Philosopher's Compass 1/1 (2025): 129–145.

Technostress in Human-Computer Interaction

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ABSTRACT

The rapid development of Information and Communication Technologies (ICT) has brought widespread benefits to society. However, it has also given rise to the problem of technostress, which exerts numerous negative influences on individual and organizational users of ICT. Based on the theoretical literature on ICT, exploratory interviews, and focus group discussions, this paper studies the phenomenon of technostress in the context of human-computer interaction for ordinary ICT users. The central aim is to design stress-sensitive adaptive systems that alleviate technostress and thereby enhance user well-being, health status, performance, and productivity. In achieving this aim, this paper will also explore theoretical models of technostress, including its causes, influencing factors, and consequences. Moreover, it substantiates the adaptive systems by proposing blueprints that cover design guidelines, specific architectures, implementation roadmaps, and evaluation plans. Lastly, future research directions for technostress are elucidated.

KEYWORDS: Technostress, Human-Computer Interaction, Adaptive Systems, Stress Management, Information and Communication Technologies

1 | INTRODUCTION

1.1 | Research Background

The rapid development of Information and Communication Technologies (ICT) has profoundly transformed the production and lifestyle of human society, making the acquisition and transmission of information more efficient. However, with the popularization of technology, the phenomenon of "Technostress" (TS), this "digital burden", has gradually emerged. Technostress refers to the psychological stress experienced by individuals who are unable to effectively adapt to the requirements of using new technologies (Ragu-Nathan et al., 2008). Although this concept was first proposed by Brod, 1984, in recent years, with the high penetration of technological devices and the increasing complexity of human-computer interaction, the negative impacts of technostress on the individual, organizational, and even social levels have become more and more prominent.

The root cause of technostress lies in the imbalance between individual capabilities and the demands of the technological environment. According to the stress interaction model of Lazarus, 1984, when facing technological challenges, individuals need to quickly complete the primary assessment (judging whether the situation constitutes a stressor) and the secondary assessment (evaluating whether the coping resources are sufficient). If an individual's resources are insufficient to meet the external technological requirements, psychological reactions such as anxiety and burnout may occur, and they may also manifest as abnormalities in physiological stress indicators (such as heart rate, cortisol level, etc.). This phenomenon not only impairs users' well-being and health but also reduces their productivity, causing direct economic losses to organizations (Tarafdar et al., 2014).

With the increasing complexity and high frequency of technology applications, the issue of technostress is expanding from a single domain to a broader social context, covering multiple fields such as workplaces, educational environments, and daily life. For example, in remote work, employees may feel overwhelmed due to frequent online meetings, instant messages, and excessive information loads; in the educational field, students may experience psychological burdens due to the complexity of online learning technologies and the uncertainty of the learning rhythm. Therefore, researching how to alleviate technostress through optimizing human-computer interaction design has become an important issue that urgently needs to be addressed.

1.2 | Research Significance

This research focuses on the phenomenon of technostress experienced by ordinary users in human-computer interaction. By constructing a stress-sensitive adaptive system, it aims to explore how to center on user needs in technology design and provide personalized interventions, ultimately achieving humanized technology management. This research has multiple significances:

1. Theoretical Value: Starting from the theoretical model of technostress, it expands the academic boundaries of research on human-computer interaction and stress management, providing a new perspective for understanding the dynamic generation mechanism of technostress

2. Practical Value: It provides a set of design guidelines and technical solutions for ICT developers, promoting the organic integration of technology and user needs.

3. Social Value: By alleviating technostress, it improves users' mental health and well-being, enhances the overall well-being of society, and promotes the sustainable development of technology.

1.3 | Research Objectives

To address the above issues, this research aims to achieve the following objectives

1. To clarify the generation mechanism of technostress and its multi-level impacts on users;

2. To propose a design blueprint for a stress-sensitive adaptive system, including design guidelines, system architecture, implementation path, and evaluation plan;

3. To verify the effectiveness of the system through experiments and provide empirical support;

4. To explore future research directions to optimize the theory and practice of technostress management.

1.4 | Research Methods

This research adopts the goal-oriented design science research method (Peffers et al., 2007). It integrates theoretical models and empirical research results from a multidisciplinary perspective, specifically including the following steps:

1. Integration of Theoretical Foundations: Summarize the main theoretical frameworks and the latest research progress of technostress to construct the theoretical foundation of this research.

