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(54) **PERIPHERAL NEUROPATHY DETECTION**

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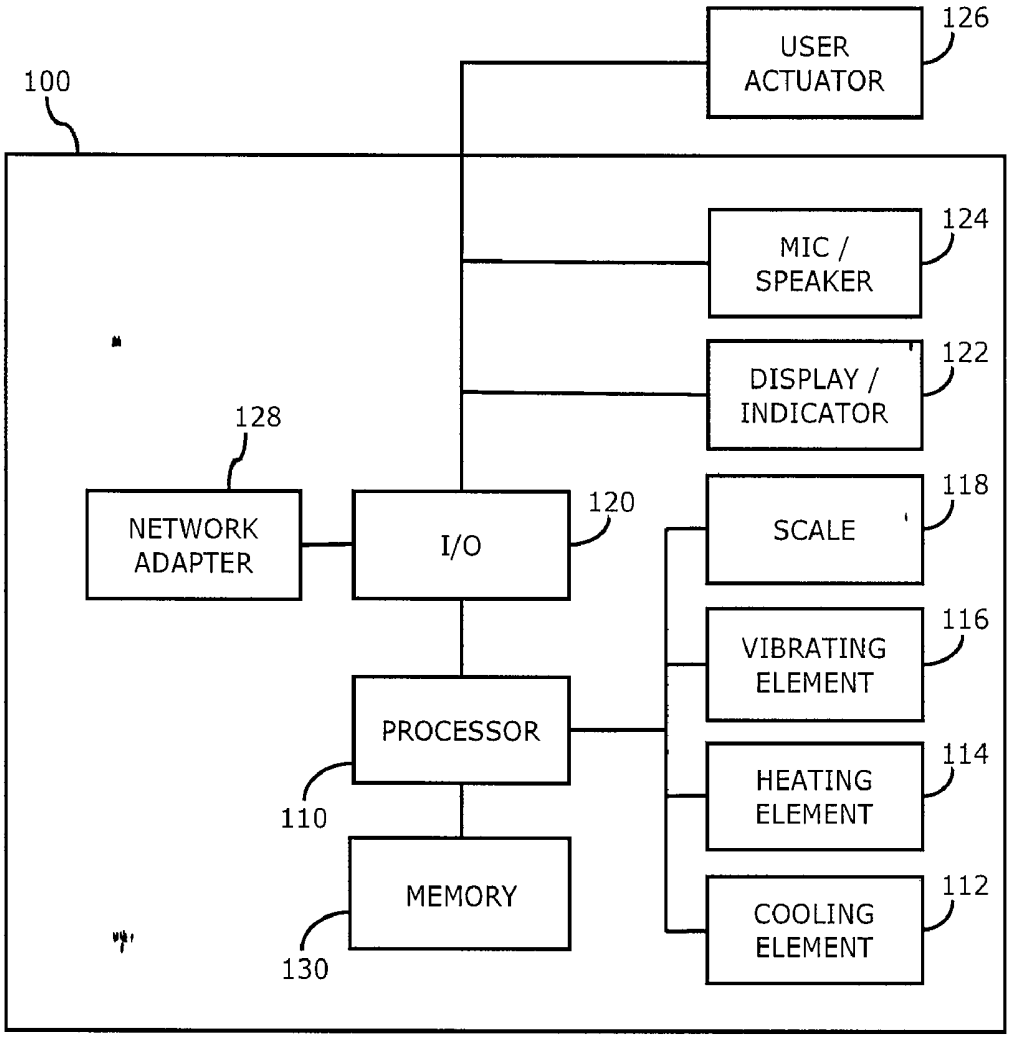
(57) **ABSTRACT**

Briefly, in accordance with one or more embodiments, a peripheral neuropathy monitor may be incorporated into a scale form factor or other device for monitoring a trend towards peripheral neuropathy by a monitored user or patient. The peripheral neuropathy monitor may include a heating element, a cooling element, and/or a vibrating element, and may be capable of performing the sensitivity of the user to hot, cold, and/or vibrations, and monitor such trends over time to facilitate detecting the onset of peripheral neuropathy. The peripheral neuropathy monitor may be capable of communicating with a remote device via a wired or wireless network for operating the monitor, and for storing and/or analyzing the test results.



