Volume 1, Issue 8 (2025)
PP 01-03

VIVA-TECH IJRI
ANNUAL RESEARCH JOURNAL

VIVA-TECH INTERNATIONAL JOURNAL FOR RESEARCH AND INNOVATION
ANNUAL RESEARCH JOURNAL
ISSN(ONLINE): 2581-7280

DEVELOPMENT OF COOLING MOBILE CASE

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Abstract: *Overheating has become a significant challenge for modern smartphones as they handle increasingly demanding tasks such as gaming, video streaming, and running high-performance applications. This paper explores the development of cooling mobile cases designed to address this issue. By leveraging innovative materials like TPU and incorporating mesh designs with perforations, these cases enhance airflow and heat dissipation while maintaining lightweight and durable profiles. Combining style, functionality, and sustainability, cooling mobile cases cater to consumer preferences for minimalistic, eco-friendly accessories. This research outlines the methodology for developing these cases, including material selection, prototyping, testing, and market analysis, offering a comprehensive approach to this innovative solution.*

Keywords *- Smartphone Overheating, Cooling Mobile Case, Mesh Design, TPU, Sustainable Materials, Heat Dissipation, Phone Accessories.*

I. INTRODUCTION

The development of cooling mobile cases represents a modern advancement in smartphone protection, seamlessly blending style, functionality, and innovation. Traditional phone cases focus on bulk and rigidity, whereas cooling mobile cases employ unique grid-like designs with perforations or tiny holes, enhancing airflow and reducing weight. Constructed from materials like TPU (thermoplastic polyurethane), silicone, or polycarbonate, these cases offer shock absorption while ensuring the device remains cool during intensive tasks. This innovative approach caters to users seeking minimalistic aesthetics without sacrificing protection, and the integration of sustainable materials addresses growing environmental concerns.

II. AIM

The primary aim of this research is to design and develop a mobile phone case that incorporates cooling capabilities to address overheating challenges faced by modern smartphones. Key objectives include:

1. Safeguarding smartphones against physical damage.
2. Enhancing airflow to manage heat dissipation.
3. Combining functionality with aesthetic appeal.
4. Exploring sustainable materials to promote eco-friendliness.

III. LITERATURE REVIEW

Existing studies provide valuable insights into the design and functionality of cooling mobile cases. Antonio Iera (2011) highlighted the adaptability of ad hoc networks, which can inspire the dynamic and innovative designs required for cooling cases. P. Bernardi et al. (2001) emphasized safety concerns with cell phone usage, underscoring the need for protective and heat-efficient cases. Tan & Lee (2022) demonstrated the effectiveness of mesh designs in reducing smartphone temperatures by approximately 15%, which significantly enhances device

performance. Further, Ethan K Murphy et al. (2024) showcased personalized modeling via 3D scans, a method applicable to customizing cooling case designs. Garcia et al. (2023) explored consumer trends, revealing a growing preference for lightweight, customizable, and modern accessories. Together, these findings establish a solid foundation for developing cooling cases that combine functionality, safety, and consumer appeal.

IV. METHODOLOGY

The methodology for developing cooling mobile cases involves several key stages. Material selection focuses on lightweight and flexible options like TPU, silicone, and polycarbonate, known for their durability and shock absorption. The design phase incorporates grid patterns with perforations to enhance airflow and facilitate efficient heat dissipation. Prototyping involves creating initial models to test fit, functionality, and cooling effectiveness. Rigorous testing evaluates drop protection, cooling efficiency, and usability, ensuring the cases meet industry standards. User feedback is collected through surveys to understand consumer preferences regarding comfort, aesthetics, and performance, guiding iterative refinements. Final adjustments based on testing and feedback optimize the design before moving to production planning, where sustainable practices and quality assurance protocols are established. The overall cost of developing these cases is estimated at approximately INR 1700 per unit, including materials, design, and production processes.

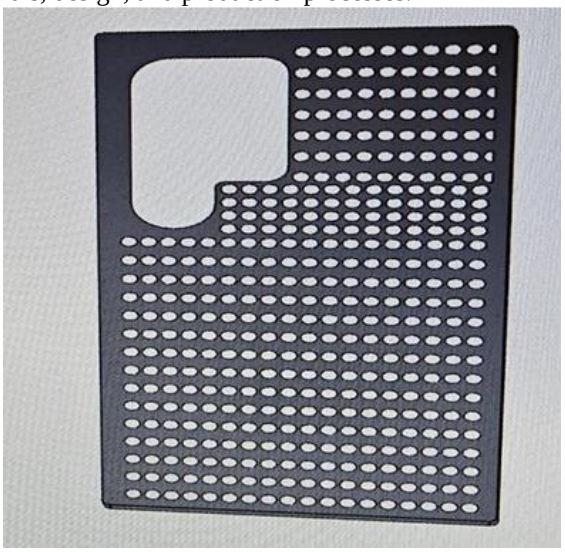

Fig. 3.1 Cooling Case Design (Solidworks)

V. CONCLUSION

Cooling mobile cases redefine smartphone protection by addressing overheating challenges while maintaining style and functionality. Lightweight and durable, these cases leverage mesh designs to enhance airflow and prevent thermal throttling during demanding tasks. Although less protective against severe impacts than fully enclosed cases, their minimalist design and personalization options resonate with modern consumers. Future research and innovation in sustainable materials and enhanced cooling technologies will further solidify their position in the accessory market.

Acknowledgements

The successful completion of this research would not have been possible without the guidance and support of numerous individuals. We express our deepest gratitude to our mentors and advisors for their insightful feedback and encouragement throughout the development process. We also acknowledge the contributions of the research team, whose dedication and expertise were instrumental in shaping this study. Lastly, we thank the participants of our market surveys and user feedback sessions for sharing their valuable insights, which played a crucial role in refining the proposed solution.

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