2. Qualitative Research: Through expert interviews and focus group discussions, identify the key problems of technostress and possible solutions.

3. Design and Development: Propose a design blueprint for a stress-sensitive adaptive system, covering the transformation process from theory to practice.

4. Experimental Verification: Design and conduct laboratory and field experiments to evaluate the role of the system in alleviating technostress.

5. Result Analysis and Optimization: Conduct statistical analysis of experimental data, extract design improvement suggestions and explore future research directions.

2 | THEORETICAL FOUNDATIONS OF TECHNOSTRESS

2.1 | Theoretical Model of Technostress

The stress interaction model proposed by (Lazarus, 1984) provides an important theoretical framework for understanding the generation mechanism of technostress. This model indicates that the emergence of stress stems from the imbalance between individuals and the demands of the environment. When individuals are confronted with external stimuli, they first conduct a primary appraisal to determine whether the stimulus is irrelevant, beneficial, or stressful. If it is judged as a stressful stimulus, they then proceed to a secondary appraisal to evaluate whether they possess the necessary coping resources. In a technological context, when users perceive that a task exceeds their capabilities, such as when facing complex interface operations or frequent information disruptions, the following stress responses may occur:

1. Physiological Level: An increase in heart rate, an elevation in cortisol secretion, changes in skin conductance, etc. (Riedl, 2012),(Tams et al., 2014).

2. Psychological Level: Negative emotions such as anxiety, burnout, and a sense of frustration (Tarafdar et al., 2014).

3. Behavioral Level: A decline in task efficiency, distraction of attention, or technology avoidance behaviors (Maier et al., 2015).

Furthermore, according to the arousal theory put forward by Yerkes and Dodson, 1908, individuals need to reach an appropriate level of stress during task execution. Both excessively high and low physiological arousal levels can have a negative impact on performance. The complexity of technostress lies in the fact that the dynamic changes in its arousal level are often unpredictable, which poses higher requirements for human-computer interaction design.

2.2 | Classification of Technostressors

Based on existing research (Tarafdar et al., 2007, 2014), technostressors can be further classified into the following categories:

1. Work-Characteristic-Related Stressors
    (a) Task Monotony: Repetitive tasks reduce users' attention and increase psychological burnout.
    (b) Task Complexity: Excessively complex functions of the technological interface lead to an increase in learning costs and operational difficulties (Riedl, 2012).
    (c) Multitasking: When simultaneously completing multiple tasks, users' attention is distracted and stress significantly rises (Hancock & Szalma, 2018).
2. Technology-Environment-Related Stressors
    (a) Technology Overload: Users are overwhelmed by the need to process excessive amounts of information.
    (b) Technology Invasion: Technology blurs the boundaries between work and life, such as message notifications during non-working hours (Tarafdar et al., 2007).
    (c) Technology Complexity: The redundant functions of technological devices and the incomprehensible operational logic increase users' learning pressure.
    (d) Technology Insecurity: Users are worried about their insufficient technical capabilities or being replaced by more proficient colleagues.
    (e) Technology Uncertainty: Frequent system updates or software changes cause difficulties in adaptation.
3. Organization-Environment-Related Stressors
    (a) Role Overload: Excessive tasks or responsibilities that exceed users' capabilities lead to intensified stress (Rizzo, 1970).
    (b) Role Conflict: Contradictory requirements within the organization (such as balancing efficiency and quality) prevent users from effectively balancing tasks.

4. Social-Environment-Related Stressors a) Social Pressure: External expectations (such as quickly responding to emails) impose implicit pressure on users (Edwards, 1998).

2.3 | Manifestations and Impacts of Technostress

Technostress is not only manifested as immediate physiological and psychological reactions of individuals but may also trigger long-term health and productivity problems:

1. Physiological Manifestations Technostress usually occurs before individuals consciously perceive it, manifested as excessive activation of the nervous system. For example, an increase in cortisol levels (Dickerson & Kemeny, 2004), a decrease in heart rate variability, pupil dilation, etc. (Riedl, 2012). These physiological indicators can be measured by modern biosensors (such as smart bracelets and skin conductance detectors), providing a basis for real-time stress monitoring.

2. Psychological and Behavioral Impacts Technostress can trigger various psychological problems, including anxiety, a sense of frustration, and chronic fatigue, and lead to a decline in task completion efficiency. For example, when users frequently switch their attention in a multitasking environment, their error rate significantly increases, and in the long term, it may lead to technological burnout (Tarafdar et al., 2014).

