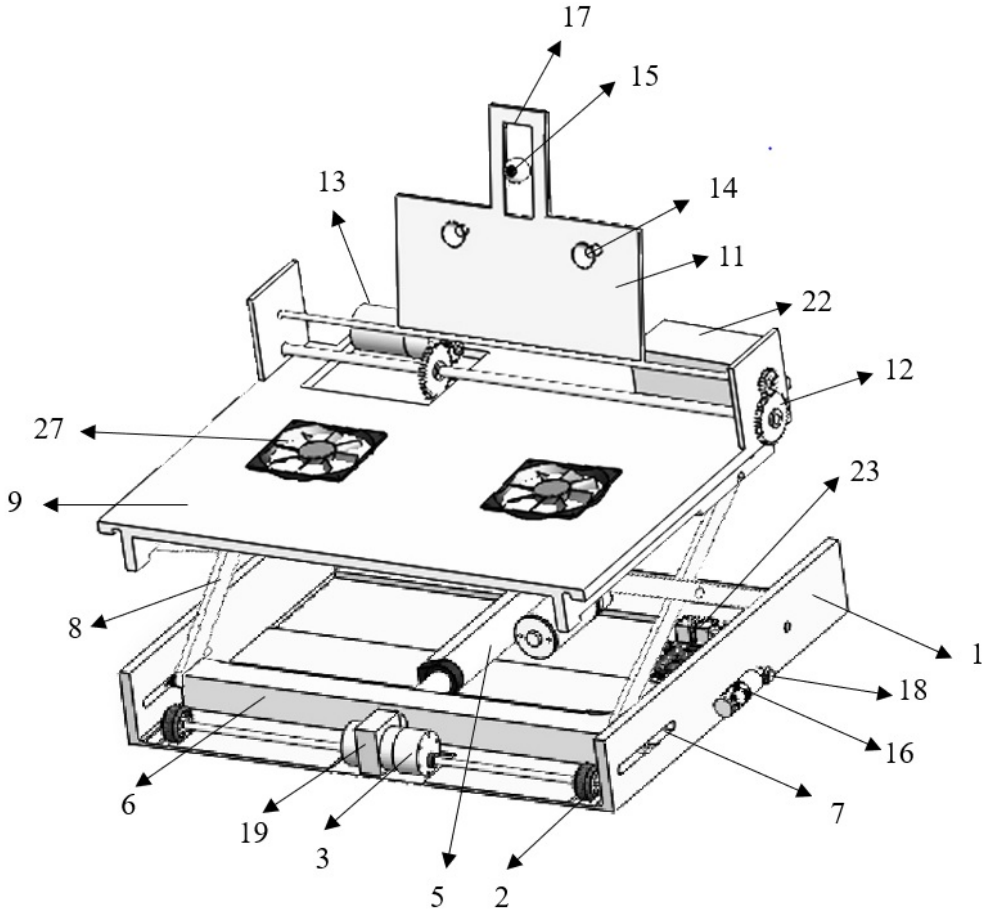


Fig. 2

Applicant: KARUNYA INTSITUTE OF TECHNOLOGY AND SCIENCES Total no. of sheets:06

Title: AN INTELLIGENT ERGONOMIC STAND FOR LAPTOP Sheet no.: 01

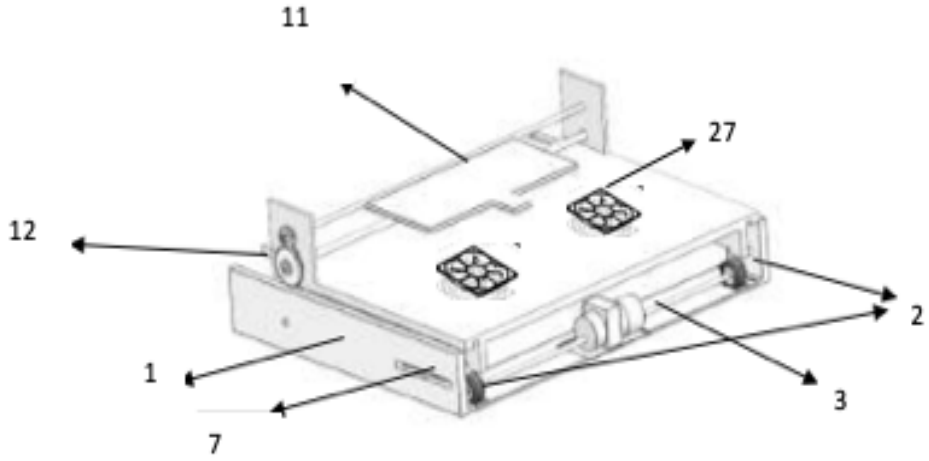


Fig. 1

Vijayalakshmi.T (IN/PA-3425)

On behalf of the Applicant

Applicant: KARUNYA INTSITUTE OF TECHNOLOGY AND SCIENCES Total no. of sheets:06

Title: AN INTELLIGENT ERGONOMIC STAND FOR LAPTOP Sheet no.: 02

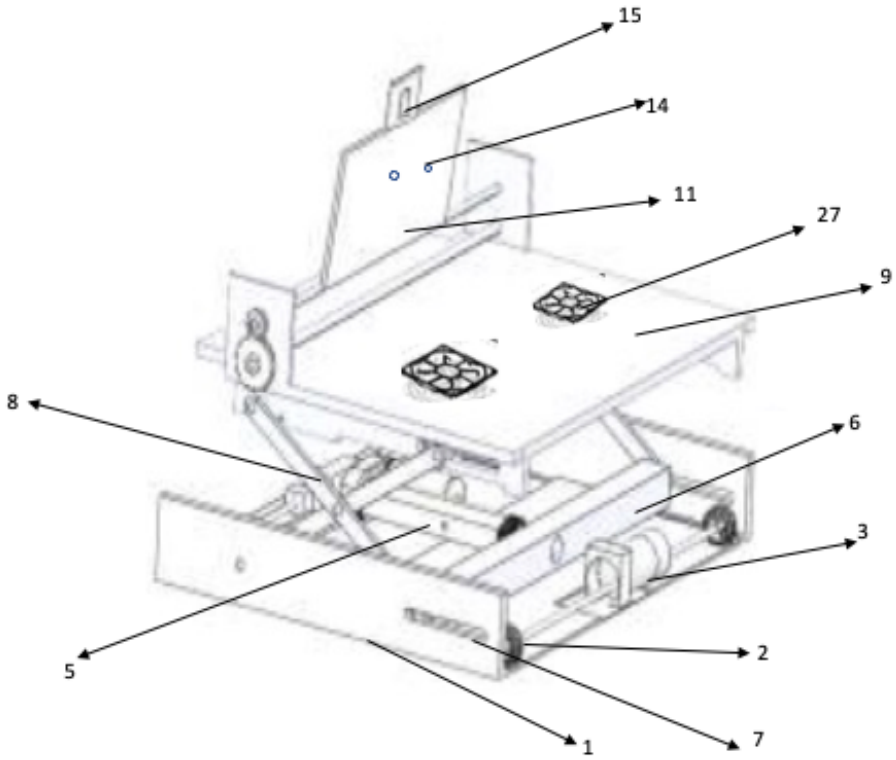


Fig.2

Vijayalakshmi.T (IN/PA-3425)

On behalf of the Applicant

Applicant: KARUNYA INTSITUTE OF TECHNOLOGY AND SCIENCES Total no. of sheets: 06

Title: AN INTELLIGENT ERGONOMIC STAND FOR LAPTOP Sheet no.: 03

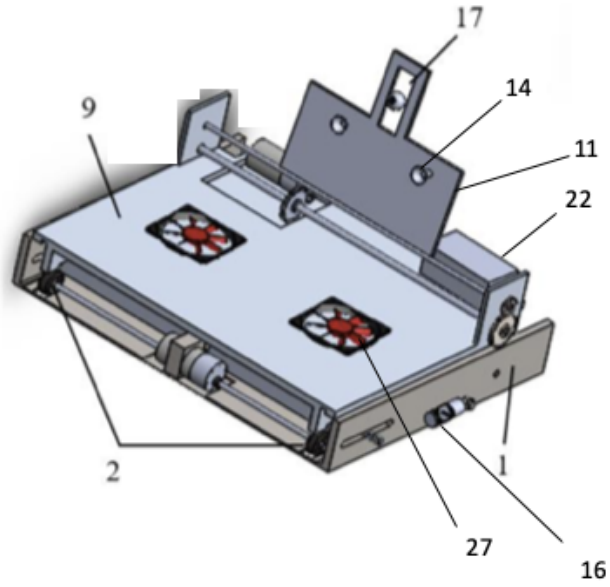


Fig. 3

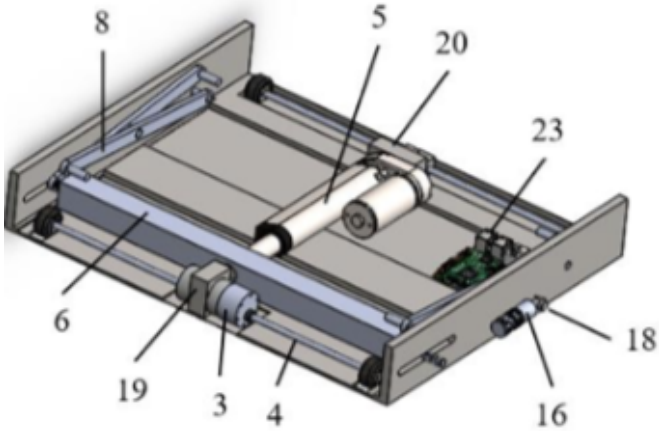


Fig. 4



Vijayalakshmi.T (IN/PA-3425)

