iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** V **Month of publication:** May 2026

DOI: https://doi.org/10.22214/ijraset.2026.81971

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue V May 2026- Available at www.ijraset.com

Mechanic's Creeper and Portable Toolbox Integration for Faster Automotive Servicing

Frank Dagondon[1], Ryan A. Yamson[2], Christian Benaro[3], Rommel Pabricante[4], Reymond Callao[5], Bon Kevin Awatin[6], Noel Cabanca[7], Dr. Mario B. Pardillo[8]

Abstract: ***This study explores the development and user acceptability of Mechanic's Creeper and Portable Toolbox Integration designed to improve efficiency in under-vehicle maintenance, particularly in environments where hydraulic car lifters are unavailable. Traditional methods using mechanical jacks, conventional creepers, or improvised materials such as cardboard often result in ergonomic discomfort, inefficiency, and workflow problems. To address these challenges, the researchers designed a multi-functional device that combines a creeper and tool storage, enabling technicians to access tools conveniently while working under the vehicles.***

The findings demonstrate that a mechanic's creeper and portable toolbox integration effectively improves productivity, minimizes physical strain, and optimizes the workplace. Although quality was rated lower than other aspects, it remained at acceptable standards, suggesting possible refinement for heavy-duty applications. Overall, the study concludes that the proposed innovation is a practical, ergonomic, and efficient solution for users, specifically in automotive servicing, especially in resource-limited workshop environments

Keywords: Mechanic's Creeper, Portable Toolbox Integration, Under-vehicle Maintenance, Ergonomic Design, Automotive Technology, Product Development.

I. INTRODUCTION

Vehicle maintenance tasks such as under-chassis replacement often require car-lifting tools that are physically demanding and time-consuming. A hydraulic car lifter is a piece of lifting equipment that is used to raise cars/vehicles off the ground to enable technicians to gain access to the underparts of the vehicle. Hydraulic jacks tend to have higher lifting capacities than mechanical jacks owing to the amount of force that can be generated by the hydraulic cylinders, which produce the lifting action. But the unavailability of a hydraulic car lifter is often a problem for technicians performing services on vehicles. Instead, they use mechanical jacks and a creeper to gain access to vehicles' underchassis parts. But the unavailability of a hydraulic car lifter is often a problem for technicians performing services on vehicles. Instead, they use mechanical jacks and a creeper to gain access to vehicles' underchassis parts. Mechanic creepers are essential tools for automotive mechanics, providing mobility and comfort during repair and maintenance tasks. But most mechanics still insist on using large sheets of cardboard and rags to spread out under vehicles to work on. Although it is cost-effective, readily available, and easily accessible, it has its issues, such as ergonomic discomfort, its bulky nature and inability to move it under cars (Herold, 2023). To address the issue, we are going to innovate the traditional mechanic's creeper by integrating a creeper mechanism within the portable toolbox. Users can conveniently transport their tools while also having a creeper board that can easily access the car under the chassis and can support various tasks in repairing vehicles outside the shop.

Traditional mechanics are lacking in features, limiting their usability, and are defined as a single-purpose tool. However, a lot of innovations were applied through the years, Afrifa, J. et al.,(2025). Innovated an Adjustable Height Mechanical Creeper; they stated that the creeper was more effective, allowing quick and stable positioning at different heights.

A portable toolbox is essential in automotive work as well, because it provides easier access and storage of tools while working. Some innovations of toolbox is The Multi Trolley Tool Box project by Muhammad Saizul Ariff bin Salahuddin and Sheikh Ahmad Farouk bin Abdullah (Politeknik Sultan Salahuddin Abdul Aziz Shah, 2021) was developed to address common workshop issues including lost tools, disorganized storage, lack of power access, difficulty moving heavy equipment, and limited workspace – identified through observations in shops, homes, and the institution's own workshops for welding, foundry, and machining tasks.