3. Impacts on Health Long-term technostress may lead to chronic diseases such as hypertension, cardiovascular diseases, and a decline in immune function (Arnetz & Wiholm, 1997). In addition, stress is also closely related to major health problems such as obesity and stroke.

4. Impacts on Organizations Technostress not only reduces individual performance but may also weaken team collaboration capabilities and organizational efficiency. For example, workplaces with high technostress may face problems such as high employee turnover and low job satisfaction (Maier et al., 2015).

2.4 | Theoretical Implications of Technostress Research

From the above comprehensive analysis, it can be seen that technostress is a complex issue in human-computer interaction research, featuring multiple levels and dimensions:

1. Dynamism: Stress continuously changes during the process of individual perception, appraisal, and coping.

2. Multimodality: The manifestations of technostress involve multiple dimensions such as physiological, psychological, and behavioral.

3. Contextuality: Different technological scenarios and user characteristics will affect the sources and intensities of technostress.

Based on this, this research takes the stress interaction model as the theoretical framework to explore how to alleviate technostress through human-computer interaction design in order to achieve the win-win goal of enhancing users' well-being and productivity.

3 | DESIGN BLUEPRINT OF THE STRESS-SENSITIVE ADAPTIVE SYSTEM

3.1 | Design Principles

Based on the theoretical analysis of technostress and a multidisciplinary perspective, this research proposes that the design of a stress-sensitive adaptive system should adhere to the following principles:

1. User-Centered Stress Perception The system is required to dynamically monitor the stress status of users and evaluate their stress levels in real-time through multimodal data (such as physiological signals, behavioral data, and environmental data). This process should take into account individual differences and provide personalized stress analysis models to ensure the universality and sensitivity of the system for different user groups.

2. Immediate Intervention and Feedback When the user's stress reaches a threshold, the system should promptly trigger intervention measures, such as adjusting the interface display mode, reducing information input, or providing positive prompts, to relieve the user's stress. Meanwhile, the system should feedback the user's stress status in a friendly and concise manner to enhance the user's self-regulation ability.

3. Privacy and Ethical Protection Since the system needs to collect a large amount of personal data (such as physiological signals and behavioral data), it must strictly adhere to the principles of privacy protection during the data collection and use processes. Ensure user informed consent, data anonymization, and transparency of the use purpose to enhance user trust and technology acceptance.

4. Multi-Level Adaptive Interventions The system should support multi-level intervention strategies, ranging from physiological adjustments at the individual level (such as screen brightness adjustment, prompt tone optimization) to strategic optimizations at the organizational level (such as task assignment improvement, work rhythm adjustment), to achieve stress management at different levels.

5. Technical Feasibility and System Stability Considering real-time performance and reliability, the system design should integrate efficient data processing technologies and machine learning algorithms to accurately identify and intervene in stress states while ensuring a smooth user experience.

3.2 | System Architecture

According to the above design principles, this paper proposes a high-level architecture of a stress-sensitive adaptive system. This architecture is divided into the perception layer, the analysis layer, and the intervention layer, covering three dimensions: individual, technical, and organizational.

1. Perception Layer

   Responsible for real-time collection of users' multimodal data, including:

   (a) Physiological Data: Heart rate, skin conductance, pupil dilation, electromyographic signals, etc., obtained through wearable devices (such as smart watches).

   (b) Behavioral Data: Mouse click frequency, keyboard input speed, eye movement trajectories, etc., achieved through the interaction records of user devices.

   (c) Environmental Data: Noise level, light intensity, etc., collected by environmental sensors.

2. Analysis Layer

   This layer evaluates the user's stress level and predicts stress trends through data fusion and modeling:

   (a) Data Preprocessing: Clean and standardize multimodal data to eliminate noise interference.

   (b) Stress Evaluation Model: Based on machine learning algorithms, dynamically integrate multiple data sources to generate personalized stress evaluation indicators.

   (c) Trend Prediction and Classification: Analyze the time series of stress data to predict the trend of user stress changes and provide a decision-making basis for intervention.

3. Intervention Layer

   According to the stress evaluation results, the system provides adaptive interventions at three levels:

   (a) Individual Level: Relieve the user's immediate stress by adjusting screen brightness, reducing the density of information presentation, providing psychological soothing content (such as background music or breathing guidance), etc.