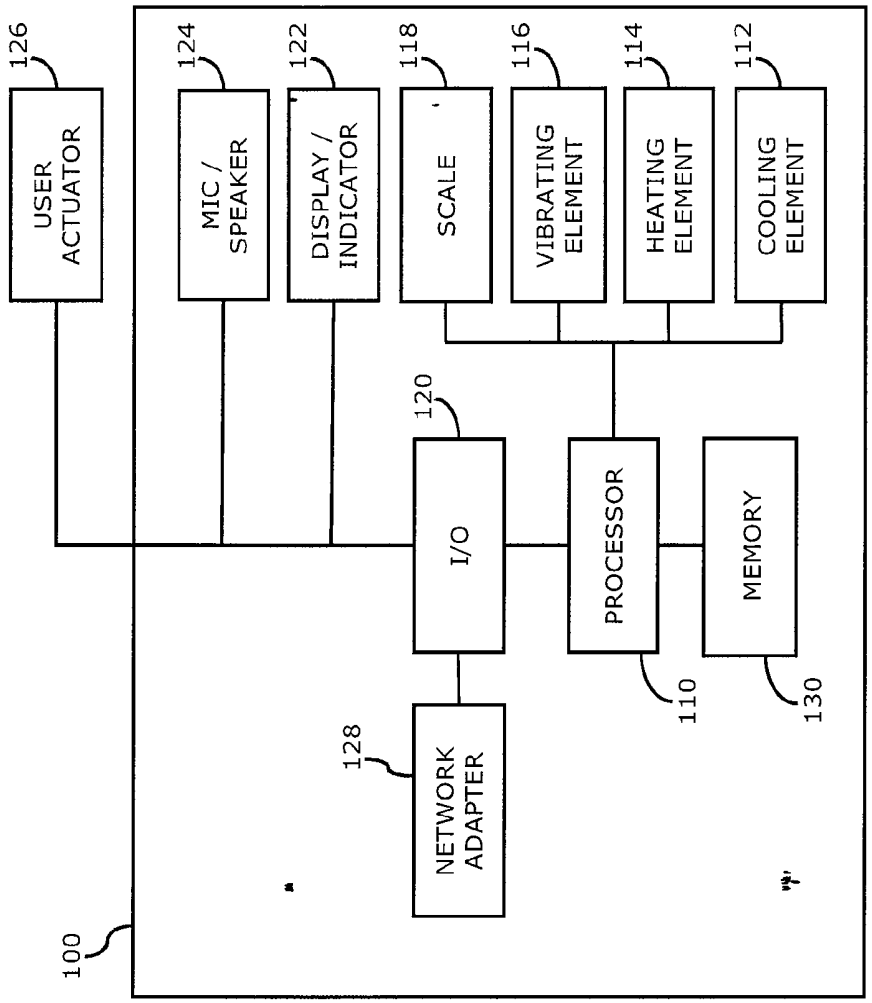

126
USER ACTUATOR
124
MIC / SPEAKER
122
DISPLAY / INDICATOR
118
SCALE
116
VIBRATING ELEMENT
114
HEATING ELEMENT
112
COOLING ELEMENT
120
I/O
PROCESSOR
MEMORY
110
130
128
NETWORK ADAPTER
100