On behalf of the Applicant

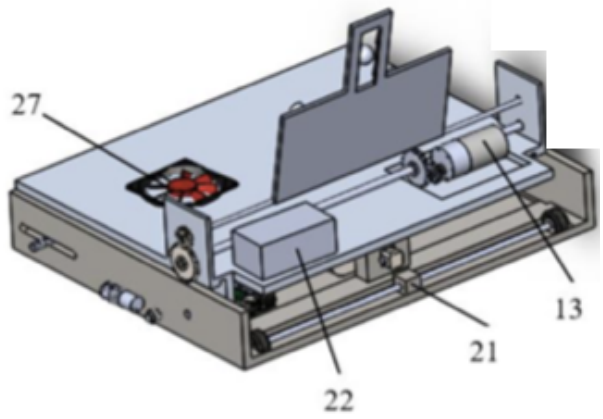


Fig. 5

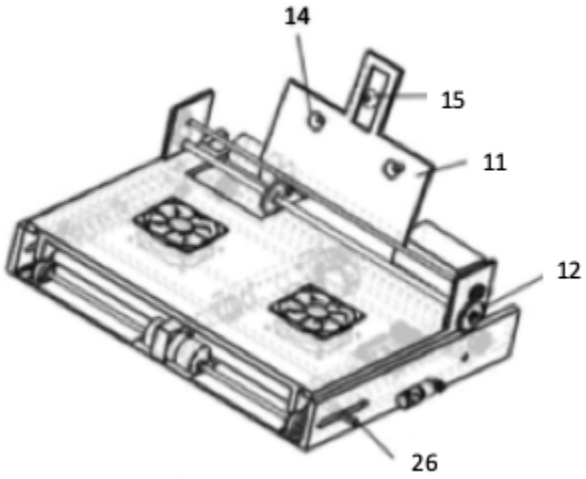


Fig.6

Vijayalakshmi.T (IN/PA-3425)

On behalf of the Applicant

Applicant: KARUNYA INTSITUTE OF TECHNOLOGY AND SCIENCES Total no. of sheets:06

Title: AN INTELLIGENT ERGONOMIC STAND FOR LAPTOP Sheet no.: 05

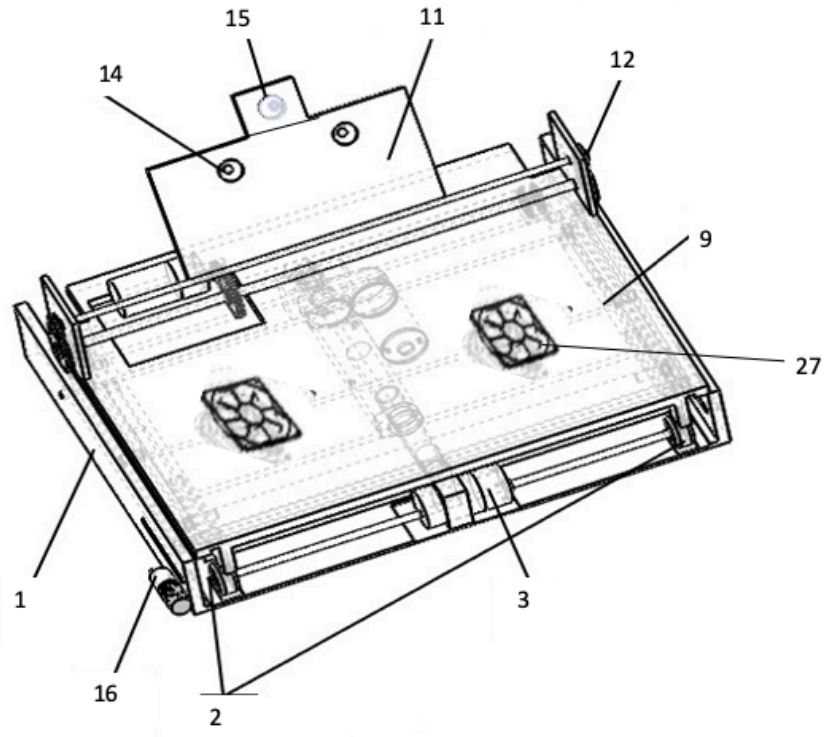


Fig. 7

Vijayalakshmi.T (IN/PA-3425)

On behalf of the Applicant

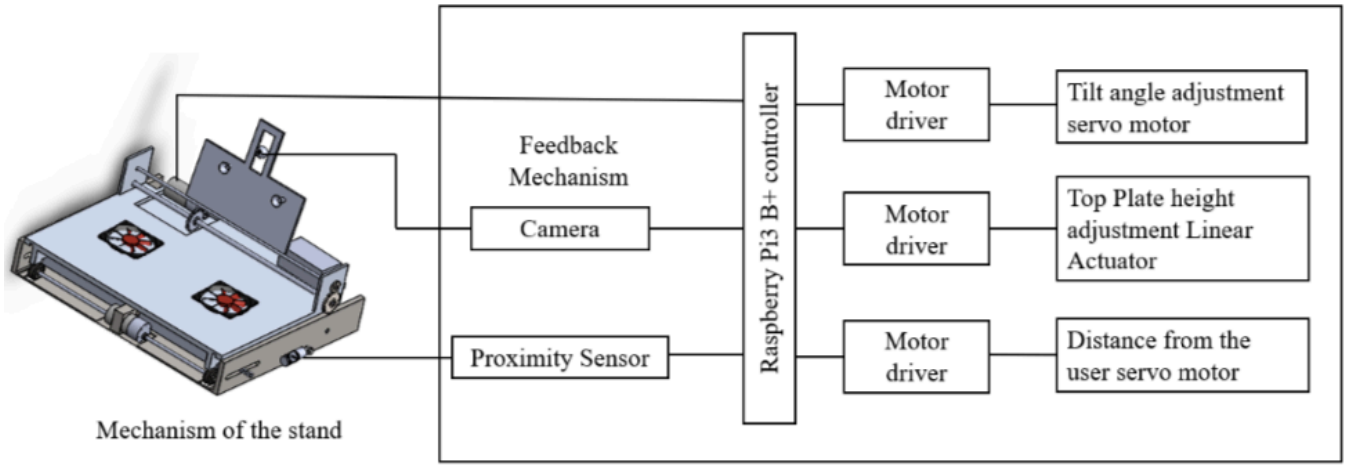


Fig. 8

Vijayalakshmi.T (IN/PA-3425)

On behalf of the Applicant

FORM - 2

THE PATENTS ACT, 1970

(39 OF 1970)

&

THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

(see Section 10 & rule 13)

1. TITLE OF THE INVENTION:

AN ARTIFICIAL INTELLIGENT ERGONOMIC STAND FOR LAPTOP

2. APPLICANT:

NAME : **KARUNYA INSTITUTE OF TECHNOLOGY AND SCIENCES**

NATIONALITY: INDIAN

ADDRESS: KARUNYA INSTITUTE OF TECHNOLOGY AND SCIENCES

KARUNYA NAGAR, COIMBATORE- 641 114,

TAMILNADU.

3. PREAMBLE TO THE DESCRIPTION :

The following specification particularly describes the invention and the manner in which it is to be performed.

AN INTELLIGENT ERGONOMIC STAND FOR LAPTOP

FIELD OF INVENTION

The present invention is related to the field of designing of computer workstation meeting the ergonomics when working in sitting position. The Laptop stand is designed to position the laptop automatically based on the height, distance from the user and the tilt angle of the display in front of the user as per the ergonomic guidelines.

