Invention Title: **Smart Swinging Bed for Young Adults and Elderly with Sleeping Disorders**

DESCRIPTION:

Field of Invention:

The present invention discloses features of the Smart Swinging Bed for Young Adults and Elderly with Sleeping Disorders.

Background:

Sleep problems constitute a global epidemic that threatens health and quality of life for up to 45% of the world's population. It is also estimated that up to 70% of older adults have chronic sleep problems, and up to 50% of their cases are undiagnosed. Sleep affects almost every type of tissue and system in the body – from the brain, heart, and lungs to metabolism, immune function, mood, and disease resistance. Research shows that a chronic lack of sleep or getting poor quality sleep increases the risk of disorders including high blood pressure, cardiovascular disease, diabetes, depression, and obesity.

Most experts agree that sleep aids should not be used long-term. Sleeping pills are best used for short-term stressors, jet lag, or similar sleep problems. Those who use sleeping pills over a long period of time are likely to experience intensified side effects. As they continue taking these pills over time, the substance builds up in their body and produces unwanted side effects. These effects may include high blood pressure, irregular heartbeat, and depression.

Summary of Invention:

To overcome the above issues, the present invention discloses a solution by introducing Smart Swinging Bed for Young Adults and Elderly with Sleeping Disorders

a) to divert the mind of the users from various thoughts such as worrying about work, school, personal life, financial problems, health, medication issues, etcetera during their bedtime.

b) to calm down and relax the body to fall asleep soon.

c) to bring back the exact biological mechanism we used to have during our early childhood time in a cradle to fall asleep soon.

d) to closely interact with the sleeping monitor(s) worn by the users during their bedtime and forecast their sleep disturbance well in advance and start swinging the bed automatically to aid continuous sleeping without interruption.

e) to help circulate blood and balance body fluid from lower limbs while swinging back and forth.

f) to provide a luxurious lifestyle.

The present invention is comprised of a standard bed assembly fitted with rolling wheels at its base to swing the bed longitudinally or transversely with the help of servo control motor(s) and gear mechanism. The bed swinging angle, speed, and direction can be precisely selected and controlled by the user based on their comfort choice. The present invention will also be able to interact with sleep monitoring devices, sensors, and controls. The bed swing operation can be achieved through a manual mode or automatic mode. The present invention will also have a salient future of closely interacting with the sleeping monitor(s) worn by the users during their bedtime and forecast their sleep disturbance well in advance and start swinging the bed automatically to aid continuous sleeping without interruption.

A dedicated mechanism or servo control motor will be used to lock the bed horizontally during its non-operational time to achieve the equilibrium as the swing bed assembly is simply resting on the Curved Railing cum Bed Support Structure and may tend to slant one side due to the center of gravity of the user.

Various Preset swinging choices such as Slow Speed, Fast Speed, min/max angles, Fastback, and Slow forth, and vice versa, can be made available in the remote controller for users to choose from based on their mood. In addition to that, the bed can also be set to stay at inclined positions like elevated at the Head side or Leg side to provide more options for users.

Sensors such as Proximity Sensors and Human Detection Sensors will be utilized to collect data from the surroundings of the bed assembly and processed by Central Processing Unit to perform automatic operation. The Remote Controller will also be used to set the choice of automatic operation or manual operation. Additional features such as CCTV, Red and Green Warning lights, and Audio Speaker System will also be added to enhance the operation of the Smart Swinging bed based on the user's requirement.

Explanation of symbols

DESCRIPTION OF SYMBOLS: 100 - Bed Assembly, 101 – Roller Wheels, 102 - Servo Motor with a Drive Gear, 103 - Power Transmission Shaft with Driven Gear, 104 - Pinion Gears at both ends of power transmission shaft (103), 105 – Bracings to rigidly mount the power transmission shaft with the body of the bed, 106 - On/Off Switch, 107 - Emergency Stop Button, 108 - Rechargeable Battery for Emergency Operation during Power Outage, 201 – Curved Railing cum Bed Support Structure, 202 – Circular Rack Gear, 203 – Stopper, 204 – Floor Mounting Base plate with Counter Sunk Setscrews, 301 – Sleep Monitor, 302 – Central Processing Unit. 303 – Proximity / Human Detection Sensor. 304 – Remote Controller

Brief Description of the Drawings

The disclosure is herein described, only through examples, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars

shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present disclosure only and are presented to provide what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the disclosure. In this regard, no attempt is made to show structural details of the disclosure in more detail than is necessary for a fundamental understanding of the disclosure, the description taken with the drawings making apparent to those skilled in the art how the several forms of the disclosure may be embodied in practice. In the drawings:

Figure-1 – Simulated View of the Swinging Bed during its Transverse Motion

Figure-2 – End View of the Bed for the option of Transverse Motion

Figure-3 – Side View of the Bed for the option of Transverse Motion

Figure-4 – Simulated View of the Swinging Bed during its Longitudinal Motion

Figure-5 – Side View of the Bed for the option of Longitudinal Motion

Figure-6 – End View of the Bed for the option of Longitudinal Motion

Figure-7 – System Diagram of the Smart Swinging Bed for Young Adults and Elderly with Sleeping Disorders.

