

AFFECTIVE COMPUTING IN AUTOMOTIVE INDUSTRY

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Current state of the art in computer science is an attempt to build a system that understands us. Affective computing is one of the attempts made to build an information system that can detect, classify, and respond to human emotion. Affective computing is a combination of artificial intelligence and cognitive science that inspired researcher to build a computer system or robot that similar to "Commander Data" in Star Trek fiction movie. This article discusses the general architecture and applications of affective computing.

Computer history begins from 3000 B.C where the first computer, abacus was invented. Abacus was used as a calculating device. In 1800 first punch cards for storing data were invented by Joseph-Marie Jacquard. Punch cards were used by the first electronic computers in the 1940's and onward until the development of more reliable data storage.

In 1936, in 1936, John Dvorak introduce keyboard as an easy to use input device with the least used keys on the outside corners, and the most often used keys within easy reach of the user's fingers. This is followed by the computer mouse, invented by Douglas Englebart in 1963. In 1969, AT&T Bell Laboratories develop UNIX which used command prompt to operate computer. In 1981, Microsoft and IBM also develop operating system using command prompt, named MS-DOS. The new era of human computer interaction (HCI) was paved by Apple Computer, Inc., using Macintosh operating system using graphical user interface (GUI) and followed by Microsoft in 1995 with Window 95. Now with the increasing of the technology, HCI is moving from the GUI operating system to computer that can understand to the user emotion, called Affective Computing.

Rosalind Picard founder of Affective Computing defined it as "computing that relate to, arises from or deliberately influence of emotion". Affective computing is a new way to communicate between human and computer. The affective computing computer will be able to recognize human emotion and computer will responds to it. With the increasing capability of computer, now day computer can be able to recognize human emotion via various devices as camera, microphone or sensor.

The first technology talk about affective computing was discussed in the MIT's Media Laboratory Perceptual Computing Section Technical Report in 1995 by Rosalind Picard. From that day it sparks great interest to build such system that capable to understand how we feel. Affective computing converts personal emotion into bits (Picard, 1995). Before converting the emotion into bits or into the computer, individual affective state must be captured. feel. Affective computing converts personal emotion into bits (Picard, 1995).

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There is two ways to capture the individual emotion, either using contact-less devices or contact devices to the human body. For example, the contacts less devices are camera and microphone. As for the physical contact, sensors like galvanic skin respond sensors, pulse, electrocardiogram, blood volume pressure and respiration sensors are used to detect emotion state, all this devices are fully connected to human body. Such devices can gather continuous data without interrupting users.

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Computers cannot recognize human thought but computers can recognize human physiological characteristics such as our behavior, heart rate and even words selection when talking. Before a computer can recognize our emotion, there are several important steps are follow. The first step is to capture human affective state, primarily from facial expression, body temperature, body gesture or heart rate pulse. All this affective state will be going to feature extraction module, in this module this input will be filter to get only the important feature.

Consider emotion detection through facial expression system, the salient feature in of this system is the formation of lips and eyebrow. The detected features will be extracted using image processing. Once the emotional data is captured and put into context, it must be analyzed and interpreted using learning algorithm. Figure 5.0 below shows the general affective pattern recognition module.

Perhaps the most fundamental application of affective computing will be to inform next -generation human interfaces that are able to recognize, and respond to, the emotional states of their users. Users who are becoming frustrated or annoyed with using a product would "send out signals" to the computer, at which point the application might respond in a variety of ways -- ideally in ways that the user would see as "intuitive". Beyond this quantum leap in the ability of software applications to respond with greater sensitivity to the user, the advent of affective computing will immediately lend itself to a host of applications, a number of which are described.

Affective Learning: Learning process might begin with curiosity and fascination. Education has emphasized conveying a great deal of information and facts, and has not modeled the learning process. When teachers present material to the class, it is usually in a polished form that omits the natural steps of making mistakes (feeling confused), recovering from them (overcoming frustration), deconstructing what went wrong (not becoming dispirited),