How robots could reach humanity with the implementation of Advanced Emotional Signalling in Algorithmically Structured Systems (AESASS)

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Materials and methods: This work is centered on five primal principles-stages. Iterative logic is employed in order the system to self-adapt to the best solution. The latter is accomplished by using soft approximation through various stages and finally a feedback loop to constantly monitor new apprehended data versus past decisions. In this way, the behavior of the robot is constantly changing in order to adapt to their owner’s manner and behavior. The decision making is enhanced by using double precision 7-likert scale i.e. the grade of every estimation has two parts. One part is the 1–7 positive value relevant to what the owner wants while the other part (1–9 value) corresponds to how much empathetic behavior is exhibited by the robot. The later depends also to past conditions and it could take different values even when the first part has the same value. This means that the robot expresses their mood and consequently an artificial intelligence behavior which is accomplished by taking into consideration various conditions even the climate itself. The iterative empathetic behavior is consisted of five stages. The first stage is a comparator of current and past condition while the second is the estimation of the optical data. Then a new soft decision (third stage) uses the newly estimated optical data in conjunction to the audio evaluation of the environment. This denotes the necessity of always taking into consideration the environmental conditions along with the data from audiovisual sensing. The fourth part estimates the value of pressure in various body parts of the robot (3D perception of the environment). E.g. when a robot senses a lot of pressure (hit) while talking to a subject then this is estimated as a value of the anger towards their structure. The fifth part is more complicated as it uses a version of an impromptu questionnaire based on SCL-90-R clinical evaluation not only for the human but also for the structure itself. Then a feedback loop passes through a memory block which has stored the significant past conditions for comparing them to the current one (consisted of five likert scores) and in this way to produce a final Likert score (five parts) which then is guided back to the first stage. The output of the final decision is each time after fifth stage. Especially the memory block is very important as it utilizes the humans’ logic of metamemory (a type of metacognition also known as Socratic awareness) in order to self-perceive and be guided by past knowledge and decisions. This is essential for developing a true robotic ability of empathy.

Results: This research involves a total sample of 30 people (15 men and 15 women) in order to be conducted a preliminary test of reaction towards Advanced Emotional Signalling in Algorithmically Structured System (AESASS) inside typical and LEED buildings [2]. The latter is in fact a true empathetic robot exhibiting a self-acquired and not conventional or programmed behavior compared to other robotic structures. This behavior will be analyzed and tested when it is experienced by 30 people. Before the testing procedure, each subject will fill the SCL-90-R questionnaire for verifying that their psychological condition is among typical population. Also, the subjects should not exhibit any disorder even those related to voice [3, 4]. Also, Active—Empathetic Listening Scale (AELS) along with Toronto Empathy questionnaire will be used in this research in order to determine the empathetic level of each subject. After the robotic experience a new impromptu questionnaire will be administered for estimating the grade of satisfaction from the interaction with the robot. The evaluation will be conducted by using (if possible) ANNOVA between various unrelated features in order to determine how these could be related to the robot’s feedback experience. Also, skewed variables will be checked and if possible Wilcoxon signed test along with Mann–Whitney U tests will be applied to the data set. Especially Kruskal–Wallis tests will be conducted as they are one of the best statistical procedures for manipulating small samples. Then cluster analysis should exhibit important results. This will help grouping objects for better analyzing the behavior and estimation of the subjects relevant to the robotic experience.

Conclusions: This work involves the construction and estimation of a robotic structure which will employ advanced empathetic logic and self-awareness with the use of an internal robotic SCL-90-R version. This version will help towards the proper self-analysis of the robot and thus will give the capability of its application to other robotic systems. Moreover, the new impromptu satisfaction questionnaire will be an important new estimator of the robotic behavior of various systems and structures. It is expected that the subjects will be keen to a robotic structure but they will be very susceptible to a structure exhibiting Empathy and not an artificial Behavior. Other future benefits will involve the recording of this satisfaction in conjunction to time, while robotic technology will keep on moving forward. If the scores increase radically from a time point and then, this will declare an even higher robotic evolution.

References


**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.