BACKGROUND OF INVENTION

Use of Desktop or Laptop is very common in everyday life either in personal life or official or social life. Most of the people from children to old people use the Gadgets which includes laptop, desktop, work station for their activities. As most of the education platform, official works, entertainment, other learnings use these computer equipment. Among this Laptop takes a top priority due to its portability and ease of handling.

Continuous use and sustained use of the laptops has increased the concern of musculoskeletal disorders associated problems in humans. The prolonged use due to the nature of the job, education requirements and other business needs without following proper ergonomics leads to such Musculoskeletal disorders. This was common in current social world. Many different advancements and configurations were developed to meet out the speed and accuracy of the machine performance without much changes in the peripheral output devices.

Ergonomics is defined as the continuous process or method to follow in use of such gadgets without compromising the health. Laptops are to be placed in proper work locations to meet these ergonomic guidelines. Several designs and adjustable laptop stands are available and are still under development in the market, however it cannot meet the unique requirements of the Ergonomic guidelines. To maintain the correct posture, arm rest position and view position while working on such laptops or workstations, it is mandate for

everyone to have thorough knowledge of ergonomic guidelines and follow the guidelines properly. However, as it is related to behavioral aspects, it always differs from person to person and result in poor follow up of the ergonomic guidelines resulting stress, Musculoskeletal disorders, cervical problems and other health related problems.

Ignorance or not meeting the ergonomic guidelines are the basic problems which results in such disorders. Researchers found that because of psychosocial risk factors, the users are unable to adjust their workstation as per the ergonomic guidelines i.e. in more general they bypass the ergonomic requirements ignoring their health due to work pressure or negligence.

Even it is now mandate for every business centers or companies to provide such periodic training on importance of ergonomics and value of following ergonomics principles to avoid permanent or temporary disorders. Surveillance system are provided in big corporates to monitor their ergonomic postures, continuous training and enforcement, taking active breaks, relaxation room, physical workout stations, posture correction sensors on head and neck position sensors etc. The challenge faced by the users is that it could only be used on vicinity of training or any such incidents happen and some time the user themselves adjust to their physical body needs to adjust their posture to reduce myopia, back pain, neck pain and other health problems.

Now a days, certain advance laptops are provided with sensors to adjust the tilt angle to maintain the preferred angle of vision from the users. But such laptops lacks portability due to increased weight and big size.

On the virtue of the size of the laptops, laptops are highly portable compared to desktops. Hence, now days from a school student to an IT employee working in a company or a freelancer works on a laptop extensively. The increased usage of laptops at work and home has also increased the concern to analyze the musculoskeletal disorders associated with their usage. It is inferred from literature that laptop users develop pain in more body regions when compared to desktop users. Most of the laptop users generally don't use an external keyboard and a separate stand to position the monitor of the laptop in the required position. Due to which they tend to adapt non-neutral postures. But desktop workstations mostly have an adjustable keyboard tray, a mouse adjustable tray and the monitor is generally kept directly

in front of the user. The design of a laptop (with the screen attached to the keyboard) forces users into a trade-off between poor neck/head posture and poor hand/wrist posture. When the screen is at the right height to maintain good neck/head posture, the keyboard is too high which forces the user into incorrect hand/wrist posture. When the keyboard is at the right height to maintain good hand/wrist posture, the screen is too low which forces the user into incorrect neck/head posture.

The present invention aims at designing a new laptop work station meeting most of the ergonomic guidelines and provide a solution to improve the siting posture while working on laptops. The artificial intelligent ergonomic stand automatically adjusts the position of the screen to correct height, vision angle, distance and also adjust to meet the arm resting position, arm stretch distance with reference to the seat from the laptop screen and the advantage of the invention is all the above requirements are met automatically without intervention of the user and knowledge level of the user.

PRIOR ARTS

Prior art US7775356 relates to a laptop carrying case and stand, which discloses a carrying case for laptop or notebook computers that convert into a convenient stand for supporting the computer at an angle to a supporting table or desktop. The angle of positions for both the keyboard and display shall be changed. The invention discloses a planar bottom panel, two planar side walls parallel to one another and fixedly attached perpendicular to and adjacent opposing edges of the planar bottom panel, and the side walls have top edges distal the bottom panel. A substantially planar rear wall is fixedly attached perpendicular to the planar bottom panel and two planar side walls. A top member having at least two substantially rigid sections is hinge connected adjacent to another of the rear wall panel and hinge attached to another of the rigid sections at the opposite edge to the first hinged connection. A top member positioning means is included for removably engaging the sections of said top member in at least one inverted V pattern for the purpose of supporting a laptop computer an angle to the user.

Prior art US10126731 relates to a height-adjustable table comprises an eye detection unit arranged to detect the position of a user's eyes. The height-adjusting arrangement (100) is configured for control of the height of the height-adjustable table (1) based on the detected position of a user's eyes.

Prior art EP1640849 relates to a portable computer stand that enables ergonomic use of a portable computer in a variety of environments. The portable computer system comprising a main chassis having a front edge, a rear edge, an upper surface and a lower surface. It comprises a main chassis to enclose the operating components of the computer system, support chassis to enclose battery or other power supply along with the provision for connecting input output devices and a display panel. Support chassis connects to the front end of main chassis by hinges and is disposed at an acute angle to lower surface. Display panel is rotatbly connected to the rear edge by hinges and forms an obtuse angle with upper surface of the main chassis. Hinges may alternatively enable support chassis or display panel to detach from main chassis. A support chassis is rotatably connected to the front edge of the main chassis. A display panel is rotatably connected to the rear edge of the main chassis. The keyboard of the laptop is disposed on the upper surface of the main chassis.

The invention disclosed in prior art US20090154079 is a laptop table including a laptop station, securely coupled with a supporting plate of a movable exclusive table such that peripheral devices of a laptop computer are neatly disposed, wherein the laptop station is separated from the movable exclusive table without disengagement of a power adaptor and cables of the laptop computer such that it can be used anywhere conveniently. It includes an inclined part, a wrist rest formed at the lower end of the inclined part, the wrist rest extending from the inclined part, the inclined protrusion formed at the upper end of the inclined part, with plurality of speakers mounted, a small sized microphone mounted in the wrist rest such that communication can be carried out without using a headset during conversation, fan grills with fans at the center of the inclined part for dissipating heat generated. The table is capable of reducing heat generated from the laptop computer. It also possess an integrated sound output system which produces quality audio from the laptop. The laptop table is also mounted with storage unit, an optical storage unit, simple structure display unit like an LED or LCD, an input /output USB port.

Another prior art US 20090179132, explains an ergonomic laptop stand, including: a front panel, there are one or more heat dissipation portholes on the said front panel; a base, one end of the said base is pivoted to connect with one end of the said front panel; a supporting plate, it comprises a pivoted end and a locating end which faces the said pivoted end, the said pivoted end can be pivoted to connect with one of the said front panel and the said base; and a plurality of locating members, the said locating members are provided on the other one of the said front panel and the said base; in which, when the said stand supports the laptop, the said locating end can be located on one of the said plurality of locating members separately. According to the invention, the laptop stand can be adjusted to support the laptop at different angles using ergonomic theory; also, while supporting the laptop, the said stand can dissipate fully the heat from the laptop. Moreover, it is very compact and convenient for taking with the laptop, and with lightweight. The material of the laptop stand, which is made of plastic, can be recycled; this is in conformity with the conception of the environmental protection.

Another prior art US 20020020329 disclosed Ergonomic Video Display Terminal and Personal Computer Workstation Apparatus is a manually operated corner oriented commercial office or telecommuter/home office computer desk that provides all exterior computer system components within reach and encourages frequent adjustment to the video display/monitor screen distance from the eyes, keyboard angle, and pointing device angle.

All the above prior art teaches a stand which includes enhanced the access to the laptop with the manual intervention to change/fix the position of the laptop. Whereas the present invention does not need any manual intervention, which automatically displaces/adjusts the position to align the laptop to the user seated at different angle, distance, position, which are done by the integrated servo motors, which are further controlled by the micro controller as none of the prior arts suggests. The operation of the position, distance, angle alignment of the laptop is completely done without manual intervention and with the help of sensors, camera, motors, which none of the prior arts have.

The primary objective of the invention is to design a laptop stand automatically aligning itself to the ergonomic standards when switched on, which is suitable to work with the laptop continuously for longtime without any strain.

The secondary objective of the invention is to control the operation of the system automatically with the feedback from the sensing and image capturing device.

The tertiary objective of the invention is to adjust the height, distance and tilt angle of the laptop stand suitable for all average height range.

The fourth objective of the invention is adjusting the height of the top base plate based on the users line of vision as predefined in the controlling means.

