалістів під час роботи з військовими та ветеранами. Мобільний застосунок є доступним інструментом зниження рівня стресу та стабілізації емоційного стану. Це досягається завдяки інтерактивності і візуальній підтримці, адаптивності і модульності, можливості автономної роботи без інтернету тощо. Проте необхідно зауважити, що використання застосунку не замінює професійну психотерапію і може слугувати лише як допоміжний та превентивний засіб.

**Ключові слова:** цифрові технології, мобільний застосунок, емоційний стан, стресові розлади, EMDR, *Unity*, психологічна самопомога.