

# An effective Research of Emotion

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**Abstract.** This paper proposes the importance of emotion technology for robot. Emotion technology is absolutely necessary for real human being in robot. However, it is very difficult to expression effectively emotion function in robot. Visual system (static and moving status), sound system, and tactile sense can express by physical sensor. However, there are some difficulties about how we can express feeling like human being's hart. Therefore, those who work in science have to cooperate with researcher in quite difference area such as, psychologist, philosopher, musician, material science, and etc.

## 1 Introduction

Many research center and University have been prospecting robot as economic driving force and future technology. However, robot technology should be developed more than recent status. Of course, there so many kinds of technologies are needed for real robot in various areas. Emotion technology is one of them. Because emotion absolutely seems to be a complex phenomenon we cannot express easily. Also, reasonable and unified theory lacks. Happiness, surprise, enthusiasm, anger, fear, and disgust are some of the emotion. A neutral emotion is also can defined with which emotions can occur concurrently and cause one to yield to the other thereby changing the behavior of emoting. Really expressing and modeling emotion may be tricky. Especially, psychologically expression might be more difficult. A weighting, normalizing and scaling mechanism should be used to express an intensity of the emotion from sensors on a robot.

## 2 Physiologically Derived Emotions

Physical function is happy, sad, cry, fear, etc. We can measure by the input sensor for these functions to application. Emotion generated by the physical functions can drive the shape or mood of body or face. That is, technical measuring function can take signal from the several emotions by Happiness, Fear and Anger, etc and resolves them

to generate the internal resultant mood of the system for application such as, robot, intelligence control, and etc. The Multi-Hybrid Architecture for Emotion Express

The emotion architecture is composed of six systems (see Fig. 1). The input system (vision or signal) is responsible for identifying and tracking the goal. The action system is responsible for choosing higher level emotion (robot motions) to move the robot control system to a specified goal. In this system, these six systems must cooperate to achieve the overall task of reaching the goal control goal or position (robot). The systems are also competing—there are some trade-offs between them. For example, both the sad and the angry system compete for the action system. The sad system needs input for action, while the angry system needs sad level for target detection and tracking. For this cooperation and competition, each system generates bids for the information offered from the input and action system. The information actually executed by each system depends on the winning bid at each point in time.

The emotion itself is implemented as a multiagent system. This system is composed of six agents with the emotion functions.

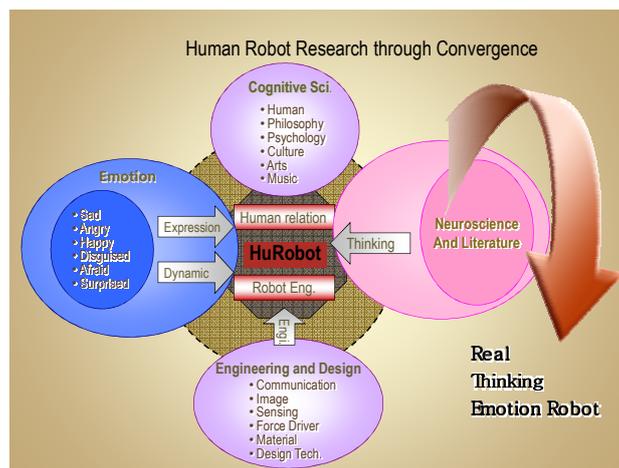


Fig. 1 Architecture of agent system for Human Robot.

### 3 Psychological Phenomenon Derived Emotion

Adrenalin is known to be generated within the body during conditions of anguish, fear and anger. That is, these emotions are fuzzy system processed by a fuzzy mood generation module to provide the current mood of the system. This fuzzy function takes the several functions from different agents and resolves them to generate the internal resultant mood of human being. In order to know that emotions are based on a psychological aspect of feeling and a physical or physiological aspect of bodily reaction, we have to introduce psychology related areas into research topic. Because emotion reactions are triggered by feelings and external reactions, culture and psychology are

also to be studied. Feeling that is, one of psychological components of emotion and the results can give an impact on the bodily reaction. Emotions are very complex function. For example anger is a complex emotion comprising of a feeling of irritability and a bodily reaction of rapid heartbeats, reddened face, etc. It is necessary to clearly research related topics for complex emotions. Recent studies in consciousness have tried to understand what feeling really is and it is essential to identify the emotions and also the associated feeling and reaction components.

## 4 Results and Discuss

An emotional function sound, smell, and touch can be sensed from its physical sensor. However, happy, fear, and anger can be obtained from physical functions because those individually be generated based on a set of sensors with more sophisticated signal conditioning. Therefore a concept of emotional based on psychology resource have to be introduced for human being emotional function. We have used a fuzzy module to realize this emotional dynamic which are generated by a multi-agent system. This paper suggests how we express and generate emotional function by both methods physical and psychological approach. Therefore, we have to make a strong human network for several topics.

For this, tests may be carried out with real robots to understand the way in which emotional robots behave in an environment. Of course, this will require knowledge of the hardware on the robot side and communication software running on the computing end that in turn also runs the agents.

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## References

1. Lin and J. Chen, Facial expressions classification with hierarchical radial basis function networks. Int. Conf. on Neural Information Processing (1994).
2. Y. Yoshitomi, S. Kim, T. Kawano and T. Kitazoe, Effect of sensor fusion for recognition of emotional states using voice, face image and thermal image of face, IEEE Int. Workshop on Robot and Human Interactive communication (2000).
3. Shivashankar B. Nair and Dong Hwa Kim, Towards a Dynamic Emotional Model", IEEE-ISIE2009, May, Seoul, Korea (2009).
4. Dong Hwa Kim and Nair, KOFST Brain pool Report 2008 (2009).
5. Dong Hwa Kim, Novel dynamic express for robot, IEEE SAMI2011, Slovakia (2011),
6. Dong Hwa Kim, Peter Baranyi, Emotion Dynamic Express By Fuzzy Function For Emotion Robot, CogInform2011, Budapest (2011)