The fifth objective of the invention is to adjust the distance from the user based on the standard one arm distance from the user as predefined in the controlling means.

The sixth objective of the invention is to adjust the tilt angle of the laptop monitor based on the predefined degree of tilting in the controlling means.

The seventh object objective of the invention is to use the invention by battery operated, with an option for manually operable stand when required.

Yet another objective of the invention is to provide an ergonomic laptop stand suitable for all laptop sizes.

And a further objective of the present invention is to provide a laptop stand with cooling fan as heat sink for sleek designed laptops which are void of cooling fans.

SUMMARY OF THE INVENTION

The invention relates to an artificial intelligent ergonomic laptop stand which aligns the height, distance from the user and the tilt angle of the monitor as per the ergonomic standards, with the feedback received from the image capturing device and the sensing

means, through the integrated motors which are controlled by the controlling means. The laptop stand is automatic and battery operated without any human intervention and is suitable for all sizes of the laptop, which also works manually based on the ergonomic guidelines as predefined in the controlling means.

STATEMENT OF THE INVENTION

The invention relates to an improved design of laptop stand which adjusts automatically and thereby improves the sitting posture while working with the laptop to reduce eye strain, neck, upper arm, fore arm, hand and wrist pain with proper sitting posture based on the person handling it. It adjusts the viewing height, angle of vision, distance from user, ergonomic arm positions, neck and eye positions as per the guidelines.

DISCLOSURE OF THE INVENTION:

The innovative design of the intelligent stand for laptop or workstation is convenient, portable, smart, battery operated and compact design for laptop users to adjust the laptop as per the ergonomic requirements based on the sitting posture. This stand is also designed to any size of commercial laptop screen sizes ranging from 13 x 8 Inches to 15.6 X 10 Inches.

It maintains the common parameter requirements like height, distance and tilt angle based on the user physique and height in a single functional unit. The user needs to sit in an ergonomic resting arm chair; to place the intelligent ergonomic stand in front of him with enough leg clearance; place the laptop on the top of the rest plate, attach the tilt plate with suction pump on the back portion of the laptop screen, and push the automatic adjustment push button on the said invention; the intelligent ergonomic stand will adjust the height, angle of vision and distance between the user to Laptop table automatically in sequential steps. This stand can fit for all commercial laptop available in the market and no need for any modification in the gadgets.

The said invention can also be used for desktop, workstation, play stations with position fixed once for a single user and can be adjusted based on the new user.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of nature and desired objects of the present invention, reference is made to the following detailed description taken in conjunction with the accompanying drawing figures wherein like reference character denote corresponding parts throughout the several views. Objects, features, and advantages of embodiments disclosed herein may be better understood by referring to the following description in conjunction with the accompanying drawings. The drawings are not meant to limit the scope of the claims included herewith. For clarity, not every element may be labelled in every figure. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating embodiments, principles, and concepts. Thus, features and advantages of the present disclosure will become more apparent from the following detailed description of exemplary embodiments thereof taken in conjunction with the accompanying drawings in which:

Fig. 1 illustrates the artificial intelligent ergonomic stand for laptop in home position

Fig. 2 illustrates the artificial intelligent ergonomic stand for laptop in raised position

Fig. 3 illustrates the front view of artificial intelligent ergonomic stand with tilt plate in raised position

Fig. 4 illustrates the front view of the bottom base plate

Fig. 5 illustrates rear view of artificial intelligent ergonomic stand with tilt plate in raised position

Fig. 6 illustrates isometric view of the ergonomic stand with the tilt plate in raised position

Fig. 7 illustrates isometric top view of the ergonomic stand with tilt plate in raised position

Fig. 8 illustrates block diagram of electronic setup including control & feedback mechanism

DETAILED DESCRIPTION OF THE DRAWINGS

With reference to Fig.1, shows the isometric view of the Artificial Intelligent ergonomic stand in home position, with the bottom base plate(1) supports the invention comprising top base plate(9) with the fans(27) to dissipate heat generated while working with the laptop for a longer duration. The front movement is provided by the double shaft motor(3) with the wheels (2) at its either ends for the rotational movement, groove for the support links(7) to

be connected with the base plate, the spur gear assembly(12) is seen at the terminated sides of the servo motor(13) connected to the tilt plate(11) to provide the tilt angle of predefined angle from the vertical position.

With reference to Fig.2, shows the raised position of the invention to show the internal parts of the said invention working with the controller based on the user details. The figure shows the bottom base plate(1) with the double shaft motor(3) in front fixed firmly by the housing means(19) and the shaft ends with the wheels(2) for the providing the rotational motion of the invention. The support beam(6) connects the front end of the linear actuator(5) fixed to the bottom base plate. The base plate(1) accommodates a power switch(18) and a proximity sensor(16) on one of its side. The electronic circuit assembly(23) for the controlling means of the entire system is placed at the bottom base plate(1). The supporting beam(6) behind the double shaft motor(3) connects one end of the four scissor links(8) with the bottom base plate(1) through the groove(7), whose other end is connected to the slots in the top base plate(9). The heat dissipating device(27) are accommodated in the top base plate(9). The servo motor(13) connected to the tilt plate(11) is mounted within the groove of the top base plate(9) to provide movement for the tilt plate to a predefined angle. The shaft of the servo motor(13) terminates with the spur gear assembly(12) at both sides. The tilt plate(11) comprises vacuum cups(14) and the camera/ image capturing device(15) which is adjustable(17) to a certain height. The battery(22) arrangement to provide power to operate this entire system is place behind the tilt plate(11) on the top base plate(9)

With reference to Fig.3, the front view of the invention with the top tilt plate (11) in raised position with vacuum cups (14) is seen. It shows the bottom base plate (1) with the sensing means(16) on it right side. The top base plate(9) with the heat dissipating device(27), tilt plate(11) with the vacuum cups(14) and the adjustable frame(17) for the image capturing device is also presented. The front portion of the assembly shows the double shaft motor (3) arranged and coupled to the front wheels (2) to provide the forward or backward rotation. The battery(22) arrangement to provide power to operate this entire system is place behind the tilt plate(11) on the top base plate(9).

While in the foregoing specification, a detailed description of a specific embodiment of the invention was set forth for the purpose of illustration, it will be understood that many of the details herein given may be varied considerably by those skilled in the art without departing from the spirit and scope of the invention. Of course the present invention is not intended to be restricted to any particular form or arrangement, or any specific embodiment, or any specific use, disclosed herein, since the same may be modified in various particulars or relations without departing from the spirit or scope of the claimed invention hereinabove shown and described of which the apparatus or method shown is intended only for illustration and disclosure of an operative embodiment and not to show all of the various forms or modifications in which this invention might be embodied or operated.

With reference to Fig.4, it shows the bottom base plate with all the components. It shows rear shaft (4) coupled to back side wheel (2) which is free to move with reference to the movement of the front Double shaft motor (3). The linear actuator(5) is connected to the support beam(6) in front, which in turn connects the scissor lift link(8) on its sides. The back of the linear actuator(5) is fixed firmly to the bottom base plate by a housing(20). The circuit(23) for the controlling means along with the driver controllers is placed in the bottom base plate(1). The sensing means(16) along with the switching means(18) is visible on the side rim of the bottom base plate(1)

With reference to Fig.5, the rear view of the invention gives a clear picture of the assembly of the battery(22), servo motor(13), heat dissipating device(27) with the rear shaft support(21).

With reference to Fig. 6, the isometric front view of the invention with the cylindrical rod(26) in the axial hole to connect the scissor links on both the sides and the linear actuator is seen projecting outside the base plate(1) groove. The spur gear assembly with the tilt plate(11) in raised position, displaying the image capturing device(15) with adjustable means(17) and two vacuum cups (14) are seen.

With reference to the Fig. 7, the isometric top view of the invention shows the bottom base plate(1), double shaft motor(3) connected with wheels(2) on the sides of the shaft. The top base plate shows(9) heat dissipating device(27) with the tilt plate(11) in raised position. The

vacuum cups(14) and the adjustable image capturing device are seen. The sensing device(16) and the spur gear assembly is also seen.

With reference to the Fig. 8, the mechanism of the stand along with the process involved in aligning the position of the laptop stand shows the feedback mechanism, data from the image capturing device about the line of vision of the user is processed by the Raspberry Pi3B+ Controller and commands the drive control or motor driver of the linear actuator for the height adjustment. The data from the sensing device is processed by the Raspberry Pi3B+ Controller and commands the driver controller of the servo motor to move forward based on the standard one arm distance of the user. With the data from the servo motor Raspberry Pi3B+ Controller commands the motor driver of the servo motor for the tilt angle adjustment. The camera (15) provided on the tilt plate (11) will identify the users view of vision and helps to position the top plate to raise up vertically with the help of linear actuator (5) along with the Scissor lift links (8) and supporting beam (6) as shown in Fig.6. The top base plate slot (10) and bottom base plate slot (7) are matched to fit properly on the top and bottom plate.

