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A Study on The Characteristics of Computer Mouse Used By Vietnamese University Students in Academic and Research Activities

Hoang Thanh Thuy[1*], Nguyen Thu Trang[2], Kim Khue[3]

[1,2,3]Hanoi University of Science and Technology,
Hai Ba Trung District, Hanoi, Vietnam

Abstract:
This study was conducted to evaluate the compatibility between computer mouse size and hand size of university students in Vietnam. Three popular types of computer mice on the market were selected for analysis, with the participation of 200 students in the survey and measurement process. The research results show that the type of computer mice preferred by Vietnamese students are medium-sized Logitech mice with a price range from 100,000 to 500,000 VND. They often have the habit of using the mouse for an average of 3 to 5 hours per day; following the Claw Grip posture on mice with a slightly symmetrical design and a height that fits the palm. The hands of male and female Vietnamese students have an average length of 16.4 – 17.8 cm and an average width of 6.9 – 7.5 cm. With such hand dimensions, mice with a length ranging from 10 to 11.5 cm would be suitable.

Keywords: ***student, computer mouse, carpal tunnel syndrome, ergonomic…***

1. Introduction

Vietnamese students nowadays use computers at a high intensity for studying, researching, designing, and entertainment. The continuous use of the mouse over long periods of time can lead to various health problems such as wrist strain, shoulder and neck muscle pain, and reduced academic performance, especially when sitting posture is incorrect or the duration of use is prolonged. The computer mouse was invented by Douglas Engelbart in 1964, with a basic structure consisting of a casing, buttons, scroll wheel, sensor (optical or laser), and electronic circuitry. At present, computer mice are classified according to various criteria, such as sensor technology, connection type, purpose and design, or ergonomic features that help reduce wrist strain.

Studies by Albin have emphasized the importance of ergonomic design based on anthropometry; the study of human body dimensions provides designers with useful tools to produce optimal products, helping to prevent injuries, enhance safety, and improve user comfort [1] (Albin & Molenbroek, 2023). Product design based on anthropometry, with particular emphasis on hand dimensions and strength (pressure, compression), serves as the foundation for creating products that meet users' needs. The more compatible a product is with the user's hand size, the easier and more convenient it is to use [2] (Yang et al., 2021). Body dimensions significantly influence the overall size of the skeletal structure, with distinct differences between males and females; specifically, adult women tend to have smaller hands and feet than men. In addition, among older individuals, this trend becomes more pronounced, resulting in smaller skeletal sizes, especially in the arms and hands [3] (Wen et al., 2020). Physiologically, men tend to have shorter finger lengths relative to palm width, while women generally have slightly longer fingers compared to their palm width – a finding that has been confirmed in the majority of international anthropometric studies. This difference represents an average impact of approximately 2.5% across the global population sample, meaning that women's fingers are typically about 2 mm longer than men's when compared proportionally to palm width [4] (Rincón-Becerra & García-Acosta, 2020). These differences highlight the importance of ergonomic designs that account for gender variations, particularly when developing hand-operated devices used for extended periods, such as computer mice, which require designs in multiple size options.

In Vietnam, research on ergonomics has not yet seen as many in-depth studies as in some developed countries. Existing research mainly revolves around workplace design, improvement of tools, and methods to reduce wrist and finger muscle strain during prolonged work. Ergonomic design for educational devices and tools used by students remains limited, particularly for frequently used products such as computer mice. In this context, conducting a study on the computer mouse usage characteristics of Vietnamese university students—aiming to identify commonly used types of mice, related health issues, and propose improvement solutions—is highly necessary.

Focusing on ergonomic research in Vietnam will make an important contribution to sustainable development in terms of labor, public health, and economic growth in the modern context.

2. Experimental Study

2.1. Research Subjects

This study focuses on two main subjects:

- **Computer mouse:** The survey covers common types of computer mouse in Vietnam, including optical mouse, laser mouse, ergonomic mouse, vertical mmouse, and mini mouse The selected brands include Logitech, Razer, Microsoft, and various affordable mainstream models.
- **Students:** The research subjects consist of university students aged 18–25. The survey sample ensures a balance in terms of gender, field of study, and mouse usage frequency.

2.2. Research Content and Methodology

2.2.1. Survey on Usage Demand

The objective of this research section is to identify the most used type of computer mouse among the student community. Subsequently, the study analyzes the relationship between mouse selection and both academic performance and health.

The research employs a survey method to collect data from students. The sample consists of 200 students from several universities to investigate the needs and habits related to mouse usage. Participating students were randomly selected to ensure representativeness of the student population.