Detail Description of Preferred Embodiments

The following description provides the modus operandi of a Smart Swinging Bed for Young Adults and Elderly with Sleeping Disorders.

Figure-1 – Simulated View of the Swinging Bed during its Transverse Motion - shows a simulated view of the Bed & Curved Railing Bed Support Structure assembly [100, 201] complete with mattress and the user laying on the bed during its transverse swinging motion.

Figure-2 – End View of the Bed for the option of Transverse Motion - shows the Smart Swinging Bed assembly at its initial position. This is to understand the compactness and volume of the assembly during its idle mode. The Curved Railing cum Bed Support Structure [201] complete with curved Rack Gear assembly [202] is mounted on the floor to hold the bed assembly at both ends. Stoppers [203] are installed at both ends of the Curved Railing cum Bed Support to stop the swinging of the bed out of its range. Roller Wheels [101] are mounted at the base of the Bed [100] and they will be designed with a guide and hold-down mechanism to avoid lifting off and derailing of the bed during its swinging motion. 303 – Proximity and Human Detection Sensors are included in the design to detect the surroundings prior to starting of swinging function.

Figure-3 – Side View of the Bed for the option of Transverse Motion - shows all the major components such as 100 - Bed Assembly, 101 – Roller wheels, 102 - Servo Motor with a Drive

Gear, 103 - Power Transmission Shaft with Driven Gear, 104 - Pinion Gears at both ends of the power transmission shaft [103], 105 – Bracing assembly to rigidly mount the power transmission shaft with the body of the bed, 106 - On/Off Switch, 107 - Emergency Stop Button, 108 - Rechargeable Battery for Emergency Operation during Power Outage, 201 – Curved Railing cum Bed Support Structure, 202 – Circular Rack Gear, 203 – Stopper to limit the bed swing, 204 – Floor Mounting Base plate with Counter Sunk Setscrews, 301 – Sleep Monitor, 302 – Central Processing Unit. 303 – Proximity / Human Detection Sensor. 304 – Remote Controller. Servo Control Moter [102] complete with Central Processing Unit [303] is installed underneath the bed.

Figure-4 – Simulated View of the Swinging Bed during its Longitudinal Motion - shows a simulated view of the Bed [100] and Curved Railing cum Bed Support Structure [201] complete with mattress and the user laying on the bed during its Longitudinal Motion.

Figure-5 – Side View of the Bed for the option of Longitudinal Motion - shows the Smart Swinging Bed assembly at its initial position. It also shows all the major components such as 100 - Bed Assembly, 101 – Roller Wheels, 102 - Servo Control Motor with a Drive Gear, 103 - Power Transmission Shaft with Driven Gear, 104 - Pinion Gears at both ends of the power transmission shaft, 105 – Bracing assembly to rigidly mount the power transmission shaft with the body of the bed frame, 106 - On/Off Switch, 107 - Emergency Stop Button, 108 - Rechargeable Battery for Emergency Operation during Power Outage, 201 – Curved Railing cum Bed Support Structure, 202 – Circular Rack Gear, 203 – Stopper to limit the bed swing, 204 – Floor Mounting Base plate with Counter Sunk Setscrews, 301 – Sleep Monitor, 302 – Central Processing Unit. 303 – Proximity and Human Detection Sensors, 304 – Remote Controller.

Figure-6 – End View of the Bed for the option of Longitudinal Motion - This is to understand the compactness and volume of the assembly during its idle mode. Both the Curved Railing cum Bed Support Structure [201] complete with Curved Rack Gear assembly [202] are located at the left and right-hand side of the beds. Stoppers [203] are installed at both ends of the Railing Bed Stand to limit the maximum swing. Roller Wheels [101] are mounted at the base of the Bed [100] and they will be designed with a guide and hold-down mechanism to avoid lifting off and derailing of the bed during its swinging motion. Servo Control Moter [102] complete with Central Processing Unit [303] is installed underneath the bed.

Figure-7 – System Diagram of the Smart Swinging Bed for Young Adults and Elderly with Sleeping Disorders – comprises a Central Processing Unit [302] complete with Sleep Monitor[301], Proximity and Human Detection Sensors[303] On/Off Switch including Power Supply [106] Emergency Stop Button [107] Rechargeable Battery for Emergency Operation during Power Outage [108] Servo Motors[102], and simulated view of Transverse and Longitudinal Swinging motions of the Bed [100]. The Central Processing Unit gets signals from the Remote Controller, Sleep Monitor, Proximity, and Human Detection Sensors and drives the Servo Motor accordingly to get Transverse and Longitudinal Swinging motions of the Bed. An emergency Stop Button is

included in the design to stop the swinging bed operation suddenly during an unexpected situation from the user and mechanism. A rechargeable Battery is included to bring back the swinging bed during unexpected power failure. Proximity and Human Detection Sensors are included to detect the surroundings and avoid accidents prior to starting the swinging function manually or automatically.