Combining the capability of a mechanic's creeper and the portable toolbox may consume less time and space in doing services, especially when a car lifter is unavailable.

©IJRASET: All Rights are Reserved

II. STATEMENT OF THE PROBLEM

The investigation focuses on the user acceptability of a combined Mechanic's Creeper and Portable Toolbox. The evaluation is structured around four core metrics: Functionality, Usability, Build Quality, and Ergonomic Design, to determine if this integration effectively improves under-vehicle maintenance tasks. In general, the focus of this study is to provide an innovation of the conventional mechanic's creeper and portable toolbox. This is to address the problem of Automotive technicians and students, specifically in Cebu Technological University Main Campus, when doing services in the shop, particularly in an environment lacking a car lifter.

III. OBJECTIVES OF THE STUDY

The following are the objectives formulated for the study :

1) Ensure immediate tool accessibility by keeping necessary equipment within arm's reach as the mechanic is working under the vehicle.
2) Improve workflow speed by limiting the need to slide in and out from under the car to retrieve different tools.
3) Enhance ergonomic safety by allowing the mechanic to remain in place, neutral position, while working and accessing tools.

IV. METHODOLOGY

This research utilizes a survey instrument to evaluate the technical requirements and user acceptability of the integrated Mechanic's Creeper and Portable Toolbox. The study was conducted at the Cebu Technological University – Main Campus, located at the corner of M.J. Cuenco Avenue and R. Palma Street, Cebu City.

The respondents consisted of students enrolled in the Bachelor of Industrial Technology, majoring in Automotive Technology. As the primary users of shop equipment, these students are directly responsible for managing service-related challenges within the automotive laboratory. Data was collected through structured questionnaires administered after the respondents utilized the product; the resulting perceptions were then analyzed and interpreted using appropriate statistical tools to test the research hypotheses.

V. RESULTS AND DISCUSSIONS

This study innovates the conventional mechanic's creeper into a versatile, multi-purpose tool. To ensure a simplified, cost-effective, and efficient production process, we prioritized streamlined design, manufacturing, and assembly. Research by Sarhan and Kalichman, (2025) supports this approach, noting that ergonomic designs can reduce task duration by 5–15 minutes compared to standard models. Every component has been designed properly for safety and durability, as illustrated in the following 2D design.



The evaluation of the Integrated Mechanic's Creeper and Portable Toolbox yielded highly positive results, particularly concerning its practical application in automotive maintenance. Based on the data gathered from the Bachelor of Industrial Technology major in Automotive students at Cebu Technological University, the device achieved an overall mean score of 4.59, placing it in the "Highly Acceptable" category. Among the four core metrics, Ergonomic Design received the highest rating (4.70), followed closely by functionality (4.65) and Usability (4.58). While Build Quality received a slightly lower score of 4.42, it remained well within the "Acceptable" range, indicating that the prototype is structurally sound for standard workshop tasks.

The high scores in Functionality and Usability directly support the study's first and second objectives: ensuring immediate tool accessibility and improving workflow speed. This reduction in "motion waste" aligns with lean manufacturing principles, which emphasize that minimizing non-value-added movement is essential for operational efficiency (Sundar et al., 2014). Respondents noted that the integration of the toolbox into the creeper frame effectively eliminated the "stop-and-start" nature of under-chassis work. Traditionally, a technician must slide out from under the vehicle multiple times to retrieve different tools, a process that is both time-consuming and physically taxing. By keeping necessary equipment within arm's reach, the device allowed for a continuous workflow, proving to be a superior alternative to the traditional use of cardboard or standalone creepers that lack storage capabilities. This mirrors the goals of workplace organization frameworks like the 5S system, which advocates for "setting in order" to ensure that tools are available at the point of use (Gapp et al., 2008).