FIG. 1

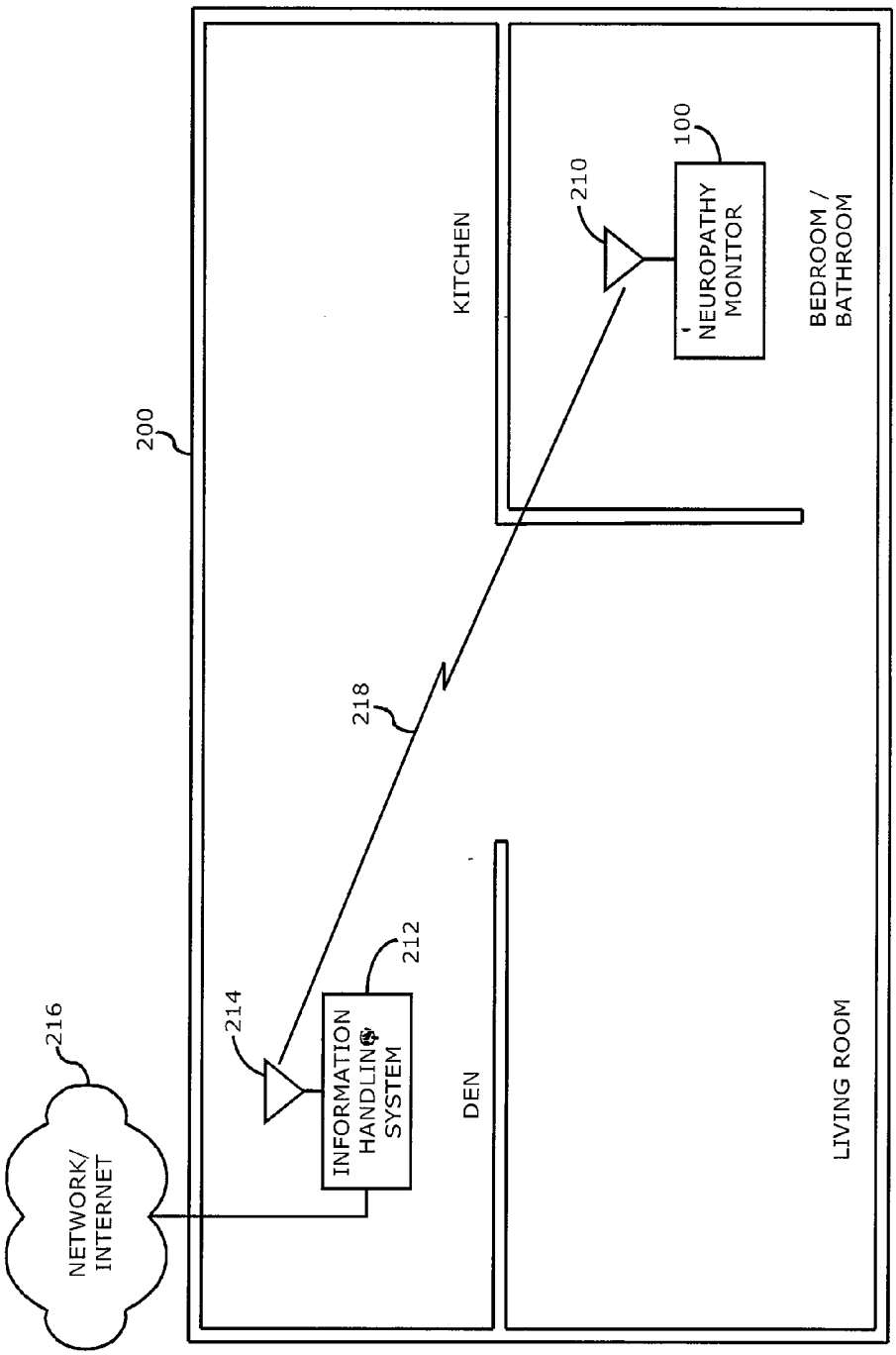

200
KITCHEN
BEDROOM / BATHROOM
DEN
LIVING ROOM
100
NEUROPATHY MONITOR
210
218
212
INFORMATION HANDLING SYSTEM
214
216
NETWORK/ INTERNET

FIG. 2

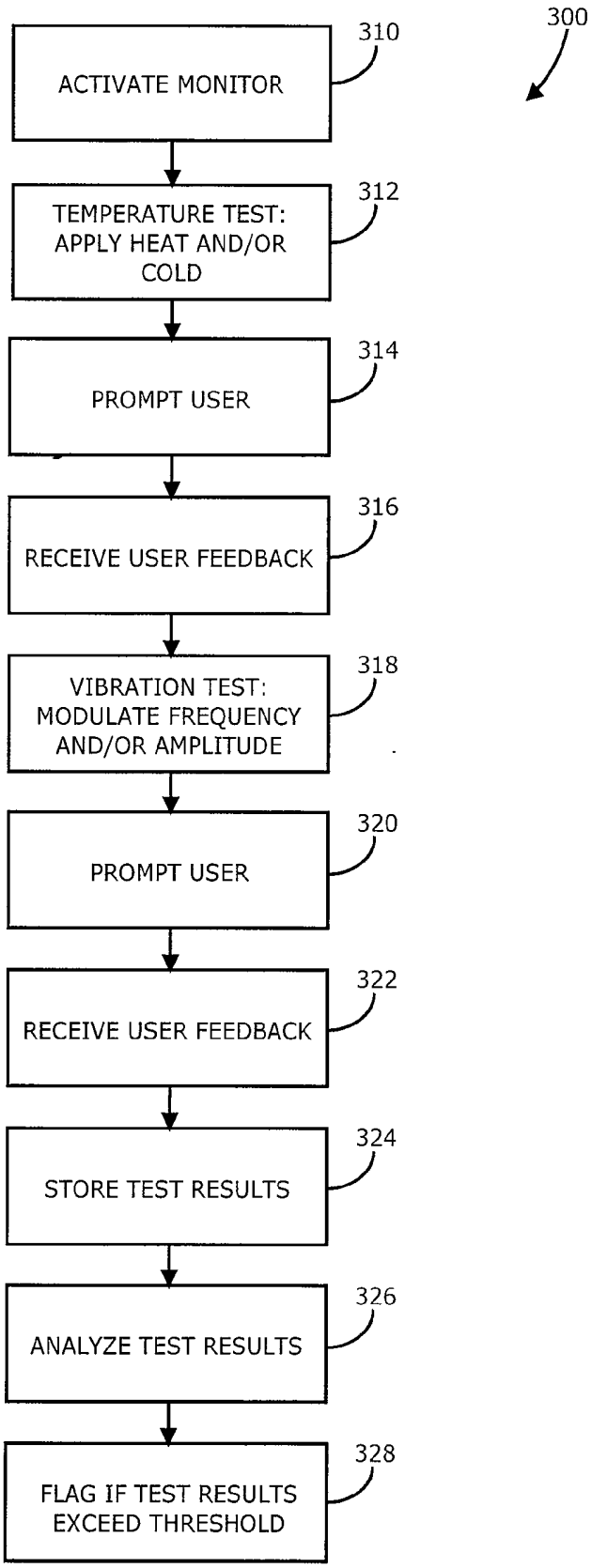

300
ACTIVATE MONITOR
310
TEMPERATURE TEST: APPLY HEAT AND/OR COLD
312
PROMPT USER
314
RECEIVE USER FEEDBACK
316
VIBRATION TEST: MODULATE FREQUENCY AND/OR AMPLITUDE
318
PROMPT USER
320
RECEIVE USER FEEDBACK
322
STORE TEST RESULTS
324
ANALYZE TEST RESULTS
326
FLAG IF TEST RESULTS EXCEED THRESHOLD
328