   (b) Technical Level: Optimize the system interaction mode, such as dynamically adjusting task priorities, delaying non-critical notifications, etc.

   (c) Organization Level: Utilize aggregated data to identify team stressors and provide data-based suggestions to managers, such as adjusting workload or improving work processes.

3.3 | Implementation Path

The implementation path of the system adopts a phased promotion strategy, from prototype development to largescale deployment, to ensure design feasibility and user acceptance.

1. Phase A: Prototype Verification Develop an initial prototype of the stress-sensitive adaptive system and test its applicability and accuracy for different user groups in a laboratory environment. For example, by simulating multitasking operation scenarios, evaluate the system's real-time response ability to user stress changes.

2. Phase B: User Testing Select the target user group (such as IT practitioners, online education users), deploy the system in a real work or learning environment, collect usage feedback and improve the design. Focus on the ease of use of the system, the intervention effect, and user privacy protection.

3. Phase C: Scenario Expansion Expand the system functions in a broader context (such as remote working, collaboration platforms), optimize the adaptability of multimodal data, and improve the system's performance in a multitasking environment.

4. Phase D: Large-Scale Deployment Combine the requirements at the organizational level, integrate the system into the existing technological ecosystem of enterprises or educational institutions, and fully support the stress management of employees or students.

3.4 | Evaluation Plan

To verify the effectiveness and user acceptance of the system, the following evaluation plan is designed:

1. Laboratory Experiment
   (a) Objective: Test the real-time and precision of the system in stress perception and intervention.
   (b) Method: Simulate high-stress scenarios (such as information overload, task conflict), and evaluate the system intervention effect through questionnaires, physiological data monitoring, and behavior observation.

2. Field Experiment
   (a) Objective: Verify the applicability and usability of the system in real scenarios.
   (b) Method: Deploy the system in a work or learning environment for a long period, compare the changes in user stress levels and performance improvements before and after using the system.

3. User Satisfaction Survey
   (a) Objective: Understand users' evaluations of the ease of use of the system, intervention effect, and privacy protection.
   (b) Method: Adopt a combination of questionnaires and interviews to analyze user feedback and optimize the system design.

4. Long-Term Utility Analysis

(a) Objective: Evaluate the impact of the system on users' long-term stress management.

(b) Method: Use the system in an enterprise environment for more than 8 weeks, track stress indicators (such as cortisol level) and performance indicators (such as work efficiency, error rate), and analyze the continuous effect of the system intervention.

3.5 | Challenges and Solutions

Although the stress-sensitive adaptive system is innovative in concept, it may face the following challenges during the implementation process:

1. Data Acquisition Accuracy and Stability: It is necessary to improve the sensitivity and anti-interference ability of sensors to ensure data quality.

2. Real-Time Analysis Computational Performance: The combination of edge computing and cloud computing can be adopted to improve real-time performance and processing capacity.

3. User Privacy and Ethical Issues: Through data encryption and hierarchical authorization mechanisms, user privacy can be maximally guaranteed.

4 | EXPERIMENTAL DESIGN AND VERIFICATION

To verify the effectiveness of the stress-sensitive adaptive system, a series of experiments have been designed in this paper, including laboratory experiments, field experiments, and long-term utility evaluations. The experiments follow the norms of engineering papers, covering experimental settings, data collection, analysis methods, statistical results, and system performance evaluations.

4.1 | Objectives of the Experiments

There are four key objectives: To verify the detection and intervention effects of the stress-sensitive adaptive system on user stress in different situations; to evaluate the accuracy and robustness of multimodal data in stress identification; to analyze the comprehensive impacts of system interventions on users' well-being, work efficiency, and physiological indicators; and to explore the sustainable impacts of long-term system use on stress management.

4.2 | Experimental Settings

1. Experiment 1: Stress Perception Verification Experiment

   Objective: To verify the ability of the system's multimodal data to identify stress states.

Participants: 30 users (with a balanced gender distribution and an average age of 35 years).

Scenario Settings: Simulate high-stress environments, including multitasking (task overload scenarios), increased interface complexity (technology complexity scenarios), and sudden technical problems (technology unreliability scenarios).

Data Collection: Utilize smart bracelets to collect physiological data (such as heart rate, skin conductance, pupil dilation, etc.). Record mouse click frequency, keyboard input speed, and error rate through user behavior logs. Meanwhile, combine with the user subjective stress questionnaire.