The Servo Motor [102] complete with Driver Gear drives the Driven Gear [103] which is directly coupled with Power Transmission Shaft. The Power Transmission Shaft complete with Bracings and bearings [105] is rigidly mounted with the bed frame structure [100]. The Pinion Gears [104] at both ends of the Power Transmission Shaft establish direct contact with the Curved Rack Gears [102]. As the Curved Rack Gears [202] are rigidly installed at the side of the Curved Railing cum Bed Support Structures [201], the rotatory motion of the Pinion Gear along with the Power Transmission Shaft complete with bed assembly will tend to climb up to make a forward swinging operation. After reaching its maximum angle set through the remote controller or Stopper, the Servo Motor [102] will reverse its rotation for backward swing operation. Through these cycles, we can establish a transverse or longitudinal swinging motion continuously to get a cradle-kind of swinging effect to bring back the exact biological mechanism we used to have during our infant stage to fall asleep soon. The main functions of the Rolling Wheels [101] are to transfer the entire load of the bed frame assembly to the Curved Railing cu m Bed Support Structures [202] and roll on the curved railing to make a bed swing.

A quick return mechanism can be utilized for Servo Motor to return to the initial point of the swing bed immediately when there is an unexpected obstruction during its operation.

The mechanism of the Smart Swinging Bed assembly can also be configured and operated with one of the other Mechanisms such as Belt Drive, Steel Rope, Hydraulic, Spring, and Linear Motors, or Technology of Floating Electromagnet Design (Maglev) which is used in Bullet Trains for ultra-smooth swinging.

The Smart Swinging Bed mechanism can be configured with one or multiple Servo Motors to meet the loads and to operate either with AI-Enabled automatic mode or manual mode.

The curved Railing cum Bed Support Structure will be designed as a single integral frame assembly to provide either longitudinal or transverse swinging function at a time.

Fall Prevention handrail assembly will be added around the bed frame to save the user from falling on the floor during the swinging operation.

A screening net will be added around the bed frame to avoid clothes, blankets, and other items stuck in the mechanism.

Claims:

In this Invention:

1. Smart Swinging Bed for Young Adults and Elderly with Sleeping Disorders comprises Bed Assembly complete with rolling wheels, Servo Motor with a Drive Gear wheel, Power Transmission Shaft with a Driven Gear wheel and two Pinion Gears at both ends, Bracing structure complete with bearings to rigidly mount the power transmission shaft with the body of bed frame, On/Off Switch, Emergency Stop Button, Rechargeable Battery for Emergency Operation during Power Outage, Curved Railing cum Bed Support Structure, Circular Rack Gears assembled with Curved Railing cum Bed Support Structure, Stopper, Floor Mounting Base Plate with Counter Sunk Setscrews, Sleep Monitor to be worn by the user during bedtime, Central Processing Unit, Proximity / Human Detection Sensors and Remote Controller to provide various benefits such as (a) to divert the mind of the users from various thoughts such as worrying about work, school, personal life, financial problems, health, and medication issues, and etcetera during their bedtime, (b) to calm down and relax their body to fall asleep soon. (c) to bring back the exact biological mechanism we used to have during our early childhood stage in a cradle to fall asleep soon, (d) to swing the bed automatically when detecting sleep disturbance through the sleep monitor, (e) to help circulate blood and balance body fluid from lower limbs while swinging back and forth direction, (f) to provide a luxurious lifestyle.
2. Claim 1 can be configured with a single integral frame assembly to provide either longitudinal or transverse swinging operation at a time. Various Sensors such as Proximity Sensors and Human Detection Sensors will be utilized to collect data from the surroundings of the bed assembly and processed by Central Processing Unit to perform automatic operation. The Remote Controller will also be used to set the choice of automatic operation or manual operation. Additional features such as CCTV, Red and Green Warning lights, and Audio Speaker System will also be added to enhance the operation of the Smart Swinging bed and user's safety.
3. The device as claimed in Claim 1 wherein the mechanism of Smart Swinging Bed assembly can also be configured and operated with one of the other Mechanisms such as Belt Drive, Steel Rope, Hydraulic, Spring, and Linear Motors, or Technology of Floating Electromagnet Design (Maglev) which is used in Bullet Trains for ultra-smooth swinging.
4. The device as claimed in Claim 1 wherein the Smart Swinging Bed assembly can also be hung from the ceiling of the building by using sling ropes as an alternative option to give a smooth swinging experience to the users.
5. The device as claimed in Claim 1 wherein the Smart Swinging Bed assembly will be manufactured with Anti-bacterial and Anti-Viral materials and coatings including mechanisms as per the regulation of Health Control Authorities.