FIG. 3

PERIPHERAL NEUROPATHY DETECTION

BACKGROUND

[0001] Patients with certain diseases may suffer from peripheral neuropathy. Such diseases may include, for example, diabetes and autoimmune diseases such as rheumatoid arthritis and lupus. Certain vitamin deficiencies, some medications and alcoholism can also cause damage in peripheral nerves. In patients suffering from peripheral neuropathy, minor cuts and infections become hard for the patient to detect, and can progress to dangerous levels, leading to expensive treatments and even amputation of the limb in severe cases. Tests have been developed to determine the patient's level of sensation. Some tests involve measuring pain, temperature sensitivity, and vibration sensitivity. These types of tests are generally conducted by trained medical professionals, and require the patient to go to a medical office/clinic or have a home visit.

DESCRIPTION OF THE DRAWING FIGURES

[0002] Claimed subject matter is particularly pointed out and distinctly claimed in the concluding portion of the specification. However, such subject matter may be understood by reference to the following detailed description when read with the accompanying drawings in which:

[0003] FIG. **1** is a block diagram of a peripheral neuropathy monitor in accordance with one or more embodiments;

[0004] FIG. **2** is a diagram of a house or a similar building in which the peripheral neuropathy monitor of FIG. **1** may be deployed in accordance with one or more embodiments; and

[0005] FIG. **3** is a flow diagram of a method for monitoring peripheral neuropathy in accordance with one or more embodiments.

[0006] It will be appreciated that for simplicity and/or clarity of illustration, elements illustrated in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity. Further, if considered appropriate, reference numerals have been repeated among the figures to indicate corresponding and/or analogous elements.

DETAILED DESCRIPTION

[0007] In the following detailed description, numerous specific details are set forth to provide a thorough understanding of claimed subject matter. However, it will be understood by those skilled in the art that claimed subject matter may be practiced without these specific details. In other instances, well-known methods, procedures, components and/or circuits have not been described in detail.

[0008] In the following description and/or claims, the terms coupled and/or connected, along with their derivatives, may be used. In particular embodiments, connected may be used to indicate that two or more elements are in direct physical and/or electrical contact with each other. Coupled may mean that two or more elements are in direct physical and/or electrical contact. However, coupled may also mean that two or more elements may not be in direct contact with each other, but yet may still cooperate and/or interact with each other. For example, "coupled" may mean that two or more elements do not contact each other but are indirectly joined together via another element or intermediate elements. Finally, the terms "on," "overlying," and "over" may be used in the following description and claims. "On," "overlying," and "over" may be used to indicate that two or more elements are in direct physical contact with each other. However, "over" may also mean that two or more elements are not in direct contact with each other. For example, "over" may mean that one element is above another element but not contact each other and may have another element or elements in between the two elements. Furthermore, the term "and/or" may mean "and", it may mean "or", it may mean "exclusive-or", it may mean "one", it may mean "some, but not all", it may mean "neither", and/or it may mean "both", although the scope of claimed subject matter is not limited in this respect. In the following description and/or claims, the terms "comprise" and "include," along with their derivatives, may be used and are intended as synonyms for each other.

[0009] Referring now to FIG. **1**, a block diagram of a peripheral neuropathy monitor in accordance with one or more embodiments will be discussed. In one or more embodiments, neuropathy monitor **100** may be incorporated into a stand alone device or appliance having approximately the same form factor as a weight scale used for obtaining the weight of a user. In one or more embodiments, neuropathy monitor **100** may be combined with a weight scale in a combination type device. In one or more embodiments, neuropathy monitor **100** may have a weight scale form factor to allow a user or patient to stand on neuropathy monitor **100** and contact a surface of the housing of with one foot or both feet, typically while not wearing shoes or socks. Neuropathy monitor **100** may include a processor **110** coupled to a memory **130**, wherein the processor is capable of controlling one or more subsystems, including for example a cooling element **112**, heating element **114**, vibrating element **116**, and/or a weight scale **118**. Processor **110** may comprise a basic controller, or a general purpose processor having one or more cores. Heating element **114** may comprise a thermal electric heater or heat coil capable of producing heat in response to an electric current. Likewise, cooling element **112** may comprise a thermal electric cooling element, or Peltier cooler, that is capable of removing heat in response to an electric current. Processor **110** may further couple to an input/output (I/O) subsystem **120** for providing output and/or for receiving input for the control and operation of neuropathy monitor **100**. For example, neuropathy monitor **100** may include a display and/or indicator **122** for displaying data regarding the operation of neuropathy monitor **100**. Display **122** may comprise a digital display, for example to provide a digital weight reading obtained by scale **118**. I/O subsystem **120** may further couple to a microphone and/or speaker **124**, for example to receive audio control input from a user where neuropathy monitor **100** is capable of being voice controlled and/or receiving voice input. Likewise, neuropathy monitor **100** may include a speaker to provide audible instructions, information, and/or feedback to a user. Neuropathy monitor **100** may also include a user actuator **126**, which may comprise one or more buttons or keys disposed within the housing of neuropathy monitor, and/or may comprise a remote control device having one or more buttons or keys where the remote control device is capable of coupling with neuropathy monitor **100** via a wired or a wireless link such as a Bluetooth link, although the scope of the claimed subject matter is not limited in this respect. Optionally, user actuator **126** may also include a microphone and/or speaker **126**, although the scope of the claimed subject matter is not limited in this respect.