WORKING OF THE INVENTION

Intelligent ergonomic stand for laptop is a stand which automatically adjusts the height, distance from the user and the tilt angle with a click of a button as per ergonomic guidelines. The user needs to place the intelligent stand Fig.1 on the table in front of the user, place the closed laptop on the stand, attach the tilt plate (11) via vacuum cups (14) onto the back portion of the laptop screen as shown in Fig.1 or 2, and be seated in front of the laptop. After which, once a button is clicked the intelligent stand adjusts as per the user's anthropometric dimensions following the ergonomic principles of adjusting the position of a laptop.

The present invention comprises of a servo motor with spur gear arrangement (13) to control revolute motion of a tilt plate (11) which is connected to the back portion of the laptop screen. At a click of an Auto adjust button based on the programming of the electronic controller, the intelligent stand first opens the tilt plate (11) along with the laptop screen to a predefined initial angle (e.g. 90 degrees). The algorithm switches on the camera (15) to determine a current location of the user's eye based on the X-axis and Y-axis co-ordinates. The preferred location of the eye is set to be in the middle of the frame. Hence, input is given to the actuator

to either raise or lower the laptop top base plate (9) and stop till the users eye reach the middle of the frame. The bottom base plate (1) comprises of a scissor mechanism via four links (8) to adjust the height of laptop screen. A linear actuator (5) applies the force to provide the upward or downward motion of the top base plate (9). Once, the height of the stand is adjusted, the algorithm switches on the proximity sensor (16) which is placed at the right side of the laptop screen and measures the distance between the user and the laptop screen. A double shaft motor (3) system rotates the wheels on which the base plate rests. The microcontroller based on the input from the sensor calculates the required rotation of the motor to move the laptop stand to the required distance. After adjusting the distance from the user, the tilt angle (11) is adjusted via spur gears (12) controlled by a servo motor (13).

The microcontroller controls the motion of the servo motor (13) to the required value to tilt the screen (11) to open the laptop screen 15 degrees from the vertical position. Once all the ergonomic requirements are met, the microcontroller will provide an alarm to indicate the user that it is ready for use. The ergonomic guidelines like view angle, tilt angle, distance of the arm from Key pad are programmed with reference to the user view of sight and arm position.

An intelligent ergonomic stand for laptop, controlled to align the height, distance, tilt angle of the laptop display automatically from the user's sitting posture by means of the integrated motors comprising; a rectangular bottom base plate(1) housing to accommodate a linear actuator(5), a supporting beam(6) to support the linear actuator and the scissor links, a double shaft motor(3), a rear shaft (4), four links (9), a sensing means (16), a battery(22), a switching means(18), a circuit board(23) for controlling means; a top base plate(9) to enclose the bottom base plate housing the components and to support the laptop when placed on it with heat dissipating devices(27); and a tilt plate(11) mounted above the top base plate(9) to tilt and support the laptop screen to a predefined angle.

The bottom base plate housing (1) having vertically collar with elongated slot (7) configured to slideably accommodate steel rod (26) connected with one end of second leg members (8) of scissor lift on both right and left side of the said base plate; a housing adapted to accommodate a motor (3) where one end of two shafts are connected to two sides of the motor longitudinally and the other ends are connected to the wheels; supporting beam member (6) provided with an axial hole to insert the steel rod (26) longitudinally and a

transverse hole (25) configured to accommodate rotatable end of the linear actuator (5); rear shaft (4) is mounted on the rear side of the base plate (1) with the supporting means (21) where both ends connected to wheels thereby facilitate the forward and backward movement; a sensing means (16) fixed on the vertical curved collar of the bottom base plate (1) to automate the distance of the laptop from the user; a battery (22) configured to supply power to the laptop stand; a circuit board (23) for controlling the function of the laptop and a switching means (18) to control the power supply; a top base plate (9) configured to connect the bottom base plate housing (1)through four leg members of the scissor lift links(8) to hold the laptop; two heat dissipating means (27) adapted to dissipate heat of the laptop on the said top base plate (9); a tilt plate (11) mounted on the rear side of the top base plate (9) to tilt and support the laptop screen to a required angle.

The bottom base plate(1) comprising the linear actuator (5) fixed with a holding means (20) transversely on the baseplate (1) whereby one end rotatably connected to the transverse hole (25) of the supporting beam member (6) and the other end mounted on the rear end of the base plate housing; a pair of scissor lift connecting bottom base plate housing (1) and top base plate (10) with four supporting beam (6) on either sides of the said base plates, a double shaft motor (3) fixed to the bottom base plate (1) and the shaft attached longitudinally on the two side of the motor with a pair of wheels (2) at its ends in the front side of the bottom base plate (1); a rear shaft (4) fixed to the base plate with wheels (2) at the rear end; two wheels of front double shaft and two wheels of rear shafts configured to be accommodated in the slots provided in the four corners of the base plate adapted to contact with the table or floor for facilitating the forward and backward movement of the ergonomic laptop stand to set desired distance from the user.

The bottom base plate(1) comprises the linear actuator(5) firmly fixed by a housing means(20) along the breadth of the baseplate(1) at the centre, connected to the longitudinally fixed supporting beam(6) at its centre, a pair of scissor lift links at either sides of the bottom base plate(1) connected to the ends of the supporting beam(6), a double shaft motor(3) fixed firmly to the bottom base plate (1) and the shaft extending with a pair of wheels(2) at its ends in the front of the bottom base plate(1), a rear shaft(4) fixed to the base plate with wheels(2) at the ends provided the wheels of the front and rear shafts in contact with the ground through the grooves meant for each wheel in the bottom base plate(1).

The bottom base plate(1) comprising a pair of scissor lift links(8) on either sides whose one end is fixed to the support beam(6) of the bottom base plate(1) and the other end connected to the top base plate(9) capable of moving the top base plate upwards and downwards, also accommodates a sensing means(16) at the proximal end of one of its sides. A pair of scissor lift links(8) adapted one at left and other at right side of the bottom base plate(1) for adjusting the height of the table; each scissor lift comprising two leg members interconnected by a common central pivot; a first leg having opposite ends, one end pivotally connected to the base plate(1) and the other end slideably connected to the elongated slot(10) provided in the bottom of both sides downward ridge of top base plate (9); one end of second leg members (8) pivotally connected to the both sides of rear downward ridge of top base plate (9) and other end connected to right and left side of the steel rod (26) in said base plate.

The top base plate(9) enclosing the bottom base plate(1) comprising a flat base surface to accommodate a laptop, a slot to accommodate a servo motor(13) with the spur gear assembly(12) whose shaft extending along the length rotatably fixed and terminating either sides through the grooves at an uplifted structure on both sides of the top base plate(9), supporting ridges on its bottom sides with grooves(10) to connect the other end of the scissor lift links(8).

The tilt plate(11) mounted on the top base plate(9) connected to the shaft of the servo motor(13) with spur gear assembly(12) capable of rotating the tilt plate (11) to a predefined angle and direction in co-ordination with an image capturing device(15) placed at the raised centre of the tilt plate(11) capable of adjusting the level of the image capturing device(15) manually from the level of the tilt plate(11), two or more vacuum cups(14) below the level of the said image capturing device(15) provided to hold the top plate of laptop along with the tilt plate (11).

The top base plate(9) comprising servo motor with spur gear attachment(13) is connected to the shaft of the tilt plate(11) to automate of the tilt angle; shaft attached to the servo motor(13) extending along the length and rotatably connected to both side ends with the side support structure and spur gears of the top base plate(9); downward supporting ridges in the sides of the top base plate adapted with elongated slot(10) to connect the other end of the first leg member of the scissor lift links(8).

The method to adjust the tilt angle, distance and height comprising; the signal from the sensing means(16) in the bottom base plate(1) received by the controlling means; processes and commands the driver controller of the double shaft servo motor(3) followed by the rear shaft(4) to move forward or backward within predefined distance from the user based on the standard arm length; the signal from the controlling means processes and commands the driver controller of the servo motor(13) to tilt the screen along with the tilt plate (11) till the predefined degree from the vertical position; the signal from image capturing device(15) in the tilt plate(11) for the user's eye contact received by the controlling means; processes and commands the driver controller to activate the linear actuator(5) of the bottom base plate(1) for an upward movement connecting the four scissor lift links(8) to raise the top base plate to a predefined height based on the user's line of vision.