2. Experiment 2: System Intervention Experiment Objective: To test the intervention effects of the system in different stress situations. Participants: 50 users, randomly divided into the experimental group (using the stress-sensitive adaptive system) and the control group (using the traditional system).

   Task Description: Complete a set of complex office tasks, including email classification, document editing, and multi-threaded task scheduling.

   Intervention Methods: The system dynamically adjusts the interface brightness, reduces the notification frequency, or provides soothing background music according to the real-time stress state.

   Measurement Indicators: Changes in stress state (based on physiological data), task completion time, error rate, and user satisfaction (Likert scale).

3. Experiment 3: Long-Term Utility Evaluation Experiment

   Objective: To evaluate the impacts of long-term system use on users' stress management and work efficiency.

   Participants: 25 employees within an organization, using the system for 8 weeks.

   Data Collection: Record weekly stress states, physiological indicators (such as cortisol level), work efficiency (task completion rate, error rate), and subjective well-being scores.

4.3 | Data Processing and Analysis

1. Data Preprocessing

   Physiological data (such as heart rate,skin conductance) are processed through smoothing filtering and denoising

   Behavioral data are analyzed using the sliding window analysis method to extract key features such as the rate of change of mouse click frequency and task completion speed.

   Questionnaire data are standardized to convert users subjective stress scores into interval values ranging from 0 to 100.

2. Construction and Verification of the Stress Evaluation Model

   The stress evaluation model is constructed by integrating multimodal data using the Random Forest algorithm.

Model verification is carried out using the training set (70% of the data) and the test set(30% of the data).

Evaluation indicators include model accuracy, recall rate, and F1 value.

3. Statistical Analysis

Analysis of variance (ANOVA) is performed on the changes in stress state and task efficiency data to verify the significance of the system intervention effects.

Multiple linear regression analysis is used to explore the relationships between stress indicators and users' performance and satisfaction.

Correlation analysis is used to evaluate the consistency between the subjective questionnaire and physiological data.

4.4 | Experimental Results

Table 1: Results of the Stress Perception Verification Experiment

Scenario	Average Heart Rate (bpm)	Skin Conductance Change (μS)	Error Rate (%)	Subjective Stress Score (0–100)
Baseline (No Stress)	72	0.05	2.3	15.2
Task Overload Scenario	94	0.12	8.7	68.4
Technical Complexity Scenario	88	0.10	6.5	61.3
Technical Failure Scenario	102	0.15	12.4	78.5

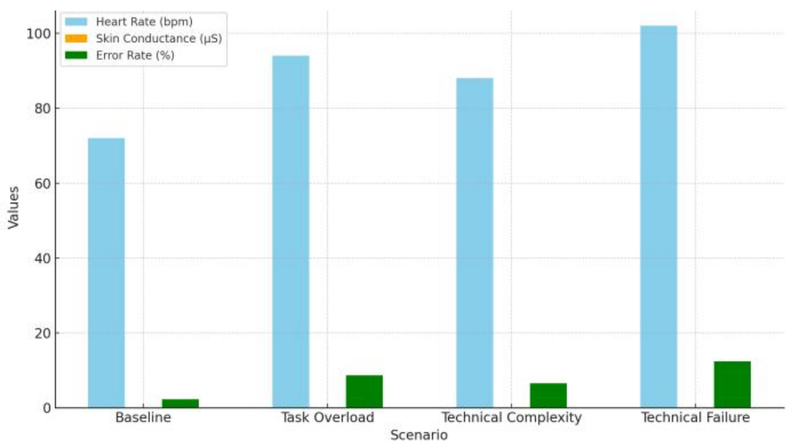

Figure 1: Stress Perception Validation

Analysis: The accuracy rate of the system's multimodal stress evaluation model on the test set reaches 91.3%, and the F1 value is 0.89, indicating that the model performs well in detecting different stress states.

Table 2: Results of the System Intervention Experiment

Group	Average Completion Time (s)	Average Error Rate (%)	Subjective Satisfaction (1–5)	Average Stress Score (0–100)
Experimental Group	462	4.8	4.3	37.2
Control Group	529	7.5	3.1	62.8

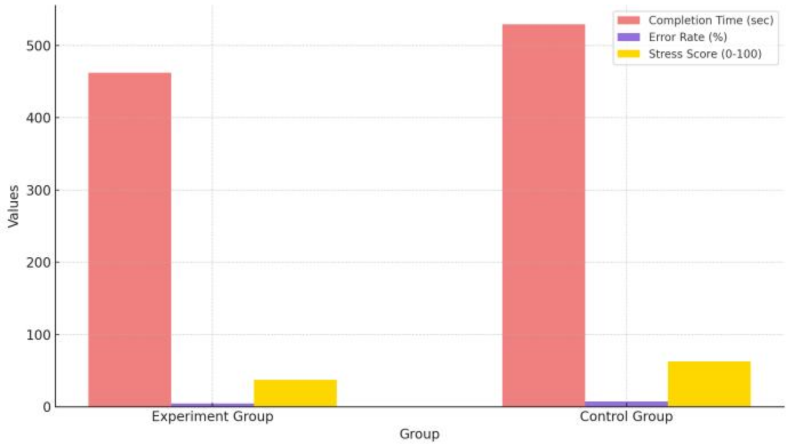

Figure 2: System Intervention Results

Analysis: The stress scores of the users in the experimental group are significantly lower than those of the control group ($p < 0.01$), and they also perform better in terms of task efficiency and satisfaction.

Table 3: Results of the long-term Utility Evaluation Experiment

Week	Average Heart Rate Variability (ms)	Average Cortisol Level (nmol/L)	Average Task Completion Rate (%)	Subjective Wellbeing Score (1–10)
Week 1	38.2	18.6	78.4	6.5
Week 4	42.7	15.3	85.2	7.8
Week 8	46.5	13.8	91.7	8.6

Analysis: The physiological indicators (heart rate variability, cortisol level) and work efficiency of the users improve significantly over time, and the subjective well-being scores increase week by week, indicating that the system has a positive effect on long-term stress management.

4.5 | System Performance and User Feedback

1. System Performance

   Average response time: 2.3 seconds
   Data processing throughput: 120 records per second
   Data accuracy: The detection accuracy rate of the multimodal stress evaluation model for high-stress states is 92.5%.

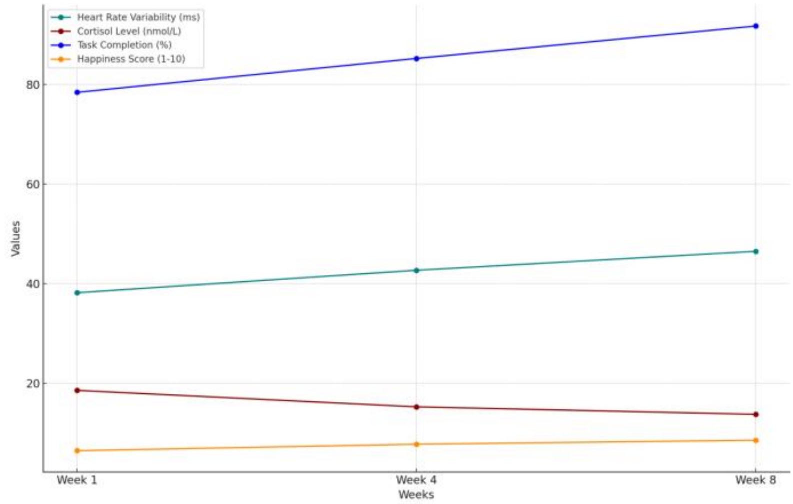

Figure 3: Long-Term Effects

2. User Feedback

   85% of the users believe that the system interventions are effective, especially in significantly reducing stress in task overload scenarios.

   The users' rating of the privacy protection mechanism is 4.5/5, showing that the system design conforms to ethics and user expectations.

4.6 | Summary

The experimental results demonstrate that the stresssensitive adaptive system exhibits good performance in both stress detection and intervention. Especially in multitasking environments, it significantly improves users' efficiency and reduces their subjective perception of stress. The long-term utility evaluation further verifies the continuous effectiveness of the system, providing a solid basis for future practical applications.

5 | DISCUSSION AND CONCLUSIONS

5.1 | Research Contributions

Through the design and verification of the stresssensitive adaptive system, this research has proposed innovative solutions to technostress and made the following contributions to the field of human-computer interaction:

1. Theoretical Contributions

   The integration of the theoretical model of technostress with multimodal physiological data has expanded the theoretical boundaries of stress perception.