[0010] In one or more embodiments, neuropathy monitor **100** may include one or more subsystems utilized to monitor

a peripheral neuropathy condition of a user, and accompanying code or software executed by processor **110**. Heating element **114** and/or cooling element **112** may be utilized to apply heat and/or to cool the foot of the user. At least one thermocouple may be utilized to couple heating element **114** and/or cooling element **112** to the foot of a user to test the temperature sensation of the user to hot and cold temperatures. In one or more embodiments, the thermocouples can be applied to the foot by raising and lowering the thermocouples as needed during temperature testing of the user. The thermocouples may couple heating element **114** and/or cooling element **112** to a metal plate disposed in the housing of neuropathy monitor **100** wherein the user may touch the metal plate with at least part of the foot, toe, or other appendage. Likewise, vibrating element **116** may be utilized to generate vibrations in neuropathy monitor **100** that are capable of being modulated in frequency and/or amplitude. In one or more embodiments, neuropathy monitor **100** is capable of coupling the vibrations generated by vibrating element **116** to a human extremity of the user. For example as discussed, above, neuropathy monitor **100** may comprise a weight scale or similar form factor to couple vibrations from vibrating element to the user's foot or feet. Alternatively, neuropathy monitor **100** may comprise a separate box not having a scale, or may be built into a glove, wristband, boot, sock, and so on, to be capable of monitoring the neuropathy of a peripheral appendage or the like of the user, although the scope of the claimed subject matter is not limited in this respect.

[0011] In one or more embodiments, neuropathy monitor **100** may provide one or more methods or mechanisms for the user to indicate whether the user feels the heat or cold, and the magnitude of the heat or cold, and/or at which point the user can no longer feel one or more generated vibrations. For example, the user may actuate a button or key disposed on the housing of neuropathy monitor or alternatively disposed on user actuator **126** where user actuator **126** comprises a remote control or similar device. Likewise, user actuator **126** may comprise a pressure sensor disposed in or on the housing of neuropathy monitor to detect when the user removes one foot or both feet from housing, or steps off of scale **118**. Furthermore, the user may provide such input to neuropathy monitor **100** via a microphone disposed in microphone/speaker **124**, which may be disposed in or on the housing of neuropathy monitor, and/or disposed in or on an external user actuator. Such a microphone may be utilized to detect the voice of the user, for example by having the user speak what sense the user is detecting, such as something, "cold", "hot" "nothing", "now", and so on, although the scope of the claimed subject matter is not limited in this respect.

[0012] In one or more embodiments, neuropathy monitor **100** may have the ability to adapt the temperature, vibration frequencies, initial amplitude, and/or amplitude decay rate into a predetermined patter or test. For example, during the course of a week, a neuropathy test is run each day by neuropathy system **100**, neuropathy system **100** may output a different temperature, frequency and/or initial amplitude of vibration on each day. Such a test pattern may be random or alternatively set along a fixed pattern or set based at least in part on the time measured the previous day.

[0013] In one or more embodiments, neuropathy monitor **100** includes processor **110** to conduct one or more neuropathy tests and to control heating element **114**, cooling element **112**, and/or vibrating element **116**, and/or to receive and process data obtained from the user including one or more results of the tests. Alternatively, neuropathy monitor **100** may be controlled by a computer or information handling system disposed externally to neuropathy monitor **100** and which may be coupled to neuropathy monitor **100** via a wired or wireless connection, via I/O subsystem, for example via a Universal Serial Bus (USB) cable or Bluetooth connection, or coupled to the information handling system **100** via network adapter **128**, for example via an Ethernet connection, a wireless local area network (WLAN) compliant with an Institute of Electrical and Electronics Engineers (IEEE) 802.11a/b/g/n standard, or the like. Furthermore, neuropathy monitor **100** may be controlled by a remote information handling system **100** coupled to neuropathy monitor **100** via a network such as the internet via network adapter **128**, although the scope of the claimed subject matter is not limited in this respect. Such a remote network connection may comprise a mechanism by which data obtained by neuropathy monitor **100** may be transferred to a remote data base such as an Electronic Medical Record data base or other external database from which one or more selected neuropathy tests may be run and in which the results of one or more neuropathy tests may be stored and/or analyzed, although the scope of the claimed subject matter is not limited in this respect. An example of such a remote connection to neuropathy monitor **100** is shown in and described with respect to FIG. **2**, below.