From an ergonomic perspective, the prototype addressed the significant discomfort issues identified by Herold (2023). The top-rated metric, Ergonomic Design, highlights the device's success in allowing mechanics to maintain a supported, neutral position while working. Students reported that they no longer had to perform awkward spinal twists or reach outside their immediate radius to find tools, which significantly reduces the risk of long-term work-related musculoskeletal disorders (Punnett & Wegman, 2004). By optimizing the interface between the technician and the equipment, the design adheres to fundamental anthropometric principles, ensuring the tool fits the physical needs of the user rather than forcing the user to adapt to the tool (Pheasant & Haslegrave, 2016). This advancement fulfills the third objective of the study, proving that an integrated design provides better physical support than makeshift solutions or single-purpose tools.

VI. CONCLUSION

In conclusion, the discussion of these results suggests that combining mobility and storage into a single unit is a highly effective innovation for automotive servicing. The data confirms that the Integrated Mechanic's Creeper and Portable Toolbox optimizes space and time, particularly in environments where hydraulic car lifters are unavailable. While the build quality was deemed acceptable, further refinements in material selection and structural reinforcement could enhance the unit's durability for heavy-duty professional use, a standard step in the iterative product development process (Ulrich & Eppinger, 2012). Overall, the study demonstrates that the prototype is a functional, ergonomic, and user-friendly solution that meets the modern demands of automotive technicians.

VII. ACKNOWLEDGEMENT

First, we want to thank Almighty God for giving us the strength, wisdom, and perseverance to complete this research paper. Without His guidance and blessings, we could not have finished this academic work. We appreciate Cebu Technological University (CTU) – Main Campus for offering a great place for learning and research. To our research adviser, Mr. Reyhn Dominique Bantilan, thank you for your patience, expert guidance, and constructive feedback that helped us improve this study. Your mentorship was key to making this work happen. We're also grateful to Dr. Mario M. Pardillo for his helpful suggestions and expertise, which improved the quality of this study . A special thanks goes to my fellow researchers, Ryan A. Yamson, Bon Kevin Awatin, Frank Dagondon, Rommel Pabricante, Christian Benaro, Noel Cabanca and Reymond Callao , for our teamwork, late nights, and constant encouragement. We shared the heavy workload easier and even enjoyable. To the participants and respondents of this study, thank you for your time and cooperation. This research would not be possible without your honest contributions.

Finally, We offer our deep gratitude to our family for their steady emotional and financial support. Your belief in our abilities has inspired us to strive for excellence.

REFERENCES

[1] Abreek-Sarhan, N., Sarhan, B., & Kalichman, L. (2025). Integrating Physical, Psychosocial, and Ergonomic Factors in Human-Work System Design for Educators: A Systematic Review.