The tilt plate(11) mounted on the rear side of the top base plate(9) connected to the shaft of the servo motor(13) with spur gear assembly(12) capable of rotating the tilt plate(11) to a predefined angle and direction with two or more vacuum cups(14); image capturing means(15) slidably mounted in the slot configured to adjust multiple levels to support the different sizes of laptop along with the tilt plate(11).

The process in turning on the ergonomic laptop stand thereof switching on the inbuilt power switching means(18) the ergonomic stand in the home position involves; the sequence of operation comprising; placing the laptop on the top base plate (9); opening the laptop screen plate and connect the vacuum cups (14) to the backside of the top screen of the laptop to hold securely to the tilt plate (11); the processing of the data for tilt angle to open the laptop to a predefined angle using the spur gear assembly (12) and servo motor (13); the processing of the data for distance detected by the sensing means(16) and commanding the double shaft servo motor(3) to move closer or far from the user with the predefined number of rotations and the rear shaft(4) to provide one degree freedom movement to move the bottom baseplate(1); followed by processing of the data for height adjustment from the image capturing device(15) of the tilt plate(11) to command the linear actuator(5) connected with the supporting beam(6) and four scissor lift links(8) where horizontal movement of the linear actuator(5) is converted to vertical movement by the scissor lift links to lift top base plate(9) to raised position from home position according to the predefined positions for the various

height ranges; heat dissipating devices(27) accommodated on the top base plate(9) turns on as a heat sink.

The method involved thereof comprising; the laptop placed on the top base plate (9) and sliding the backside of the screen of the laptop close towards the vacuum cups (14) mounted on the tilt plate (11) to hold securely and adjusting the image capturing device(15) by means of height changing means (17) to fix at the required height based on the size of the laptop; user sitting in front of the laptop turning on the inbuilt power switching means(18); image capturing device(15) determine the current distance of the user's eye based on the X-axis and Y-axis and send a signal to the actuator to either raise or lower the top base plate (9) till the user's eye reaches the middle of the frame by applying the force to the supporting beam member (6) where horizontal movement of the linear actuator(5) is converted to vertical movement by the four leg members (8) to lift top base plate(9) to raised position from home position according to the predefined positions for the various height ranges; the sensing means(16) measures the distance between the user and the laptop screen and a signal send to rotate the wheels attached to the double shaft motor(3) to make a forward or backward movement of the laptop stand to the required distance where the wheels attached to the double shaft motor configured to rotate and forced the rear wheels follow the rotation; the servo motor(13) connected to spur gears(12) rotates to adjust angle of the display of the laptop to the user by adjusting the tilt plate(11); height, distance and the angle of the display of laptop once adjusted the power supply automatically disconnected.

The predefined values of data fed to the controlling means comprising;

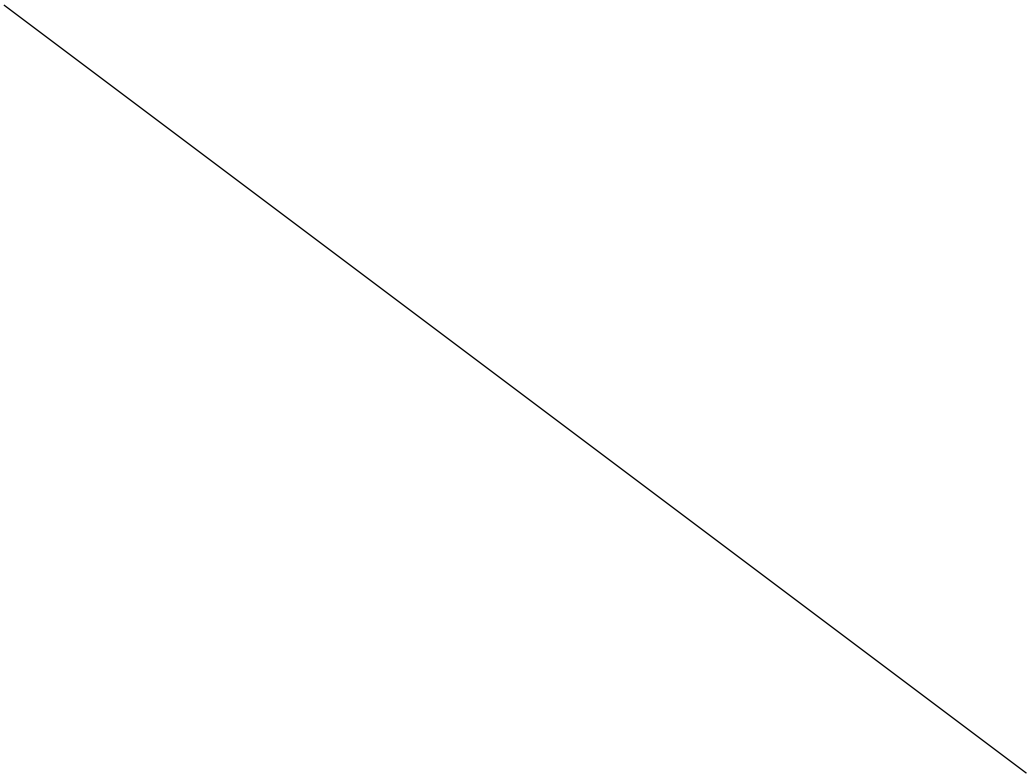
a. the number of rotations of the servo motor(12) with spur gear assembly(13) for tilt angle of the tilt plate(11) with the rotations made by the servo motor(12) based on the predefined average angle of tilting from the right angle.

b. the number of rotations of the double shaft servo motor(3) gives the distance far or closer to the user based on the standard one arm distance from the user,

The ergonomic laptop stand as disclosed, wherein the raised position of the laptop stand winds up to the home position by switching home button.

10. The laptop stand system is operated by battery(22) or connected with laptop's USB port in switched on condition or manually adjustable in switched off condition, suitable for varying sizes of laptops, with one or more battery operated heat dissipating device(27) to cool the device.

While in the foregoing specification, a detailed description of a specific embodiment of the invention was set forth for the purpose of illustration, it will be understood that many of the details herein given may be varied considerably by those skilled in the art without departing from the spirit and scope of the invention. Of course the present invention is not intended to be restricted to any particular form or arrangement, or any specific embodiment, or any specific use, disclosed herein, since the same may be modified in various particulars or relations without departing from the spirit or scope of the claimed invention hereinabove shown and described of which the apparatus or method shown is intended only for illustration and disclosure of an operative embodiment and not to show all of the various forms or modifications in which this invention might be embodied or operated.



CLAIMS

We claim,

1. An intelligent ergonomic stand for laptop to align the height, distance, angle of the laptop display from the user's sitting posture comprising;

a bottom base plate housing (1) having vertically curved collar with elongated slot (7) configured to slideably accommodate steel rod (26) connected with one end of second leg members (8) of scissor lift on both right and left side of the said base plate; a housing adapted to accommodate a motor (3) where one end of two shafts are connected to two sides of the motor longitudinally and the other ends are connected to the wheels; supporting beam member (6) provided with an axial hole to insert the steel rod (26) longitudinally and a transverse hole (25) configured to accommodate rotatable end of the linear actuator (5); rear shaft (4) is mounted on the rear side of the base plate (1) with the supporting means (21) where both ends connected to wheels thereby facilitate the forward and backward movement; a sensing means (16) fixed on the vertical curved collar of the bottom base plate (1) to automate the distance of the laptop from the user; a battery (22) configured to supply power to the laptop stand; a circuit board (23) for controlling the function of the laptop and a switching means (18) to control the power supply; a top base plate (9) configured to connect the bottom base plate housing (1)through four leg members of the scissor lift links(8) to hold the laptop; two heat dissipating means (27) adapted to dissipate heat of the laptop on the said top base plate (9); a tilt plate (11) mounted on the rear side of the top base plate (9) to tilt and support the laptop screen to a required angle;

2. The ergonomic laptop stand as claimed in claim 1, wherein the bottom base plate (1) comprising the linear actuator (5) fixed with a holding means (20) transversely on the baseplate (1) whereby one end rotatably connected to the transverse hole (25) of the supporting beam member (6) and the other end mounted on the rear end of the base

plate housing; a pair of scissor lift connecting bottom base plate housing (1) and top base plate (10) with four supporting beam (6) on either sides of the said base plates, a double shaft motor (3) fixed to the bottom base plate (1) and the shaft attached longitudinally on the two side of the motor with a pair of wheels (2) at its ends in the front side of the bottom base plate (1); a rear shaft (4) fixed to the base plate with wheels (2) at the rear end; two wheels of front double shaft and two wheels of rear shafts configured to be accommodated in the slots provided in the four corners of the base plate adapted to contact with the table or floor for facilitating the forward and backward movement of the ergonomic laptop stand to set desired distance from the user.