Data were collected through an online questionnaire, with questions related to the design, features, and user experience of the computer mouse. The questionnaire included both closed-ended (yes/no) and open-ended questions to gather detailed information.

The questionnaire content includes:

- Type of mouse used (optical, laser, ergonomic, mini).
- Popular mouse brands.
- Price range and selected market segment.
- Frequency of use (less than 1 hour/day, 1–3 hours/day, 3–5 hours/day, more than 5 hours/day).
- Issues encountered when using the mouse, such as hand fatigue or difficulty in operation.

The collected data were processed to determine the frequency and usage trends of computer mice, as well as the relationship between mouse type and both comfort level and health-related issues.

2.2.2. Identification of Computer Mouse Design Characteristics

Based on the manufacturers' catalogs, the study collected information including dimensions (length, width, height), weight, and special features such as DPI buttons, LED lights, or macro buttons. The computer mice were classified into three size groups—small, medium, and large—to facilitate comparison.

2.2.3. Assessment of Compatibility Between Mouse Size and Vietnamese Students' Hand Dimensions

The objective of this study is to assess the compatibility between computer mouse dimensions and students' hand dimensions in order to determine the level of comfort and provide recommendations for design.

Methodology:

a. Determination of Students' Hand Dimensions

To design an optimal computer mouse for users, it is necessary to base the design on the dimensions of palm length, palm width, and finger sizes to create a product that fits the user's hand, optimizing comfort and efficiency during use. The key hand dimensions that need to be considered include:

- **Hand Length (Dbt):** Measured from the wrist (the area in contact with the mouse) to the tip of the middle finger. This parameter helps determine the overall size of the mouse to match the user's hand length.
- **Hand Width (Rgbt):** Measured as the horizontal width from the base joint of the index finger to the base joint of the little finger when the hand is open. This measurement helps define the appropriate mouse width to ensure the hand can rest comfortably on its surface.

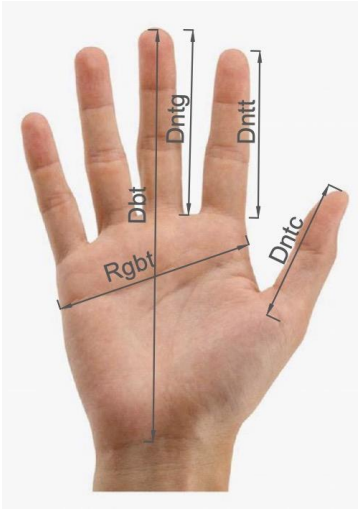

Figure 1. Measurement of hand dimensions

- **Thumb Length (Dntc):** Measured from the base joint of the thumb to the fingertip. This parameter supports the design of side function buttons for easier accessibility.
- **Index Finger Length (Dntt):** Measured from the base joint to the tip of the index finger. This length helps design the distance from the main buttons to the palm rest, determining the spacing between the primary buttons.
- **Middle Finger Length (Dntg):** Measured from the base joint to the tip of the middle finger. This measurement aids in positioning the primary buttons of the mouse to align comfortably with the middle finger when gripped.

To ensure systematic, accurate, and regionally representative data, these measurements are based on previously published anthropometric research data: "*Survey Results on Certain Anthropometric Indicators (Static Indicators) of Vietnamese Workers in the Current Period"* [5]

b. Comparison of Hand and Computer Mouse Dimensions

- Analyze the compatibility between mouse sizes (small, medium, large) and hand dimensions.
- Identify the proportion of students who experience discomfort due to incompatible mouse size.

c. Experimental Study

- Five male and five female students were selected from the group of 200 students, with hand lengths ranging from 14.5 cm to 18 cm and hand widths between 6.5 cm and 8 cm, to conduct the experimental study. All 10 students had the habit of using a computer mouse regularly, with a minimum daily computer usage time of 5 hours.
- The mouse samples selected included three Logitech models available on the market that met the criteria specified in the survey (Figure 2). The main differences among these three models were in the length and height of the mouse.
  - Sample A: Pebble M350, a symmetrical mouse with a length of 106 mm.
  - Sample B: Silent M331, a slightly asymmetrical design with a length of 105 mm, medium palm height, a small thumb rest, and a slim body.
  - Sample C: G403 Wireless Prodigy, a gaming ergonomic mouse with the largest length of 124 mm.

Figure 2. Images of the tested mouse models

- The experimental setting was selected according to standard learning space criteria. The standards included working surface height and operating plane.
- The experiment was conducted over the course of one hour, involving clicking and pointing tasks similar to those performed in daily academic activities. The total task completion time for each type of mouse was 20 minutes.

The task sequence included performing multiple-choice exercises involving mouse clicks to select checkboxes arranged horizontally and vertically within a time limit. The tasks also included clicking and selecting in technical drawing exercises, involving full-screen, medium-distance, and short-distance movements. During task execution, participants were required to move the mouse as quickly as possible while maintaining stability in both speed and accuracy.

Before using the mouse, participants were asked to provide their initial preferences based on appearance and tactile feel. After completing a series of multidirectional pointing and clicking tasks with each mouse, participants then ranked their final mouse preferences. The mouse-clicking journey diagram is illustrated in Figure 3.

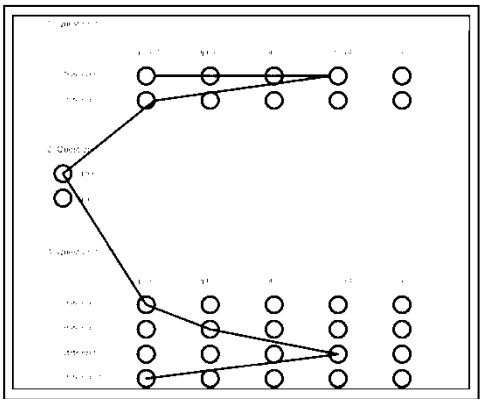

Figure 3. Simulation of clicking and selection tasks in the experiment

- The experiment was conducted using three mouse grip styles: Palm grip (the whole hand envelops the mouse); Claw grip (fingers and part of the palm are used); and Fingertip grip (only the fingertips are used to hold the mouse) [6].

Figure 4. Mouse grip postures

3. Research Results And Discussion

3.1. Characteristics of Students Using Computer Mouse

Among the 200 students participating in the survey, 60% were male and 40% were female. They had an average age of 20 and were studying majors such as engineering, economics, and computer science. They had the habit of using a computer mouse daily, with an average usage time ranging from 3 to 5 hours per day (Figure 5).

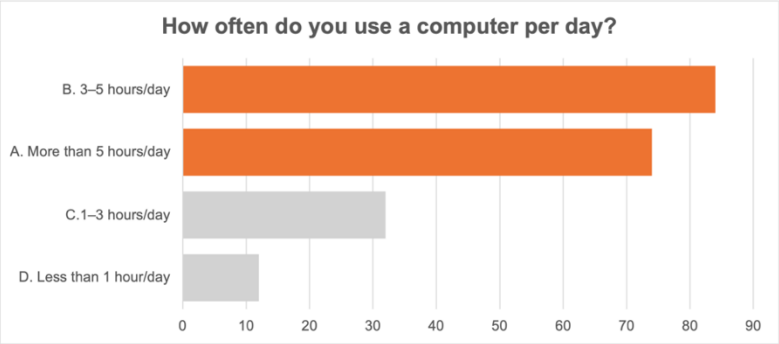

Figure 5. Daily computer usage frequency

3.2. Characteristics of Computer Mouse Commonly Used by Students

Computer mice commonly used by Vietnamese students are typically affordable, ranging from 100,000 to 500,000 VND (Figure 6). Popular products are often from brands such as Logitech, Fuhlen, Zadez, or Genius. Wired or wireless optical mice with symmetrical designs are the most widely used. Students majoring in graphic design often use high-sensitivity mice with ergonomic designs. Survey results indicate that the majority of students use Logitech mice due to their low cost, reliability, and popularity.

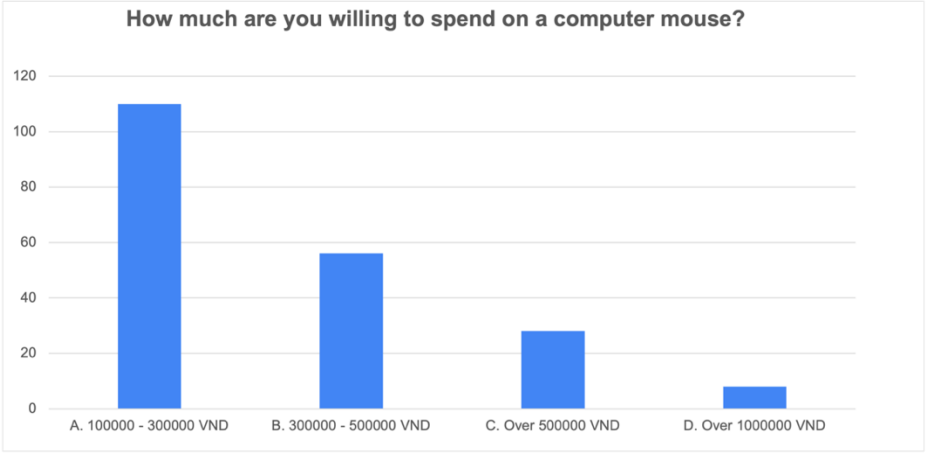

Figure 6. Commonly chosen mouse price range

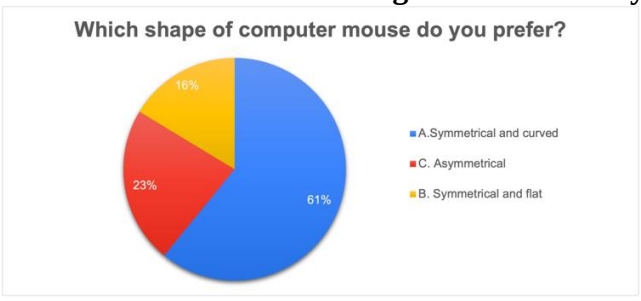

Figure 7. Preferred types of computer mouse

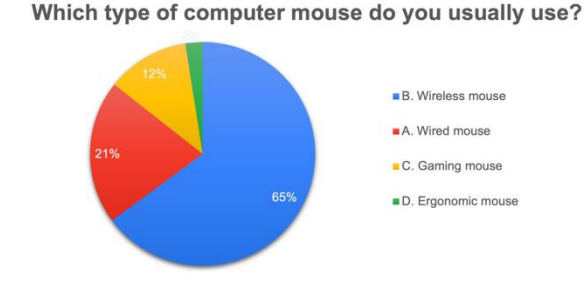

Figure 8. Most commonly used types of computer mouse

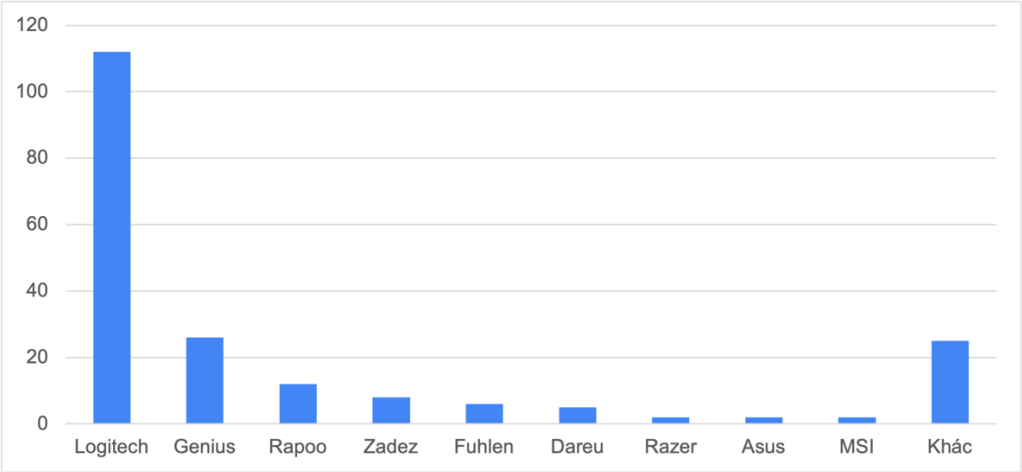

Figure 9. Survey chart of the most preferred mouse brands

3.3 Determining the Hand Size of Vietnamese Students

Within the scope of this study, the research team adopted the measurement results of male and female students' hands from previous studies [7,8,9]. The hand dimensions of male and female students were then compiled and are presented in Table 1.

Table 1. Hand size parameters for research on sudents using a computer mouse.

No	Symbol	Measurement	Hand size data					
			Male Students (Avg.)	Female Students (Avg.)	Min	Max	Standard deviation (SD)	Coefficient of variation (Cv)
1	Dntg	Middle finger length	7.839	7.315	7.39	9.30	0.40	4.86
2	Dntt	Index finger length	7.095	6.682	5.1	8.25	0.42	5.78
3	Dntc	Thumb length	6.045	5.605	4.2	6.8	0.41	6.89
4	Dbt	Overall hand length	17.82	16.42	14.6	20.61	0.71	3.66
5	Rgbt	Palm width	7.68	6.933	6.4	9.98	0.45	4.99

3.4. Experimental study on the compatibility between computer mouse size and Vietnamese students' hand dimensions

On the other hand, the research team also adopted the research method of Peter Wallace Johnson [10] to determine the type of computer mouse that best fits the hand dimensions of Vietnamese male and female students. Based on the dataset of Vietnamese students' hand measurements, the corresponding mouse dimensions were identified according to Peter's recommendations, as shown in Table 2.

Table 2. Dimensions of computer mouse and hand for research [Peter]

Age	Hand length (cm)	Recommended mouse length (cm)	Hand width (cm)	Recommended mouse width (cm)	Experimental size group
Adult male ♂	19	12 (group 1)	8,7	6.2 (group 1)	
Adult female ♀	17,6		7,8	5.2 (group 2)	Group selected for experimental size
13	17	10,0 (group 2)	7,8		
12	16,5		7,2		
11	15,5		7		
10	15		7		
9	14,5	8,5 (group 3)	6,5	4,4 (group 3)	
8	14		6,5		
7	13,5		6,2		
6	12,8		6		
5	12,6		5,8		
4	11,8	7,2 (group 4)	5,5	3.8 (group 4)	
3	11,1		5,2		

Based on the information about students' hand dimensions and the corresponding suitable mouse dimensions, the study was conducted to evaluate the level of comfort or strain when students operate a computer mouse.

The experimental results showed that, with the same tasks, there was no significant difference in the time required to complete them. Most students used the Claw Grip posture. Therefore, with sample A, hand maneuverability was more limited compared to samples B and C. Sample B was assessed to be more suitable for both Claw Grip and Palm Grip postures.

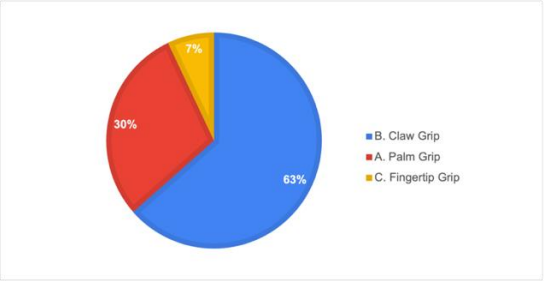

Figure 10. Mouse grip posture survey.

The survey results indicated that students tend to prefer traditional mouse designs with which they are already familiar. Before performing the tasks, the mouse samples were ranked based on grip feel and appearance. Among them, the medium-height mouse (Sample B) received the highest rating (Table 3).

After completing the tasks with all mouse samples, participants were asked to re-evaluate their preferences. The results showed that Sample B remained the most favored. However, the average rankings of Samples A and C changed, with Sample C's ranking decreasing after use. Notably, Sample C – with a longer design – was rated lowest both before and after the experiment.

The reason Sample B was prioritized was due to its design fitting well with the users' hands, allowing easier manipulation compared to the other models. Conversely, Sample C received lower ratings due to its oversized dimensions, which were not suitable for users' hand sizes, and its excessive number of buttons, which hindered smooth operation. Additionally, using this mouse required users to adjust their hand posture, reducing working efficiency. When high-speed manipulation was required, Sample C was reported to be more difficult to control than the other mouse models.

Table 3. Preferences for mouse models before and after the experiment

The bottom row represents the average ranking for each mouse model [N = 10]. Lower values indicate stronger preference.

	Before Experiment				After Experiment		
	Sample A	Sample B	Sample C		Sample A	Sample B	Sample C
Rank 1	2	6	2	Rank 1	2	8	0
Rank 2	3	3	4	Rank 2	6	2	2
Rank 3	5	1	4	Rank 3	2	0	8
Average Ranking	2,3	1,16	2,5	Average Ranking	1,66	1,5	2,8

Based on these results, it is possible to propose suitable computer mouse dimensions that match the hand sizes of Vietnamese university students. This is of great importance, as a mismatch between mouse size and hand dimensions may affect performance and lead to various musculoskeletal issues [11–14].

The main limitation of this study lies in the short duration of interaction with the tested mice. The surveyed mouse samples may differ slightly from the participants' commonly used devices, requiring a period of adaptation. This could have impacted their performance and, consequently, led them to prefer the traditional models. Furthermore, the experiment was conducted under simplified usage conditions, which indicates the need for further development and expansion of this research.

4. Conclusion:

This study identified the characteristics of computer mice preferred by Vietnamese university students, which are primarily medium-sized Logitech models priced between 100,000 and 500,000 VND. These students typically use a mouse for an average duration of 3 to 5 hours per day. The average hand length of male and female Vietnamese students ranges from 16.4 to 17.8 cm, while the average hand width falls between 6.9 and 7.5 cm. Based on these measurements, the students' hand sizes are compatible with mice ranging from 10 to 11.5 cm in length. They commonly use the Claw Grip posture and prefer mice with a slightly symmetrical design and moderate height that fits comfortably in the palm.

References

1. Albin, T. & Molenbroek, J. (2023). Introduction to the Special Issue, Anthropometry in Design. Ergonomics in Design.
2. Yang, Y., Zhou, H., Song, Y., & Vink, P.(2021). Identify dominant dimensions of 3D hand shapes using statistical shape model and deep neural network. Applied Ergonomics.[source]
3. Wen, J., Wang, J., Xu, Q., Wei, Y., Zhang, L.,Ou, J., & Tong, M. (2020). Hand anthropometry and its relation to grip/pinch strength in children aged 5 to 13 years. Journal of International Medical Research, 48(12),0300060520970768.
4. Rincón-Becerra, O. & García-Acosta, G.(2020). Estimation of anthropometric hand measurements using the ratio scaling method for the design of sewn gloves. Dyna.
5. Dr. Ngan Pham Thi Bich, MSc. Hien Nguyen Thi, and colleagues. Survey Results on Certain Anthropometric Indicators (Static Indicators) of Vietnamese Workers in the Current Period. Journal of Science and Technology Activities on Occupational Safety, Health, and Environment, Issues 1, 2 & 3, 2020.
6. https://www.daskeyboard.com/blog/claw-grip-palm-grip-fingertip-grip-mouse-grips/
7. Anh, L.T.N., Cuc, N.T.K., Hien, P.T., Nga, T.T., Van Doanh, T., Hieu, T.M. (2022). Research on the Characteristics of the Length, Breadth, and Diagonal Hand Dimensions of Male Students by Indirect Measurement Method. In: Khang, N.V., Hoang, N.Q., Ceccarelli, M. (eds) Advances in Asian Mechanism and Machine Science. ASIAN MMS 2021. Mechanisms and Machine Science, vol 113. Springer, Cham. https://doi.org/10.1007/978-3-030-91892-7_61
8. Bui Van Huan ,Do Thi Hoa Nga. Research on Establishing the Hand Size System of Hung Yen Female Students for Leather Glove Design. Journal of Science and Technology, Hanoi University of Industry .140 (2020) 025-030.
9. Pham, T. T. V., Tran, N. A., & Vu, D. T. (2022). Research anthropometry of hand, upper limbs, height,and weight of Thai Binh Medical University. Journal of Military Pharmaco-medicine, 47(5). https://doi.org/10.56535/jmpm.V20220506
10. Erin HughesPeter Wallace JohnsonPeter Wallace Johnson. Child Computer Use and Anthropometry. Conference: Proceedings of the Human Factors and Ergonomics Society Annual MeetingVolume: pp 1716-1719. DOI: 10.1177/1071181311551356
11. E. Fernström and M. O. Ericson, 1997. Computer mouse or Trackpoint - Effects on muscular load and operator experience. Appl. Ergon., vol. 28, no. 5–6, pp. 347–354
12. E. Gustafsson and M. Hagberg, 2004. Computer Mouse Use in Two Different Hand. Positions: Exposure, Comfort, Exertion and Productivity. Appl. Ergon., vol. 34, no. 2, pp.107–113
13. A. Delisle, D. Imbeau, B. Santos, A. Plamondon, and Y. Montpetit, 2004. Left-handed versus right-handed computer mouse use: Effect on upper-extremity posture. Appl. Ergon., vol. 35, no. 1, pp.21–28.
14. C. Jensen, V. Borg, L. Finsen, K. Hansen, B. Juul-Kristensen, and C. H, 2008. Job Demands, Muscle Activity and Musculoskeletal Symptoms in Relation to Work with the Computer Mouse. Scand J Work Env. Heal., vol. 24, no. 5, pp. 418–424.

Author Profile

Hoang Thanh Thuy received a Master of Science degree in Civil Architecture from Hanoi Architectural University, Vietnam in 2023. Currently she is working at the Department of Mechatronics, Hanoi University of Science and Technology (HUST). She has been involved in teaching and research in the field of industrial design.

Her research interests Architecture of Industrial Construction, Construction design of Garment factory, Construction design of Chemical plant, Industrial Design. She has authored/co-authored several scientific papers published in national and international journals and conferences.