[0014] Referring now to FIG. **2**, a diagram of a house or the similar building in which the neuropathy monitor of FIG. **1** may be deployed in accordance with one or more embodiments will be discussed. As shown in FIG. **2**, neuropathy monitor **100** may be deployed in the home **200** of a user, for example in a bedroom and/or in a bathroom. In one or more embodiments, neuropathy monitor **100** may include a network adapter **128** and appropriate antenna **210** that is capable of communicating wirelessly via wireless link **218** to a remote information handling system **212** likewise having an antenna **214**. Alternatively, neuropathy monitor **100** may couple to information handling system **212** via a wired link such as an Ethernet type connection or the like. As shown in FIG. **2**, neuropathy test data obtained by neuropathy monitor **100** may be transmitted to information handling system **212** for storage and/or analysis of the test data. In one particular embodiment, information handling system **212** may be capable of analyzing the test data obtained by neuropathy monitor **100** and flagging a test result that may indicate that the user may be suffering from peripheral neuropathy. Flagging may generally refer to the highlighting or otherwise indicating of a test score that may be indicative of peripheral neuropathy for example so that a medical professional may follow up and review the test result. Such a flag may be stored at least temporarily in information handling system **212** that may be later retrieved by a medical professional who periodically visits home **212**. Alternatively, information handling system **212** may provide a print out of the test results, including a flag of one or more tests if so indicated, so that the user may take the print out to a medical professional for review and diagnosis. In one particular embodiment, information handling system **212** is capable of running a diagnosis program, for example using artificial intelligence or the like, to infer and/or diagnose a condition of the user based at least in part on one or more test results. Furthermore, information handling system **212** is capable of coupling to a remote device or system via network **216**, which may comprise the internet, to where the remote device or system, or a medical professional operating the remote device or system, may be capable of

analyzing the test results and/or diagnosing a condition of the user based at least in part on the test results obtained by neuropathy monitor **100**.

[0015] Likewise, neuropathy monitor **100** may have its own capabilities similar to those of information handling system **212**. For example, neuropathy monitor **100** may be adapted to controlling the elements and performing one or more tests, however more advanced processing may be performed by information handling system **100**. In another embodiment, neuropathy monitor **100** may include more advance processing and adaptive learning based at least in part on one or more test results from previously run tests. In such an embodiment, such tests may be fixed, that is selected from a group of predetermined tests stored in neuropathy monitor **100**, or alternatively the tests may be adaptive in that a test that is run one day may be based on one or more tests that were run on one or more previous days or times. For example, if a previous test indicates that the user may be trending toward peripheral neuropathy, the next test run by neuropathy monitor **100** may be a more thorough test to obtain greater precision in the test results. In yet another embodiment, processor **110** may be capable of executing more advanced code or software that is capable of inferring and/or diagnosing a peripheral neuropathy status of the user based on an analysis of one or more test results obtained by neuropathy monitor **100**. However, these are merely examples of how neuropathy monitor **100**, information handling system **212**, and/or a remote device coupled to neuropathy monitor **100** and/or information handling system **212**, or a medical professional using such equipment, may be able to operate neuropathy monitor **100**, conduct one or more neuropathy tests, and/or to analyze or diagnose a condition of the user based on one or more test results, and the scope of the claimed subject matter is not limited in this respect.

[0016] In one or more embodiments, neuropathy monitor **100** may be capable of conducting one or more peripheral neuropathy tests to monitor and/or identify progression of the user towards peripheral neuropathy over time. For example, a person suffering from peripheral neuropathy may gradually lose the ability to sense heat and/or cold in his or her extremities. Likewise, a user suffering from peripheral neuropathy may also gradually lose the ability to sense vibrations. Typically, a user may lose temperature sensation before losing vibration sensation. Neuropathy monitor **100** may apply a predetermined temperature to the metal plate of the housing that is touched by the user. The user may then be prompted by neuropathy monitor for a response indicating how hot or how cold the user perceives the output to be. For example, the user may be asked via microphone/speaker **124** the level of heat or cold sensed by the user on a scale of 1 to 10. Such a query may comprise voice synthesized speech or prerecorded speech. The user may provide feedback to neuropathy monitor **100** by entering the number between 1 and 10 via user actuator **126**. Alternatively, the user may speak the number and the user's voice data may be obtained by microphone **124**, and optionally processed to determine the spoken number or stored as an audio file. In another embodiment, the user may actuate a button on user actuator **126** in response to the user detecting the output of neuropathy monitor **100**. The tests may alternate from day to day, with cold being tested on one day and heat being tested on another day so that user bias may be eliminated from the test results. Likewise, the level of heat and/or cooling may be varied from day to day to determine a level of temperature sensitivity of the user. Randomness in the testing may also be provided to help ensure the accuracy of the test results.

