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Standalone Empathetic Intelligent Monitoring System (SEIMoS)

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Background: In the modern era of vast communication and information dissemination the need for radical security measures must be addressed. Specifically, as the Internet has a tremendous influence on people and especially on younger ones, new threats are added to existing ones such as the Blue Whale phenomenon [1]. The latter is arise while being already beyond acceptable values. Especially in some countries the percentage is really high denoting that immediate confrontation is needed. Many solutions can be found but the most proper should be found in any means of electronic monitoring and intervention. In turn, this autonomous monitoring system will exhibit empathetic characteristics. This system will have the capability of working locally but can also be connected to every network in order to alert security services for quick on-site intervention. The hardware part of the system will contain wired and wireless sensor nodes which will conduct measurements from various points of the body, as well as from various peripheral devices that are close to it. The software part will include a database and a local application to store the information acquired by sensors. In turn, the feedback will be processed algorithmically based on significant principals of psychotherapy in order the system to influence the users through multimedia interaction (empathetic approach) for the sake of their mental health. Also, additional features will be available for the sake of their relaxation or their stimulation for carrying on their work. The proposed scheme is named as Standalone Empathetic Intelligent Monitoring System (SEIMoS) which is based on Freudian psychoanalysis.

Materials and methods: This research has the purpose of investigating a viable solution towards the continuous clinical monitoring of people in order to act as precaution beneficial measure. By properly classifying the various stage procedures of SEIMoS such as its input information acquisition (by sensors) and the signal processing part, the system could be split into three major subsystems. The first subsystem includes all the sensory components, the second subsystem is directly related to the software innovative operation while the third subsystem is the algorithmic implementation of Freudian psychoanalysis into the software of the system. The latter enhances the system for exhibiting empathetic reactions in order to confront potential hazards such as imminent users' suicide attempts. A small but significant detail is that each subsystem has digital signal processors (DSPs) acting as an additional intermediate security firewall against network attacks. Albeit this adds more complexity to the system, it is a needed part for not compromising the health of the monitored subjects in any case of potential security violation. The first subsystem includes various sensors, located or integrated in the keyboard, mouse, monitor screen, desk, footrest, inside buttons, chair, and in the perimeter of the user's position. Additional supported sensors could be based on the body wireless sensors network (BWSN) technology [2]. Generally, these sensors will measure transpiration, pressure (diastolic and systolic), heartbeat, body temperature, and vibrations. Also, an integrated oximeter on a device such as a "mouse" could even provide other vital information. Furthermore, additional technologies will be part of this subsystem such as face recognition with high detail sensing for recognizing facial features like the movement of the eye's pupil (expansion or contraction), of the eyebrows or even lips' micro movements. Also, audio will be processed automatically regarding the spoken words and the voice quality relevant to potential disorders [3]. The second subsystem is the software system with the capability of combining different results for activating various procedures. One of the procedures could be the immediate self-adaptation of the system relevant to an imminent hazard. Then, the system could interact with the users in order to notify them or to "persuade" them to act differently. For example, if the users interact with "Blue Whale", then the system will adapt and start to show messages or advertisements with subconscious messages. These will help changing their mood and consequently to make them abort the "Blue Whale" procedure relevant to an imminent suicide. Also, the system could even control devices compliant to IoT (Internet of Things). E.g. If a sensor (mouse device) sends the information of increased moisture or transpiration, along with a probable rise of user's circumferential temperature then the air conditioning will be activated for adjusting the microclimate. Finally, the third subsystem is the heart of the proposed scheme as it acts based on Freudian Psychoanalysis which will be implemented as the decision maker into second subsystem. This theory claims that the pleasure principle drives a person towards the instinctive seeking of pleasure or death. This seeking is combined to the avoidance of pain for satisfying the biological and psychological needs. So, the system will constantly measure the satisfaction of the users and their psychological condition in order to identify if they experience pain (psychological or physical). Consequently, the id (type of the personality) of a user could be easily understood by the system when six values (10-scale) will have been measured. These are the positive satisfaction (PS—seeking of pleasure), the negative satisfaction 1 (seeking of death—aggressive towards others), the negative satisfaction 2 (seeking of death—self aggressive), avoidance of pain 1 and 2 which exhibit positive or negative values respectively, and finally the estimation or the already known knowledge of clinical condition. Even if this condition is not known this is not a prohibitive factor for the system to conclude to an action towards the user. E.g. If a user exhibits positive satisfaction and at the same time a negative avoidance of pain then these measurements indicate a potential masochistic subject. Also, if a user is measured of having negative satisfaction and positive avoidance of pain then he is a not a potential victim of "Blue Whale". If the aforementioned six factors are implemented inside the third subsystem then the latter can understand the users' condition and accordingly to act empathetically for helping them to supersede various hazardous psychological or clinical emerged conditions.

Results: This research will be carried out in at least three different places which would be inside typical buildings, inside a LEED building [4] and finally a building which shares elements from the previous two types of buildings. 150 people (men and women) will be split into three teams of 50 subjects. All the subjects should be analyzed prior to the use of SCL-90-R in order to determine if they are typical users [5–7]. Also, another impromptu questionnaire will be filled in for determining the type of a possible physical illness and for correlating the results of this category of subjects to possible system's unpredicted results. After the procedure, all the subjects will be evaluated again with a new impromptu questionnaire based on the system's employed Freudian Psychoanalysis' factors. Then, statistical analysis will be conducted along with the goal of finding correlations between typical people having physical illnesses and various confronted conditions such as "Blue Whale" phenomenon. The anticipated tests will

probably include cluster analysis along with Wilcoxon signed rank tests. In fact, a prediction would definitely be that typical population, having a physical illness and being in a negative avoidance of pain, would be candidate of heavy influence not only through Internet but also in real life.

Conclusions: This study has two perspectives. One is the research towards creating an evolved interactive electronic system while the other prospective is to construct a new questionnaire which will be even used for monitoring purposes. Specifically, the Standalone Empathetic Intelligent Monitoring System aims to promote the decisions of every electronic interactive system to a higher intelligence level (with the support of sensory technology). The constant use will enhance this system as it will learn and adapt according to special conditions such as imminent suicides, deaths from other causes or even typical needs of a better micro climate inside a typical or a green house. The prototyping's anonymous results will be saved to a database in order to discover new factors of estimating the clinical condition of a person along with the evaluation of the results from the system's intervention to users' decisions. Another significant result would be the validation of a new questionnaire which will be further enhanced based on the feedback from the electronic prototype platform. This questionnaire based on Freudian Psychoanalysis will be a significant predictive tool in the hands of a clinician.

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Ethics Approval: The study was approved by the Ethical Committee of Department of Speech Language Therapy (School of Health and Welfare Professions) TEI of Epirus

Consent to publish: Informed consent to publish has been obtained from each participant.