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The Future of Computer Ergonomics

Since the dotcom boom an increasing part of the workforce spends its workday typing or clicking. While computers have improved by leaps and bounds, their ergonomic features have not progressed in any significant way. Essentially the mouse and keyboard are the same as they were ten or even twenty years ago. But repetitive stress injury (RSI) incidents are growing at a fast pace.

According to the Bureau of Labor Statistics, in 1981 (when the IBM PC was released) only 18% of all occupational illnesses reported were due to repetitive stress injury (RSIs). In 1984 that figure grew to 28%, in 1992 to 52%, and by the year 2000 estimates were that 70% of all occupational illnesses reported will be RSIs. This rapid increase in RSIs coincides with the increase of personal computer use.

Starting with a typical computer mouse there are three essential problems. The plastic surface is too hard for the human hand to be pressing it for a full workday. The shape of the mouse does not enable the joints of the fingers to bend when clicking (when exerting force it is more natural and comfortable for the fingers to bend into a grasping position rather than remaining straight). Another shortcoming of the average mouse is the lack of support for the wrist, hence the large market for wrist supports.

Some of the most serious injuries that Dr. Emil Pascarelli (a specialist in RSI treatment) has seen have come from mouse use. The mouse strains the hand by forcing repetitive use of one finger, and is awkward to hold.

NEW ACCESSORY

Jacob Innovations LLC has developed add-on silicon pads that help correct hand position. The [PADandCLICK](#) accessory has finger pads which allow the joints to bend when clicking while providing a softer surface to press against. They also increase the total surface of contact between the finger and mouse which results in less strain for each click. For a worker who spends over eight hours a day clicking the new accessory bring relief, according to reviews posted by customers and various articles. The palm pad lifts the wrist and allows the hand curve into a more grasping position – as the hand is designed to function in the natural world – grabbing, holding etc.

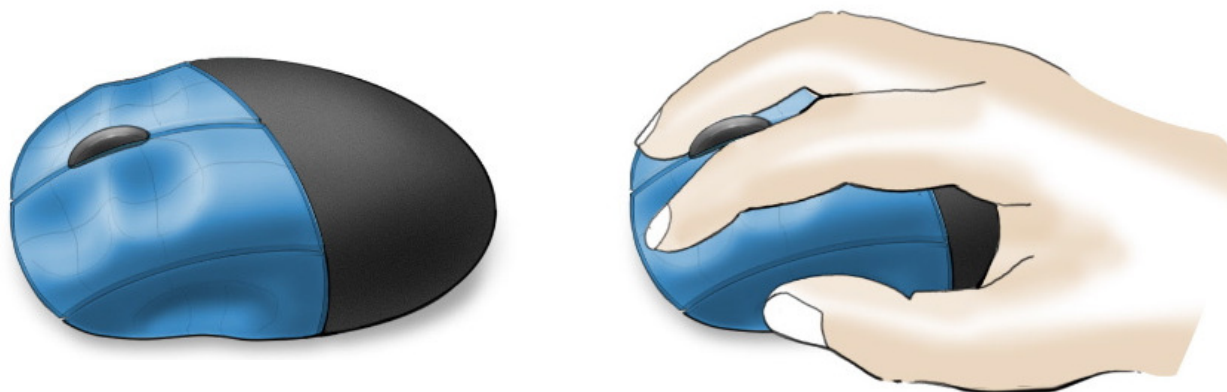




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NEW MOUSE

A further development by Jacob Innovations LLC improving mouse ergonomics is a new mouse incorporating the PADandCLICK benefits as well as additional ergonomic features. We view the PADandCLICK gel pads as a short term solution and correction of a typical mouse. In the future we envision mouse that has soft silicon built into it as well as an additional button for the thumb to duplicate the index. This allows alternate use of the index and the thumb. A double click, for example, can be alternated by a click with the index and one with the thumb. This feature reduces the repetitive stress on the index finger currently resulting from the typical mouse.



Jacob Innovations LLC is currently proposing the new concept for a mouse with built in silicone - GeloMouse.

NEW KEYBOARD

Looking at the conventional keyboard there is room for extensive improvement. The current computer keyboard, to the detriment of millions of users, is quite the same as the initial typewriter (QWERTY) keyboard. The QWERTY keyboard was designed, or rather redesigned, to slow down the typist. Initially the order of the letters starting in the top left corner was ABCD... but this made typing too fast and caused the keys to jam when the typist worked quickly. To solve the problem inventor Christopher Sholes in 1875 patented a new keyboard placing the commonest letters further away from each other in order to slow down the typist and avoid jamming. While the QWERTY arrangement helped reduce the jamming problem for typewriters it is slowing down typing today and is detrimental computer ergonomics. The order of the keys is not the main problem however. The main ergonomic impediment with a computer keyboard is requiring the fingers to be held up in the air while typing. In other words if the hand could rest on a rounded surface while activating the keys the RSI would be greatly reduced. This is very difficult with a typical keyboard as the hands and fingers need to be held up in the air to move across the keys which are spread over too large an area.

