not limited to such a case. Moreover, numerous other detailed changes may be made in the precise implementation of the architecture. For example, the weight update signal PR+ and PR- can be calculated in different fashions. In the above example, PR+ could be generated in the case where O_2=O_3=0.0, and PR- could be generated in a case where O_2=O_3=1.0.

[0042] Examples of different applications of the above-described architecture will now be described in order to aid understanding of the function and utility of the present invention.

Alarm Generation

[0043] Fig.4 illustrates the structure of a primary response network 41 adapted for use in an alarm device which implements self-biased conditioning so as to modify its alarm-generation function to take into account factors other than those indicated by its initial programming or design. This primary response network 41 will first be described in the context of a smoke alarm device and then there will be a discussion of experimental results obtained in a simulation based on a substantially similar architecture applied in the context of generation of "eagle alarm calls". In a third section, an SPA device using alarm signals will be described.

Smoke Detector

[0044] The primary response network 41 of Fig.4 comprises a single activation node X, a single expectation node Y and a single motor centre M. The activation node X receives an input signal from an ion detector S_A (of the type used in conventional smoke detectors). When the signal received from the ion detector exceeds a threshold level the activation node X is designed to output a signal triggering the motor centre M which, in turn, is designed to activate a device C generating an audible alarm signal. When the activation node X is triggered it, in its turn, activates the expectation node Y. The expectation node Y monitors audio signals detected by a microphone/audio signal processing device S_B. In this embodiment, the expectation node Y is adapted to output a signal indicating that the primary response of the primary response network is inappropriate if the signal received via the microphone/audio processing device S_B indicates that a person in the vicinity has spoken the words "false alarm". It will be appreciated that the activation of the motor centre M should be inhibited in such circumstances. This is achieved by operation of the associative memory which augments the value of the negative reinforcement signal applied to the negative reinforcement node y-.

[0045] Similarly, in a case where the activation node X has triggered, no-one has spoken the words "false alarm", but the motor centre M has not triggered the generation of the audible alarm, this also represents "abnormal" or "inappropriate" behaviour of the device. In such a case, activation of the motor centre M should be promoted. This is achieved by operation of the associative memory which augments the value of the positive reinforcement signal applied to the positive reinforcement node y+.

[0046] In this application, the associative memory functions as described above with respect to Fig.3, that is, the reinforcement signals, weight update signals and changes in values of weights are calculated as described with reference to equations (2) to (5) above. Moreover, the associative memory receives input signals from other sensors, such as a temperature sensor S_1, and a supplementary ion detector S_2 physically spaced apart from the detector S_A and, when it is determined, based on the values of the signals O_1, O_2 and O_3 output by the activation node X, expectation node Y and the motor centre M, that the existing response of the primary response network is inappropriate then the weights applied to the signals received from the temperature sensor S_1 and supplementary ion detector S_2 are updated so as to increase the values of the positive and negative reinforcement signals.

[0047] In this way, depending upon the circumstances which exist when the behaviour of the primary response network is determined to be "inappropriate", the smoke alarm device can become conditioned to output an audible alarm signal when its own detector detects a number of ions exceeding a threshold level AND, for example, the signal output by the temperature sensor S_1 indicates an over-threshold temperature and the signal output by the physically spaced apart ion detector S_2 indicates an over-threshold number of detected ions.

"Eagle Alarm Call" Generation

[0048] As mentioned above, a simulation was performed based on an architecture substantially similar to that described above with reference to Fig.4 but designed to generate "eagle alarm calls". In this experiment, the activation node X was fed input signals A whose value indicated detection or non-detection of a flying object and the expectation node Y was fed signals B indicative of the detection or non-detection of an audible "eagle alarm call" generated by another agent. The motor centre M was designed such that, when it was triggered, it output a signal to an actuator C for generation of an audible "eagle alarm call" signal. In this experiment, "abnormal" or "inappropriate" behaviour of the primary response network consists either of: