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(54) **A TOY SYSTEM AND A METHOD FOR USE OF SUCH TOY**

(57) The invention relates to a toy system comprising one or more separate toy elements adapted for placement on a substrate with mutual distance, each of the separate toy elements comprising an acoustic sound

emitter, the toy system further comprising a sound reception means as well as means capable of recognizing the individual sound emitted.

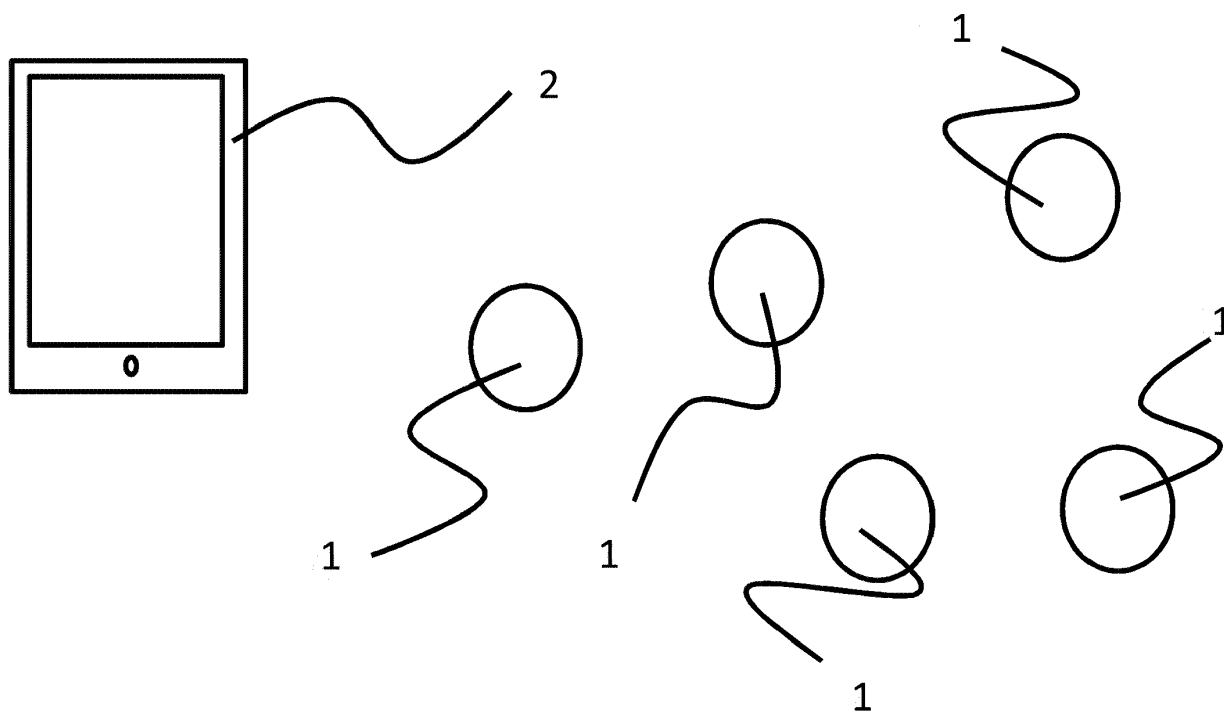


FIG. 1

Description

Field of the Invention

[0001] The present invention relates to a toy as well as a method for performing a play using a toy according to the invention.

Background of the Invention

[0002] The invention is related to the area of toys employing a sound emitter. Such toys are obviously well known in the art.

[0003] In neighboring fields of technology it is known to employ acoustic signals to control light switches etc. with a so-called 'clicker' emitting an intense broad-spectrum sound when pressed. The detector for these types of signals is typically a high-pass filter followed by a peak detector, with a threshold possibly set adaptively according to background noise level.

[0004] It is desirable to develop toys that may stimulate the use of the toy as well as stimulate the intellectual capability in coordinating the output from the toy.

Object of the Invention

[0005] The objective of the invention is to provide a simple and reliable system for interaction between a set of play devices and a control device.

Description of the Invention

[0006] According to the invention the objective is achieved with a toy system comprising one or more separate toy elements adapted for placement on a substrate with mutual distance, each of the separate toy elements comprising an acoustic sound emitter, the toy system further comprising a sound reception means as well as means capable of recognizing the individual sound emitted wherein said acoustic sound emitter and said sound reception means comprises a mechano-acoustical component for emitting an identifying acoustic signature in response to an event and said sound reception means being equipped with a microphone and means for analysing sound picked up by said microphone in order to distinguish said identifying acoustic signature from other sounds in the environment.

[0007] By providing an acoustic sound emitter being a mechano-acoustical component, a much more rigid construction is provided and at the same time the toy system is not limited by electronic means which could be limited due to the power needed to power electronic devices or the range of wireless means etc. By mechano-acoustical means or components shall be understood any sound emitter which without the use of the power source and electronics may emit a sound. Examples of such sound emitters are the object of a further embodiment of the invention. The analysing means in the sound reception

means is relatively simple in that a microphone is provided in order to register the ambient noise. As sound is emitted from the mechano-acoustical component this sound will also be detected by the microphone but will be different from the ambient sound and easy to detect by the reception means and as such an event may be registered in a fairly simple manner.

[0008] In an embodiment the sound emitter is adapted for emitting a sound characteristic for the element in connection with the sound emitter. For example the sound emitter may be shaped as a frog, and the sound emitting means designed to emit a "frog-like" sound/tone when being activated. Likewise for, for example other animal figures (squeal like a pig, "mjaau" like a cat, "muuh" like a cow etc.)

[0009] The identifying acoustic signature emitted by the mechano-acoustical means may in a further advantageous embodiment consist of several tones with nonharmonically related fundamental frequencies.

[0010] From music (scores or in general) a nonchord tone, nonharmonic tone, or embellishing tone is a note (i.e., a pitch) in a piece of music or song that is not part of the implied or expressed chord set out by the harmonic framework. Similarly, a chord tone is a note that is a part of the functional chord. Nonchord tones are most often discussed in the context of the common practice period of classical music, but they can be used in the analysis of other types of tonal music as well, such as Western popular music. Chord and nonchord tones are defined by their membership (or lack of membership) in a chord: "The pitches which make up a chord are called *chord-tones*: any other pitches are called *non-chord-tones*." They are also defined by the time at which they sound: "*nonharmonic tones* are pitches that sound along with a chord but are not chord pitches. For example, if an excerpt from a piece of music implies or uses a C major chord, then notes C, E and G are members of that chord, while any other note played at that time (e.g., notes such as F#) is a nonchord tone. Such tones are most obvious in homophonic music but occur at least as frequently in contrapuntal music.

[0011] Most nonharmonic tones are dissonant and create intervals of a second, fourth or seventh which are required to resolve to a chord tone in conventional ways. If the note fails to resolve until the next change of harmony, it may instead create a seventh chord or extended chord. While it is theoretically possible that for a three-note chord there are (in equal temperament) nine possible nonchord tones, nonchord tones are usually in the prevailing key. Augmented and diminished intervals are also considered dissonant, and all nonharmonic tones are measured from the bass or lowest note sounding in the chord except in the case of nonharmonic bass tones.

[0012] Nonchord tones are distinguished through how they are used. The most important distinction is whether they occur on a strong or weak beat and are thus accented or unaccented. They are also distinguished by their direction of approach and departure and the voice or voice-

es in which they occur, and the number of notes they contain.

[0013] Over the centuries of music history, tones which were considered to be nonchord tones came to be viewed as chord tones, such as the seventh in a seventh chord. In 1940s-era bebop jazz, tones which were previously considered to be nonchord tones, such as playing an F# note with a C⁷ chord, became to be viewed as chord tones (in this example, the F# would be analyzed as a sharp eleventh chord, or C⁷(#11)). In European classical music "The greater use of dissonance from period to period as a result of the dialectic of linear/vertical forces led to gradual normalization of ninth, eleventh, and thirteenth chords [in analysis and theory]; each additional nonchord tone above the foundational triad became frozen into the chordal mass.

[0014] In an embodiment the means for sound reception and recognition of individual sounds are a computer device capable of running a digital recognition algorithm and providing an output based on the recognition. For example the toy element comprising a mechano-acoustic sound emitter,

[0015] In a further embodiment the sound is characteristic for that element.

[0016] In an embodiment the acoustic sound emitter is adapted to emit a sound when the toy element is exposed to a pressure from a physical load. The physical load may for example be exerting a pressure by a user to the sound emitter, whereby the sound emitter is depressed expelling air through a whistle device, or the surface of the sound emitter may be provided with ridges or notches such that by passing a stick across the surface, the stick bumps against the ridges or notches, thereby generating a sound. Likewise the sound emitter may be a drum or similar device.

[0017] The objective of the invention is further achieved method for conveying and distinguishing the occurrence of an event at one of possibly several transmitting devices to one or more receiving devices by means of sound, emitting an identifying acoustic signature by the transmitting device in response to said event and analyzing sound picked up by said microphone in order to distinguish said identifying acoustic signature from other sounds in the environment.

[0018] The identifying acoustic signature may be characterized by consisting of several tones with non-harmonically related fundamental frequencies, as already discussed above.

[0019] The defined event may be a mechanical event, such as a user interacting with the device.

[0020] The sound emitting component may be actuated by an air stream, where said air stream may be derived from the compression and/or expansion of a bellow.

[0021] The sound emitting component may be based on the percussive excitation of a mechanical structure with multiple distinctive vibrational modes.

[0022] In an embodiment the amplitude characteristics of said tones have a predetermined evolution in time.

[0023] Further said different fundamental frequencies may be varying over time.

[0024] Still further said time varying fundamental frequencies may have a high degree of temporal covariance.

[0025] In an embodiment said sound emitting component being based on a one or more vibrating reeds.

[0026] Mechano-acoustical transmitters may be designed so that the detection method in the receiving device may easily discriminate between different transmitters. Further the immunity to background noise is dramatically increased. This is accomplished by using signals in which several non-harmonically related constituent tones have to occur at the same time, and further by making the fundamental frequencies as well as the relative amplitude of the tones co-vary. In telecommunications, the Dual-Tone-MultiFrequency (DTMF) principle has been used for many years as a robust method for encoding and transmitting numbers via the baseband signal. It has also been used for remote control of various devices.

[0027] In contrast to the DTMF method, the present invention does not rely on precise means for generating tones with well-defined frequencies, which usually requires electronically implemented oscillators or individually tuned mechanic or acoustical elements.

[0028] Instead the present invention relies on the covariance of the characteristics of several constituent non-harmonically related tones.

[0029] This type of signal does not occur often in normal background noise, which may contain human voices, random noise, musical sounds and the impact noise from structures being hit.

[0030] The invention will be described in more detail in the following detailed description of the invention, with reference to the drawing, where;

Description of the Drawing

[0031]

FIG. 1 schematically shows the elements of a system;

FIG. 2 schematically shows a stepping stone with a sound emitter integrated with the stepping stone; and FIG. 3 graphically shows received signals.

Detailed Description of the Invention

[0032] From FIG. 1 a toy system appears comprising a number of stepping stones 1 (mechano-acoustical devices) and a recording and analysing device 2. The stepping stones 1 each comprise a sound emitter and each of the emitters is individual and characteristic for the particular stepping stone. It may be foreseen that the system comprises two or more identical stepping stones and hence two or more similar sound emitters.

[0033] From FIG. 2 it appears schematically that the

individual stepping stone 1 comprises a sound emitter 3, adapted to emit a sound when a pressure is applied onto the stepping stone. The sound may be emitted as a consequence of a deformation of the stepping stone or as a consequence of the sound emitter itself being subject to an impact.

[0034] The sound emitter may be of several types. A combination of different types of sound emitters may also be an option, hereby providing the possibility of a greater variation of the sound emitted.

[0035] From FIG. 3 shows an example of a recoding where A indicates a frequency pattern that has been recognised and where B indicates a sound that does not fit the expected pattern. It is possible to recognise a certain pattern even in a noisy environment, e.g. in a kindergarten or school. In this manner, as the algorithm used to analyse the sounds is programmed to identify specific patterns (illustrated as A), the ambient noise (for example as illustrated by B) is not recognised as input.

Claims

1. A toy system comprising one or more separate toy elements adapted for placement on a substrate with mutual distance, each of the separate toy elements comprising an acoustic sound emitter, the toy system further comprising a sound reception means as well as means capable of recognizing the individual sound emitted wherein said acoustic sound emitter and said sound reception means comprises a mechano-acoustical component for emitting an identifying acoustic signature in response to an event and said sound reception means being equipped with a microphone and means for analyzing sound picked up by said microphone in order to distinguish said identifying acoustic signature from other sounds in the environment.
2. A toy system according to claim 1, wherein said identifying acoustic signature comprises several tones with non-harmonically related fundamental frequencies.
3. A toy element according to claim 1 or 2, where the acoustic sound emitter is adapted to emit a sound when the toy element is exposed to a pressure from a physical load.
4. A toy system according to any of the preceding claims, where the sound emitter is one or more of: an air driven sound emitter e.g. a squeaker, mechanical percussion sound emitter e.g. a bell or a drum.
5. A toy system according to any of the preceding claims, where two or more sound emitters are provided in each toy element, for providing two distinct sounds.
6. A toy system according to any of the preceding claims, where the means for sound reception and recognition of individual sounds is a computer device capable of running a digital recognition algorithm and providing an output based on the recognition of individual sounds.
7. A method for conveying and distinguishing the occurrence of an event at one of possibly several mechano-acoustic transmitting devices to one or more receiving devices by means of sound, **characterized by** emitting an identifying acoustic signature by the transmitting device in response to said event and analyzing sound picked up by a microphone in order to distinguish said identifying acoustic signature from other sounds in the environment.
8. A method according to claim 7, where said identifying acoustic signature being **characterized by** consisting of several tones with non-harmonically related fundamental frequencies.
9. A method according to claim 7, further **characterized by** said event being a mechanical event.
10. A method according to claim 7, further **characterized by** said sound emitting component being actuated by an air stream, e.g. by said air stream being derived from the compression and/or expansion of a bellow.
11. A method according to claim 7, further **characterized by** said sound emitting component being based on the percussive excitation of a mechanical structure, e.g. with multiple distinctive vibrational modes.
12. A method according to claim 7, further **characterized by** the amplitude characteristics of said tones having a predetermined evolution in time.
13. A method according to claim 7, further **characterized by** said different fundamental frequencies varying over time.
14. A method according to claim 7, further **characterized by** said time varying fundamental frequencies having a high degree of temporal covariance.
15. A method according to claim 7, further **characterized by** said sound emitting component being based on a one or more vibrating reeds.

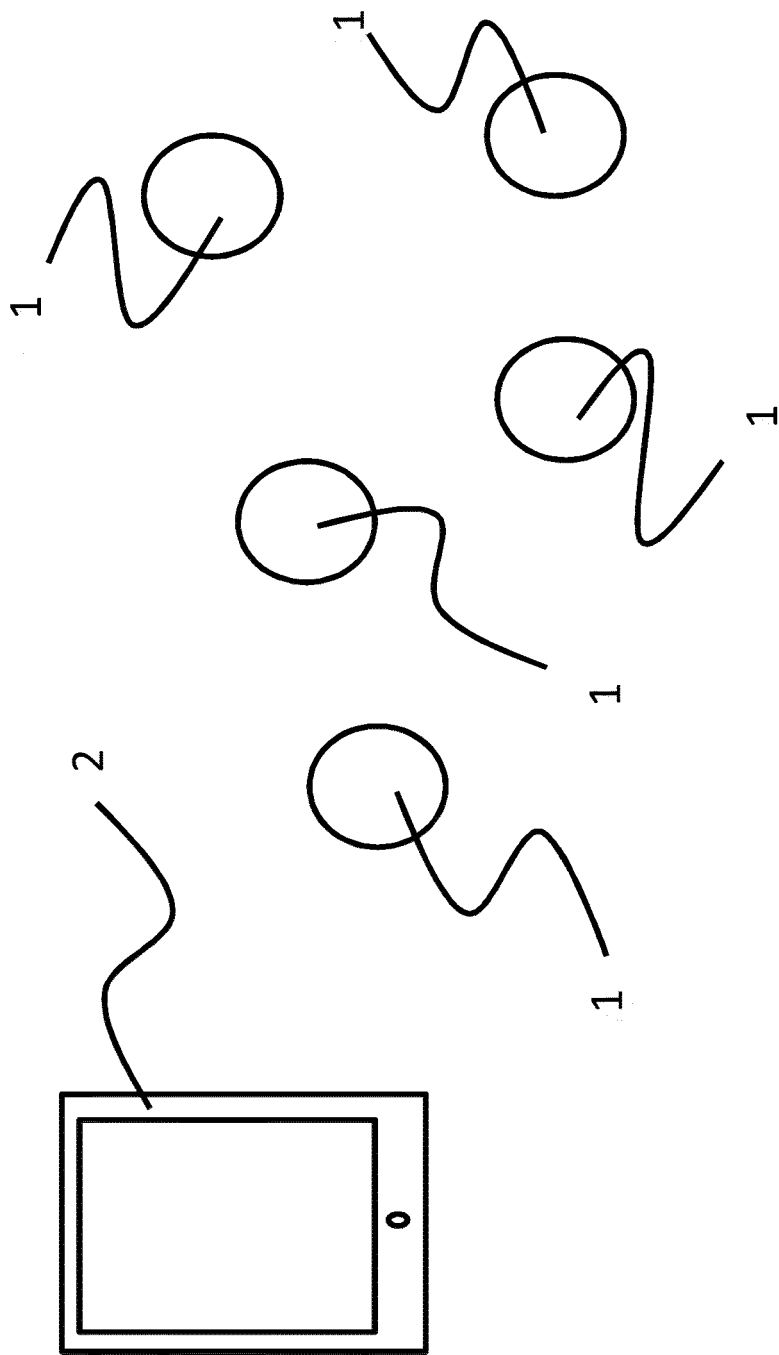


FIG. 1

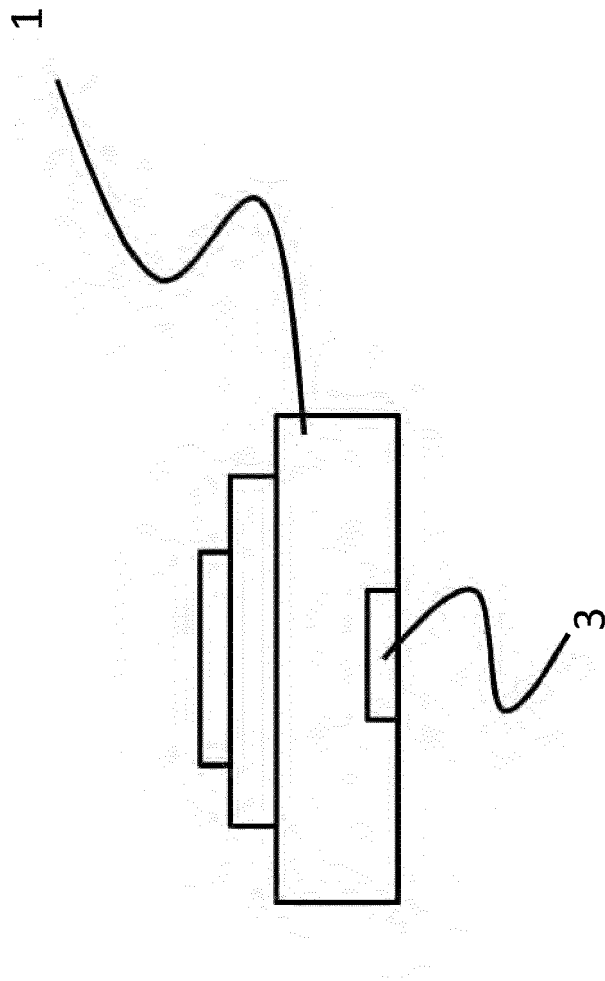


FIG. 2

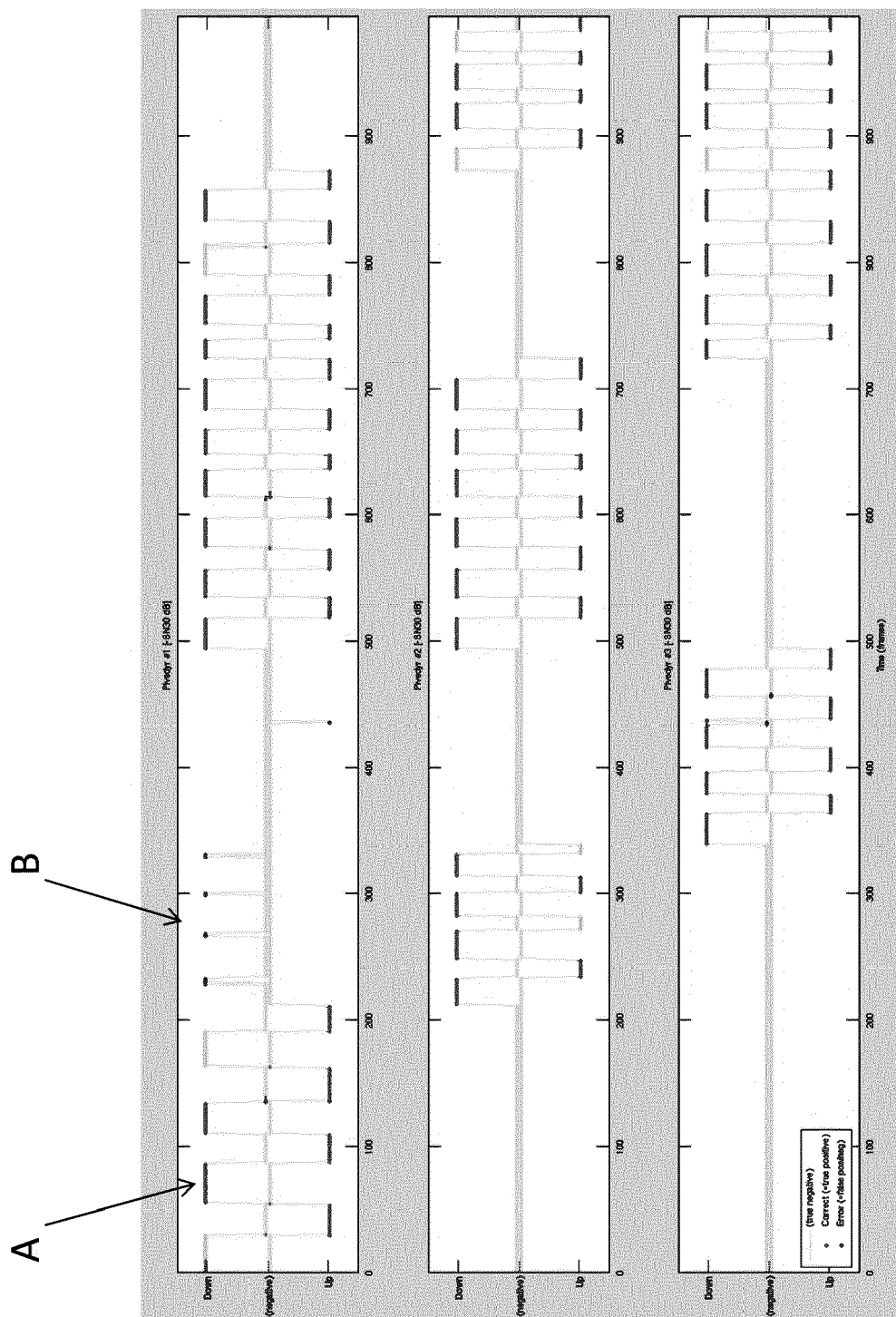


FIG. 3