

(54) Title of the invention : A SYSTEM AND METHOD FOR PRIVACY-PRESERVING EMOTION RECOGNITION USING FEDERATED LEARNING AND EXPLAINABLE AI ON EDGE DEVICES

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(57) Abstract :

[039] The present invention discloses a privacy-preserving, real-time emotion recognition system designed to operate entirely on edge devices without transmitting raw user data to centralized servers. Utilizing multimodal inputs—including visual, auditory, and physiological signals—the system performs on-device signal preprocessing, feature extraction, and emotion classification using compressed deep learning models. It incorporates user-specific personalization through local adaptation, federated learning for collaborative model improvement without compromising privacy, and an explainability module to generate interpretable emotional insights. The invention functions in both online and offline modes, ensuring robust performance in low-connectivity environments. Its modular design enables scalable deployment across smartphones, wearables, automotive systems, and embedded IoT platforms, providing a secure, adaptive, and ethically grounded solution for emotion-aware applications. Accompanied Drawing [FIGS. 1-2]

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