**Deep learning-based solutions for physical identification in a confined environment employing vision and behavioral pattern recognition**

As a biometric trait, a person's face may be used to identify them as unique. Face recognition uses a person's physical and behavioral traits to identify or verify their uniqueness. There are several hurdles to overcome when employing biometric technologies to authenticate users and identifying their emotions from face expressions. The non-invasive biometric characteristic face is employed to construct the system in order to solve the authentication issues. This recognition system is primarily used to verify the user's identity and monitor their emotional state. Face detection and recognition are the two primary steps of the face recognition system. Deep transfer learning-based facial recognition software is the primary goal of this research project. A facial expression analysis module and an authentication module are included in this deep learning-based solution. The deep transfer learning strategy is employed in these two modules for face picture identification. When a user submits their identification to be verified, an authentication module is created to verify their identity and to detect spoofing attacks. In the second module, the automated system captures the user's facial expressions. The deep transfer learning-based tools are developed by forming and training bespoke models that benefit from transfer learning. Customized models are trained and tested on a variety of datasets in order to improve model accuracy. ROC curves are used in the experiments to measure the accuracy, precision, recall, f1 score value, true positive rate (TPR), false positive rate (FPR), and receiver operating characteristic (ROC) of the transfer learning and convolutional neural network models' performance. These performance indicators are used to compare and contrast the various Deep Learning, Transfer Learning, and Long Short-Term Memory algorithms.

**Keywords:** Face Recognition, Facial Expression, Deep Learning, Long short-term memory, Transfer Learning.