3. The ergonomic laptop stand as claimed in claim 1, wherein pair of scissor lift links(8) adapted one at left and other at right side of the bottom base plate(1) for adjusting the height of the table; each scissor lift comprising two leg members interconnected by a common central pivot; a first leg having opposite ends, one end pivotally connected to the base plate(1) and the other end slideably connected to the elongated slot(10) provided in the bottom of both sides downward ridge of top base plate (9); one end of second leg members (8) pivotally connected to the both sides of rear downward ridge of top base plate (9) and other end connected to right and left side of the steel rod (26) in said base plate.

4. The ergonomic laptop stand as claimed in claim 1, wherein the top base plate(9) comprising servo motor with spur gear attachment(13) is connected to the shaft of the tilt plate(11) to automate of the tilt angle; shaft attached to the servo motor(13) extending along the length and rotatably connected to both side ends with the side support structure and spur gears of the top base plate(9); downward supporting ridges in the sides of the top base plate adapted with elongated slot(10) to connect the other end of the first leg member of the scissor lift links(8).

5. The ergonomic laptop stand as claimed in claim 1, wherein the tilt plate(11) mounted on the rear side of the top base plate(9) connected to the shaft of the servo motor(13) with spur gear assembly(12) capable of rotating the tilt plate(11) to a predefined angle and direction with two or more vacuum cups(14); image capturing means(15) slidably

mounted in the slot configured to adjust multiple levels to support the different sizes of laptop along with the tilt plate(11).

6. The ergonomic laptop stand as claimed in claim 1, wherein a method to adjust the tilt angle, distance and height comprising;

a. the signal from the sensing means(16) in the bottom base plate(1) received by the controlling means; processes and commands the driver controller of the double shaft servo motor(3) followed by the rear shaft(4) to move forward or backward within predefined distance from the user based on the standard arm length;

b. the signal from the controlling means processes and commands the driver controller of the servo motor(13) to tilt the screen along with the tilt plate (11) till the predefined degree from the vertical position;

c. the signal from image capturing device(15) in the tilt plate(11) for the user's eye contact received by the controlling means; processes and commands the driver controller to activate the linear actuator(5) of the bottom base plate(1) for an upward movement connecting the four scissor lift links(8) to raise the top base plate to a predefined height based on the user's line of vision.

7. The ergonomic laptop stand as claimed in claim 6, wherein the method involved thereof comprising; the laptop placed on the top base plate (9) and sliding the backside of the screen of the laptop close towards the vacuum cups (14) mounted on the tilt plate (11) to hold securely and adjusting the image capturing device(15) by means of height changing means (17) to fix at the required height based on the size of the laptop; user sitting in front of the laptop turning on the inbuilt power switching means(18); image capturing device(15) determine the current distance of the user's eye based on the X-axis and Y-axis and send a signal to the actuator to either raise or lower the top base plate (9) till the user's eye reaches the middle of the frame by applying the force to the supporting beam member (6) where horizontal movement of the linear actuator(5) is converted to vertical movement by the four leg members (8) to lift top base plate(9) to raised position from home position according to the predefined positions for the various height ranges; the sensing means(16) measures

the distance between the user and the laptop screen and a signal send to rotate the wheels attached to the double shaft motor(3) to make a forward or backward movement of the laptop stand to the required distance where the wheels attached to the double shaft motor configured to rotate and forced the rear wheels follow the rotation; the servo motor(13) connected to spur gears(12) rotates to adjust angle of the display of the laptop to the user by adjusting the tilt plate(11); height, distance and the angle of the display of laptop once adjusted the power supply automatically disconnected.

Dated this the 06th day of October, 2020



Vijayalakshmi.T(IN/PA-3425)

Applicant's Patent Agent

ABSTRACT

AN ARTIFICIAL INTELLIGENT ERGONOMIC STAND FOR LAPTOP

An artificial intelligent ergonomics stand for laptop relates to a convenient, portable, smart, battery operated and compact design for laptop users to adjust the laptop as per the ergonomic requirements based on the sitting posture. It maintains the common parameter requirements like height, distance and tilt angle based on the user physique and height in a single functional unit. The user needs to sit in resting arm chair; to place the intelligent ergonomic stand in front of him with enough leg clearance; place the laptop on the top of the base plate(9), attach the tilt plate(11) with suction cups(14) on the back portion of the laptop screen, and push the automatic adjustment push button on the said invention; the intelligent ergonomic stand will adjust the height, angle of vision and distance between the user to Laptop table automatically in sequential steps. This stand can fit for all commercial laptop available in the market and no need for any modification in the gadgets. The said invention can also be used for desktop, workstation, play stations with position fixed once for a single user and can be adjusted based on the new user.

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Title: AN INTELLIGENT ERGONOMIC STAND FOR LAPTOP Sheet no.: 01

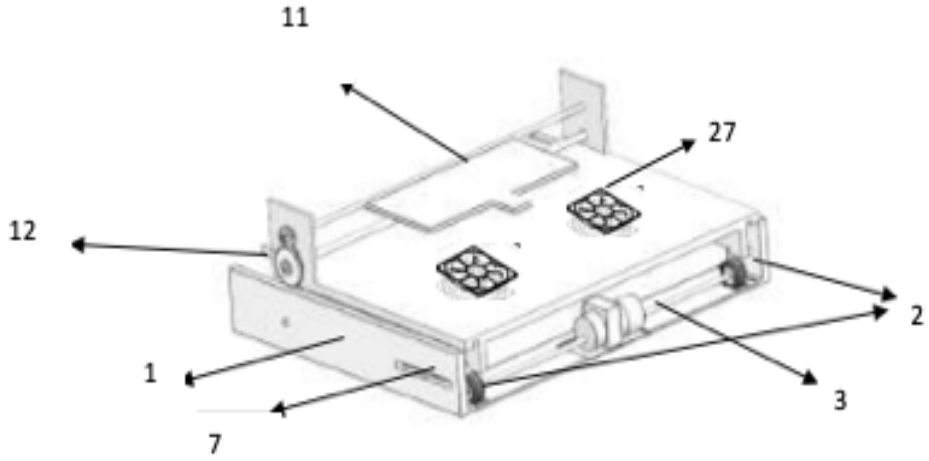


Fig. 1

Vijayalakshmi.T (IN/PA-3425)

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Title: AN INTELLIGENT ERGONOMIC STAND FOR LAPTOP Sheet no.: 02

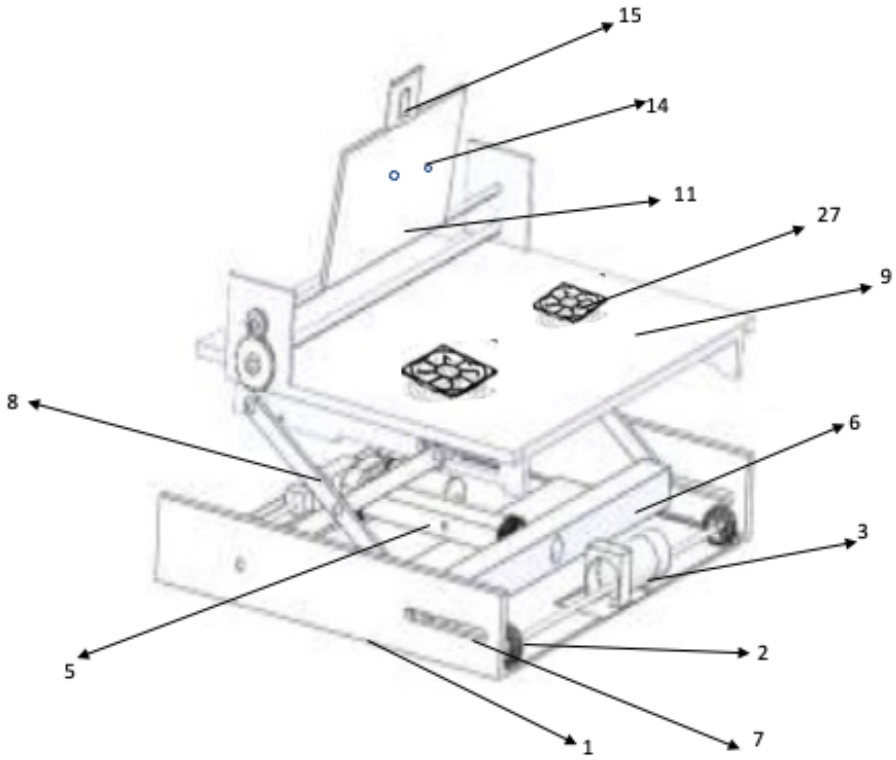


Fig.2

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Title: AN INTELLIGENT ERGONOMIC STAND FOR LAPTOP Sheet no.: 03

