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**POSSIBILITIES OF KEYSTROKE DYNAMICS ANALYSIS FOR
EARLY STRESS RECOGNITION IN OFFICE ENVIRONMENT**

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This thesis explores the possibilities of keystroke dynamics analysis as a method for early stress recognition in office environments. Chronic stress in the workplace is a growing concern, with negative consequences for both employees and organizations. Traditional methods of stress detection have limitations in terms of accuracy and practicality, and there is a need for alternative approaches. Keystroke dynamics analysis, which involves analyzing typing patterns, has shown promise as a non-invasive, unobtrusive, and cost-effective tool for stress detection. The aim of this thesis is to investigate the potential of keystroke dynamics analysis as a stress detection method, including its advantages and limitations, and its application in real-world office settings.

Work-related stress has been defined as the emotional, cognitive, behavioral and physiological reaction to aversive and noxious aspects of work, work environments and work organizations. It is a state characterized by high levels of arousal and distress and often by feelings of not coping. Work-related stress is experienced when the demands of the work environment exceed the employee's ability to control them. These demands are not only related to high workload or long working hours, but also to high perceived stress, low social support from colleagues and managers, or to the individual characteristics of each one like the education and competitiveness [1].

Workplace stressors are classified as physical and psychosocial. Physical stressors include noise, poor lighting, poor office or work layout, and ergonomic factors, such as bad working postures. Psychosocial stressors are, arguably, the most predominant stress factors. These include high job demands, inflexible working hours, poor job control, poor work design and structure, bullying, harassments, and job insecurity. Workplace stress not only affects the worker, it also has adverse effects on company performance well. The effects of job-related strain are evident in workers' physical health, mental health, and their behavior. These effects occur in a continuum, beginning as distress in response to stressors. Distress, in turn, leads to elevated blood pressure and anxiety, which increase the risk of coronary heart disease, substance abuse, and anxiety disorders.

The implications of work-related stress include the effects on worker satisfaction and productivity, their mental and physical health, absenteeism and its economic cost, the wider impact on family function and finally, the potential for employer liability. While depression is the most likely adverse psychological

outcome, the range of other possible psychological problems include burn-out, alcohol abuse, unexplained physical symptoms, absenteeism, chronic fatigue and accidents, sick building syndrome and repetitive strain injury [2].

Keystroke dynamics is a behavioral biometrics which captures the typing rhythms of users [3]. The most frequently extracted features from the keystroke dynamics are dwell time, which is the time a key is pressed, and the average dwell time, duration between keystrokes and their average, time between two consecutive keys are down, pause rate, typing speed, number of key press events, duration of digraphs and trigraphs, number of events in the key events combination and frequency of using specific keys such as backspace or the space-bar. Key pressure has also been measured in some researches [1].

Our objective is to use keystroke dynamics the study of a user's typing rhythms – as a method for stress detection. The ubiquity of computing devices means that keystrokes are constantly being generated as a user goes about his or her daily business. Capturing these keystrokes, and their associated typing rhythm, is as easy as writing a simple piece of software to collect them. No specialized hardware is required; virtually every computing device has a physical or virtual keyboard built-in. Moreover, no explicit action is required from the user; a user can simply go about his intended task while the stress detection software runs in the background and s/he will not be inconvenienced in any way. If it is possible to detect stress via changes in typing rhythm, this technology could be rapidly and cheaply deployed while being invisible to end-users.

Keystroke dynamics analysis system for recognition of stress in office environment is user-friendly and cost-effective, provides real-time analysis, and can be used for continuous stress detection. In addition, the analysis of the dynamics of keystrokes can be used for authentication. By utilizing keystroke dynamics analysis, organizations can enhance stress control of their employees and provide a more secure environment for their users.

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