[0017] In one or more embodiments, neuropathy monitor **100** may be capable of conducting one or more vibration sensitivity tests to measure changes in sensation by the user to vibrations. As with temperature testing described above, neuropathy monitor **100** may generate a vibration having a selected amplitude and/or frequency via vibrating element **116**. The frequency of the vibrations may run from as low as about 60 Hertz to about 300 or 400 Hertz in one or more embodiments. In general, the frequency may range from the tens of Hertz to the hundreds of Hertz. Neuropathy monitor **100** may test a different frequency from test to test or day to day, or the frequency may be gradually increased from a lower frequency to a higher frequency during the test, or from a higher frequency to a lower frequency. The user may actuate user actuator **126** when the user can detect vibration at the tested frequency. Likewise, the amplitude of the vibrations may be increased from a lower amplitude to a higher amplitude, or from a higher amplitude to a lower amplitude. The user may then actuate user actuator **126** in response to detecting a threshold amplitude and/or frequency. In one or more embodiments, the tests performed by neuropathy monitor **100** may be basic tests capable of testing temperature and/or vibration sensitivity of the user in order to detect progression of the user towards peripheral neuropathy. Such tests may be utilized to indicate a trend towards peripheral neuropathy, without necessarily providing detailed testing or analysis. In one or more embodiments, neuropathy monitor **100** may be capable of performing more detailed and more advanced tests, for example in response to a detected trend towards peripheral neuropathy and/or in response to an order from a physician or other medical professional. However, these are merely example tests capable of being performed by neuropathy monitor **100**, and the scope of the claimed subject matter is not limited in this respect.

[0018] FIG. **3** is a flow diagram of a method for monitoring peripheral neuropathy in accordance with one or more embodiments. Method **300** may be executed by neuropathy monitor **100**, for example via code or software executed by processor **110** and/or by information handling system **212**, and may include more blocks or fewer blocks than shown, and/or the other orders of the blocks of method **300** may be implemented, and the scope of the claimed subject matter is not limited in this respect. Neuropathy monitor **100** may be activated at block **310**, for example in response to the user stepping on the top surface of neuropathy monitor **100** where the form factor is a weight scale or the like. For example, if neuropathy monitor **100** detects a weight greater than a predetermined threshold, such as at or near the weight of the user, or if the detected weight is a non-zero weight, as detected by scale **118**, neuropathy monitor **100** may be activated and one or more neuropathy tests may be initiated. In some embodiments, neuropathy monitor **100** may be designed to be operated by the user while the user is sitting, in which case a threshold weight to activate neuropathy monitor may be a percentage of the known or expected weight of the user, for example at approximately a weight of 15% of the user's weight. A temperature test may be executed at block **312**, for example to test the sensitivity of the user to cold and/or heat, by actuating heating element **114** and/or cooling element **112**. The user may then be prompted at block **314** for a response to the test, for example if the user can detect the hot or cold

output, and/or a level of hot or cold detected by the user. Neuropathy monitor **100** may receive the user's feedback at block **316**, for example via user actuator **126** and/or the microphone of microphone/speaker **124**. Likewise, neuropathy monitor **100** may perform one or more vibration tests at block **318** at which a vibration may be provided by vibrating element **116**, where the frequency and/or amplitude of the vibration may be modulated according to the particular test being performed. The user may be prompted at block **320** for the user's response to the vibration test, and the user's feedback may be received at block **322**, for example via user actuator **126** and/or the microphone of microphone/speaker **124**. After performing one or more tests, neuropathy monitor **100** may store one or more test results in a memory or hard drive of neuropathy monitor **100**, or alternatively in a memory or hard drive of information handling system **212** or of a remote device or system coupled to network **216**. The test results may be analyzed at block **326**, for example to determine any trend or pattern indicating that the user may be suffering from peripheral neuropathy. If it is determined that the user may be trending towards or suffering from peripheral neuropathy based at least on one or more tests, such a result may be flagged at block **328** of the test results exceed a threshold of a normal range of sensitivity. For example, display/indicator **122** of neuropathy monitor **100** may display a visual flag to the user so that the user is aware of the flag. Alternatively, the flag may be transmitted to information handling system **212** for storage in information handling system **212** and/or indicated in a report stored in information handling system **212**. In another alternative, the flag may be transmitted to a remote device or system coupled to network **216** for entry into a medical record of the user and/of for review by a medical professional monitoring the user by operating the remote device or system.