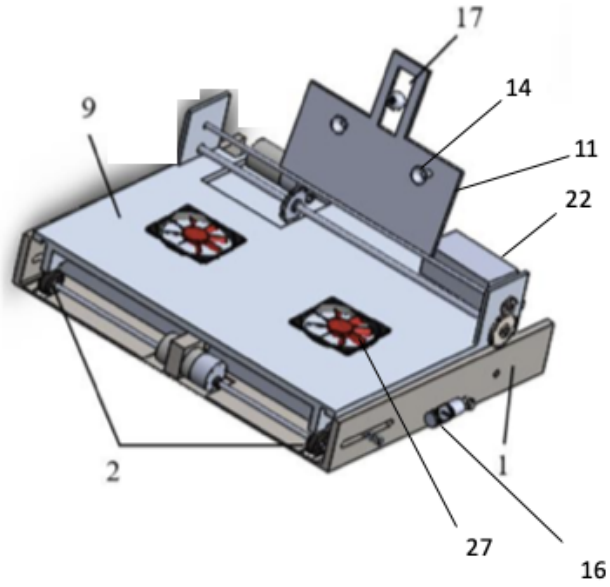


Fig. 3

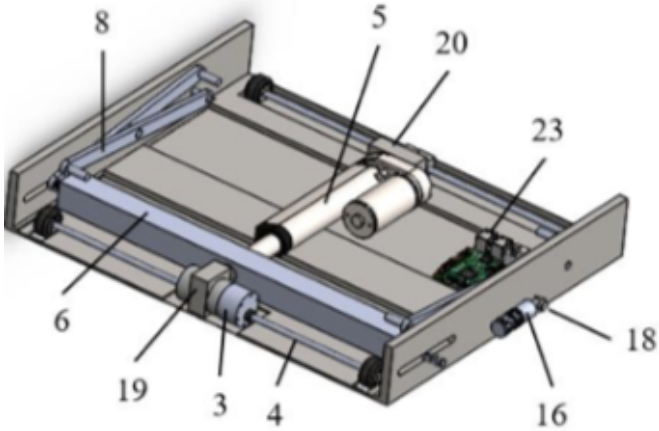


Fig. 4



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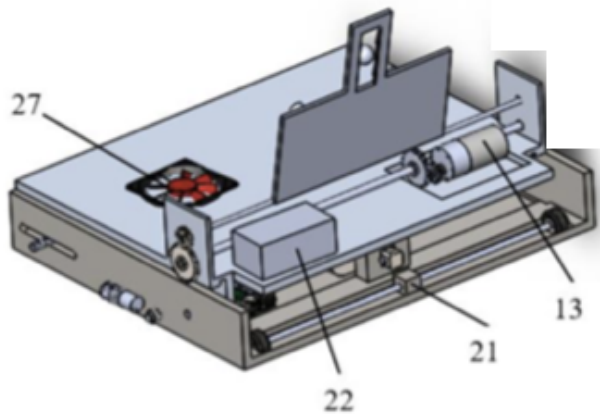


Fig. 5

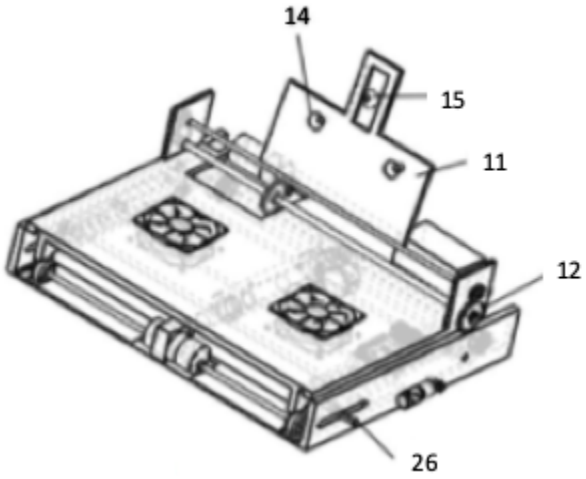


Fig.6

Vijayalakshmi.T (IN/PA-3425)

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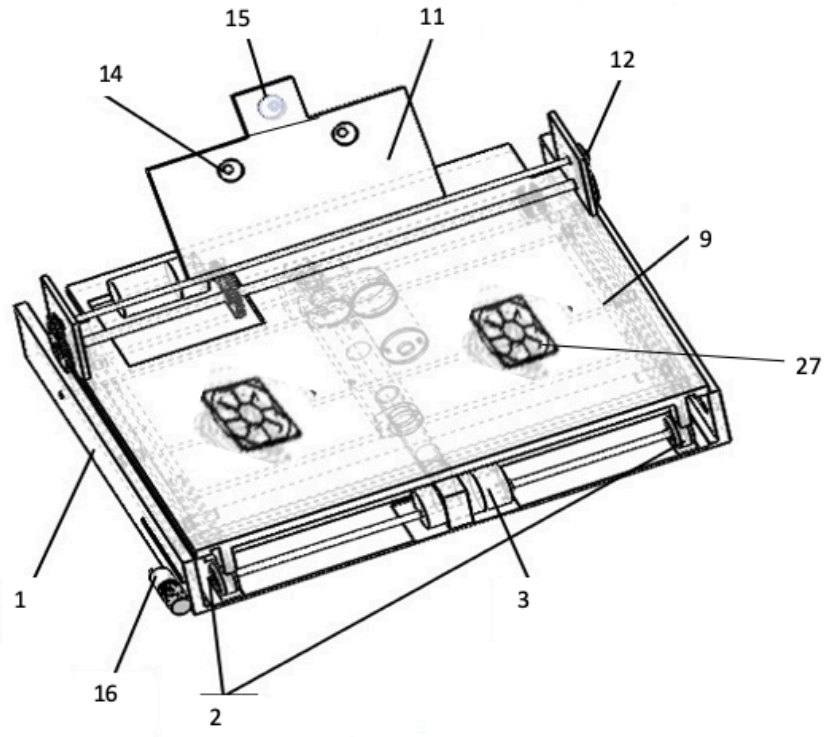


Fig. 7

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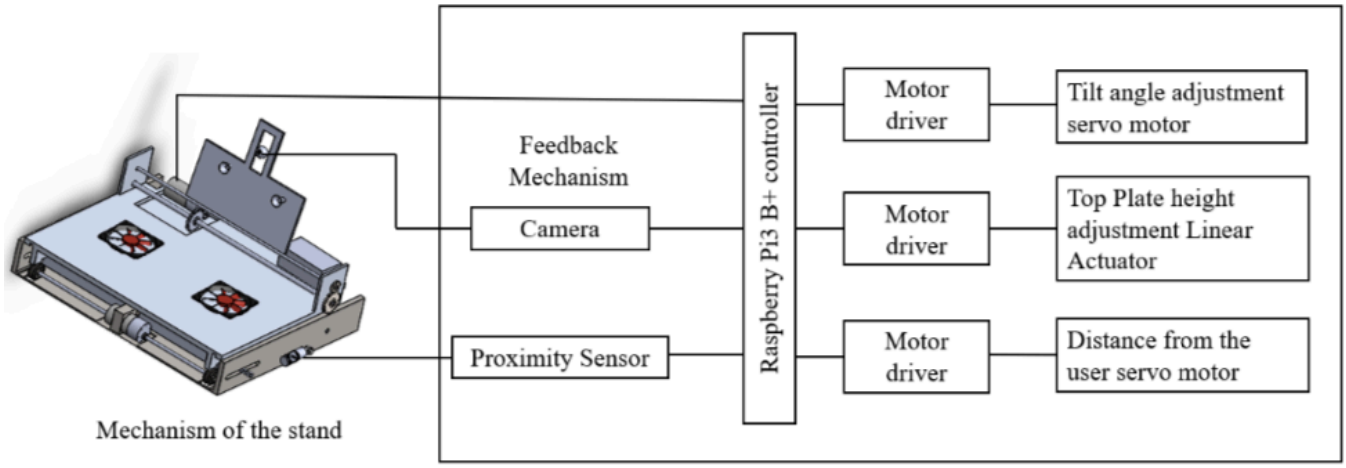


Fig. 8

Vijayalakshmi.T (IN/PA-3425)

On behalf of the Applicant