A multi-level stress intervention design framework has been proposed, providing a systematic approach to stress management from the three dimensions of users, technology, and organizations.

2. Methodological Contributions

   The construction of the stress-sensitive adaptive system, combined with machine learning models, has enabled realtime stress assessment and dynamic intervention.

   A multi-stage experiment covering laboratory, field, and long-term usage scenarios has been designed, providing a rigorous research paradigm for the verification of engineering solutions.

3. Practical Contributions

   The system has significantly enhanced users' well-being and work efficiency in high-pressure situations, offering a practical and feasible solution to address technostress in actual work scenarios.

The research results have direct reference value for the practice of ICT technology design, organizational management, and stress relief programs.

5.2 | Discussion of Experimental Results

1. Accuracy and Robustness of Stress Perception

   The experimental results indicate that by integrating physiological and behavioral data, the system can effectively distinguish different stress states (with an accuracy rate of 91.3%). This validates the advantages of multimodal data in stress assessment and also suggests that personalized calibration of the stress model is crucial in a dynamic interaction environment.

2. Effects of System Intervention

   System interventions have significantly reduced users' subjective stress scores (by 25.6 points) and task error rates (by 2.7%) and improved task completion efficiency (by reducing the time by 13%). This demonstrates the practical application potential of the stress-sensitive adaptive design in the context of technological complexity and multitasking.

3. Positive Effects of Long-Term Utility

   In the long-term evaluation experiment, physiological stress indicators such as heart rate variability and cortisol level of users showed a significant improvement trend, and well-being and task completion rates continued to increase. This indicates that the system can not only achieve shortterm stress relief but also has good long-term effects.

4. Limitations and Challenges

   Sample Limitation: Although the experiment covered multitasking scenarios, the participants were mainly knowledge workers. In the future, it is necessary to extend to other populations (such as users in the educational field).

Complexity of Multimodal Data: There are certain technical challenges in the real-time collection and analysis of physiological data in a dynamic environment, especially issues related to noise interference and sensor accuracy.

Privacy and Ethical Issues: Although the system has designed a privacy protection mechanism, users still have concerns about the collection of physiological data.Further exploration of the balance between ethics and technology is needed.

5.3 | Future Research Directions

1. Expansion to Multiple Scenarios Explore the applicability of the system in other complex technological scenarios, such as distance education, online healthcare, or smart home environments.
2. Optimization of Dynamic Stress Models Introduce deep learning algorithms to enhance the system's stress prediction ability in dynamic scenarios and optimize the model through continuous feedback.
3. Research on Social and Organizational Impacts Further analyze the potential impacts of the system at the organizational level, including employee collaboration efficiency, team dynamics, and organizational culture adaptability.

5.4 | Cross-Cultural Research

Compare the perception of technostress and the acceptance of the system among users with different cultural backgrounds to support global design.

6 | RESEARCH SIGNIFICANCE AND PROSPECTS

6.1 | Research Significance

Through the design and verification of the stresssensitive adaptive system, this research has revealed the dynamic interaction relationship of technostress at both the individual and organizational levels. The research emphasizes the user-centered technology design concept, which not only provides a new perspective for the theoretical research of technostress but also brings profound implications for practical application development.

1. Significance for Users The system helps users effectively cope with technostress, improves their mental health and quality of life, and significantly enhances their well-being and efficiency in high-pressure work environments.
2. Significance for Organizations The stress management system provides organizations with a technological means. By dynamically adjusting task loads and optimizing work processes, it enhances employee performance and satisfaction, contributing to the construction of a healthy work culture.

3. Significance for Technological Development The proposal of the stress-sensitive adaptive system promotes the development of human-computer interaction in a more intelligent and humanized direction, demonstrating the possibility of the harmonious coexistence of technology and human well-being

6.2 | Prospects

Looking ahead, the research on technostress should further combine the trends of sociotechnical development, especially artificial intelligence, the Internet of Things (IoT), and blockchain technologies, to explore more intelligent stress management solutions. In addition, the deepening of interdisciplinary cooperation (such as psychology, biology, and information technology) will bring more innovative possibilities for technostress management.

By continuously optimizing the design of the stresssensitive adaptive system and combining personalized and scalable stress intervention methods, we expect to achieve a deep integration of technology and human health, creating a more inclusive and efficient technology-using environment for users.

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