[0019] Although the claimed subject matter has been described with a certain degree of particularity, it should be recognized that elements thereof may be altered by persons skilled in the art without departing from the spirit and/or scope of claimed subject matter. It is believed that the subject matter pertaining to peripheral neuropathy detection and/or many of its attendant utilities will be understood by the forgoing description, and it will be apparent that various changes may be made in the form, construction and/or arrangement of the components thereof without departing from the scope and/or spirit of the claimed subject matter or without sacrificing all of its material advantages, the form herein before described being merely an explanatory embodiment thereof, and/or further without providing substantial change thereto. It is the intention of the claims to encompass and/or include such changes.

1. An apparatus, comprising:

a housing;

a vibrating element capable of producing a vibration at a selected frequency and amplitude;

a temperature element disposed in the housing and being capable of producing thermal output at a selected temperature;

a processor to control the vibrating element and the temperature element, individually or in combination, to run one or more peripheral neuropathy tests on a user;

a user actuator to provide user feedback to the processor in response to the one or more neuropathy tests; and

a memory coupled to the processor to store results of the one or more neuropathy tests and the user feedback received via the user actuator;

wherein the processor is capable of adapting one or more subsequent neuropathy tests based at least in part on the results of one or more previous neuropathy tests and the user feedback stored in the memory to identify progression of the user towards peripheral neuropathy over time.

2. An apparatus as claimed in claim **1**, further comprising a scale element, being disposed in the housing having a weight scale form factor wherein the user stands on the housing during operation and wherein said processor is capable of executing the one or more peripheral neuropathy tests in response to a non-zero weight being detected by said scale element.

3. (canceled)

4. An apparatus as claimed in claim **1**, said temperature element comprising a heating element or a cooling element, or combinations thereof.

5. An apparatus as claimed in claim **1**, further comprising a wireless network adapter coupled to the processor, said wireless network adapter being capable of communicating with a remote device, wherein the remote device is capable of storing test results of the one or more neuropathy tests, or controlling the one or more neuropathy tests, or combinations thereof.

6. (canceled)

7. An apparatus as claimed in claim **1**, further comprising a speaker and said user actuator comprising a microphone, said microphone to provide user feedback to the processor in response to the one or more neuropathy tests and the microphone to provide audio information to the user.

8. A method, comprising:

activating a peripheral neuropathy monitor in response to detecting an activation event by a user;

performing one or more peripheral neuropathy tests in response to said activating, the one or more peripheral neuropathy tests comprising a heat test, a cold test, a vibration test, or combinations thereof;

prompting the user for a response to the one or more tests; and

storing the response to the one or more tests as a test result;

adapting one or more subsequently performed neuropathy tests based at least in part on one or more previous neuropathy test results to identify progression of the user towards peripheral neuropathy over time.

9. A method as claimed in claim **8**, further comprising analyzing the test result to determine if the user is trending toward peripheral neuropathy, and if so highlighting the test result for follow up.

10. A method as claimed in claim **8**, further comprising transmitting the test result to a remote device for storage or analysis, or combinations thereof.

11. A method as claimed in claim **8**, said performing comprising randomly performing the heat test, the cold test, or the vibration test.

12. A method as claimed in claim **8**, said performing comprising performing a current test based at least in part on the results from one or more previous tests.

13. A method as claimed in claim **8**, said activating being based at least in part on detecting a weight of a user, or a partial weight of a user, upon a surface of a device housing.

14. A method as claimed in claim **8**, said performing comprising applying heat or cold to an extremity of the user at a selected temperature, and said prompting comprising requesting the user to rate the level of heat or cold on a numerical scale.

15. A method as claimed in claim **8**, said performing comprising applying a vibration to an extremity of the user at selected frequency and amplitude, and gradually increasing the amplitude or frequency of the vibration or combinations thereof until the user is able to detect the vibration, or gradually decreasing the amplitude or frequency of the vibration or combinations thereof until the user is no longer able to detect the vibration.

* * * * *

专利名称(译)	周围神经病变检测		
公开(公告)号	US20090082694A1	公开(公告)日	2009-03-26
申请号	US11/860846	申请日	2007-09-25
[标]申请(专利权)人(译)	英特尔公司		
申请(专利权)人(译)	英特尔公司		
当前申请(专利权)人(译)	CARE的创新，LLC		
[标]发明人	POISNER DAVID		
发明人	POISNER, DAVID		
IPC分类号	A61B5/00		
CPC分类号	A61B5/0051 A61B5/441 A61B5/483 A61B5/4827 A61B5/4824		
其他公开文献	US7854703		
外部链接	USPTO		

摘要(译)

简而言之，根据一个或多个实施例，可以将周围神经病监测器结合到比例形状因子或其他装置中，用于监测被监测的用户或患者对周围神经病变的趋势。周围神经病监测器可以包括加热元件，冷却元件和/或振动元件，并且能够执行用户对热，冷和/或振动的敏感性，并且随着时间的推移监测这种趋势以便于检测周围神经病变的发作。周边神经病监测器可以能够经由有线或无线网络与远程设备通信以操作监视器，以及用于存储和/或分析测试结果。