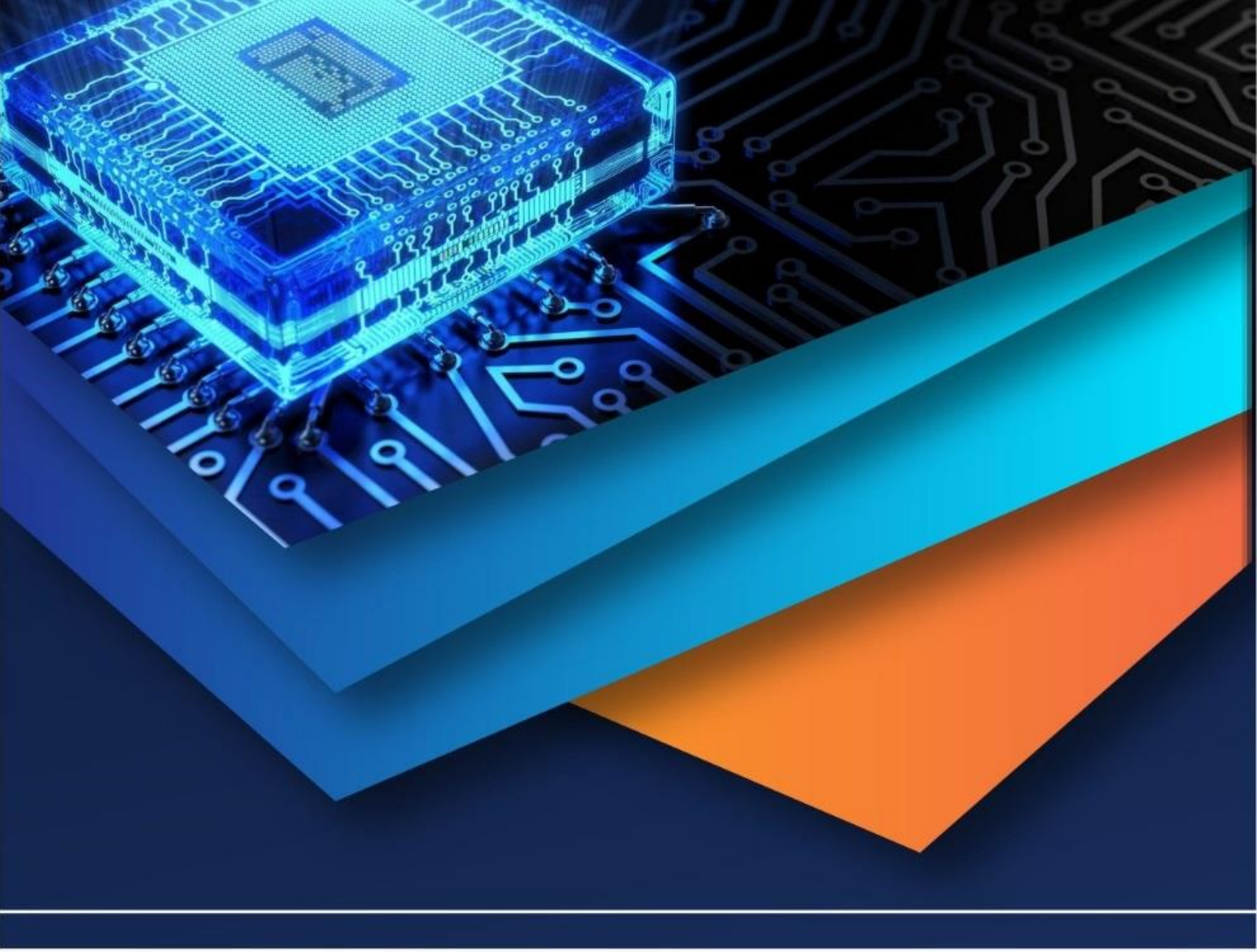
[2] Afrifa, J. Y., Amoanab, N. J., Dery, F., Naawe, N., Awongo, S. D., Akokre, E. A., & Dorbal, D. D. (2025). Engineering A Locally-Sourced Adjustable Height Mechanical Creeper for Enhanced Automotive Service Ergonomics. African Journal of Applied Research, 11(3), 73-85.

[3] Eppinger, S. D., & Ulrich, K. (1995). Product design and development.

©IJRASET: All Rights are Reserved

[4] Gapp, R., Fisher, R., & Kobayashi, K. (2008). Implementing 5S within a Japanese context: an integrated management system. Management decision, 46(4), 565-579.
[5] Herold, B. (2023). The evolution of auto mechanics: From cardboard to magic creepers.
[6] MUHAMMAD SAIZUL ARIFF BIN SALAHUDIN, S. A. F., & ABDULLAH, B. (2021). MULTI TROLLEY TOOL BOX.
[7] Pheasant, S., & Haslegrave, C. (2016). Bodyspace: Anthropometry, ergonomics and the design of work (Third)
[8] Punnett, L., Gold, J., Katz, J. N., Gore, R., & Wegman, D. H. (2004). Ergonomic stressors and upper extremity musculoskeletal disorders in automobile manufacturing: a one year follow up study. Occupational and environmental medicine, 61(8), 668-674.
[9] Sundar, R., Balaji, A. N., & Kumar, R. S. (2014). A review of Lean Manufacturing implementation techniques.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)