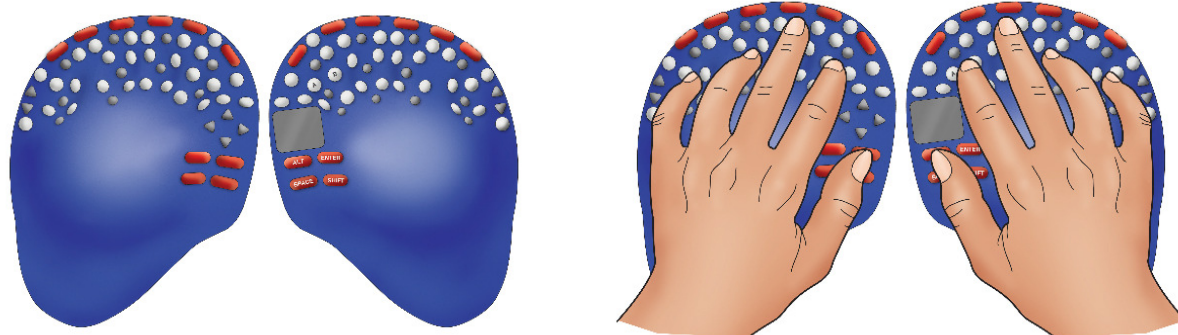
Jacob Innovations LLC has designed a new keyboard where almost all keys are at the tip of each finger requiring minimal movement and pressure for each activation. The FingerTip keyboard is designed to have the hands rest on a round/convex surface in the most natural, curved, position and each finger only presses the specific keys assigned to it at its tip. This ensures that all ten fingers are used and that no typing classes are required to learn which finger should press a specific key. The keys are designed and placed in slightly concave areas at the tip of each finger which ensures that only the assigned keys can be pressed by each



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finger. One of the main goals of the FingerTip keyboard is to create as much as possible a grasping/inward turning of the hands and fingers while typing since this position and movement is more natural (as the hand was design to hold and grab). The new keyboard may also have a touchpad for basic mouse functions which ideally should be alternated with a regular mouse to encourage change in hand position and movement.

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NEW KEYBOARD

Jacob Innovations LLC is initially targeting the FingerTip keyboard for users who suffer from pain due to typing, particularly those who have had surgery and are reluctant to return to typing. In the long run, given the increasing number of jobs at the keyboard, the new concept might be a preferred choice for employers.

HANDHELD COMPUTERS

The growing use of handheld computers has increased the number of Repetitive Stress Injuries. Since all functions are performed by using only the thumbs there is a great exposure to RSI, hence even new terms such as “Blackberry Thumb”. Given the number of workers who are often on the road and need to use handheld devices for extensive emailing the incidents of RSIs and required surgery from hand held computer use is growing.

Jacob Innovations LLC has developed a new design for handhelds that helps reduce the strain on the thumbs. The goal of the new design is to make use not only of the thumbs but all ten fingers. The new keyboard for handheld computers provides keys in the rear of the handheld as an alternative to the front keys activated by the thumbs. The keys in the rear are only an alternative to the keyboard in the front. Users have the option of using the rear keys only when facing pain in their thumbs. As with the FingerTip Keyboard the FingerTip Handheld will have small buttons assigned for the tip of each finger. In order to know where each key is in the rear of the keyboard there is a “map” in the front where the user can see the buttons assigned to each finger. This design helps not only reduce repetitive stress injury but also to type faster. The rear of the new handheld may also have a touchpad that enables more effective scrolling.



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The number of surgeries required due to damage from repetitive stress injury (RSI) goes into the hundreds of thousands. According to the Bureau of Labor Statistics, RSI's of all types account for 60% of all reported occupational illnesses. The estimated direct cost to businesses was over \$25 billion in 1993 just in the U.S. The vast majority of RSI's are a result of computer use. The question remains to why have there not been any serious changes in computer ergonomics to date. Perhaps due to the effort required to make the change or the switch to newer and different designs, or that the problem has not reached a critical point to be reviewed more thoroughly. But as the number of RSI's is growing the likelihood for change and even requirements of new standards seems likely in the not so distant future.

Sources:

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