



2025 Biomedical Research Award
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Development of A Smart Orthodontic Retainer with Metasurface-Augmented Wearable Technology

Wearable technology has revolutionized various aspects of healthcare, offering innovative solutions for monitoring and improving health outcomes. The integration of wearable technology into orthodontic retainers represents a significant advancement in orthodontics. This approach not only enhances patient compliance but also provides data-driven tools for orthodontists to optimize post-treatment retention plans. Orthodontic retainers are indispensable in preserving the results of orthodontic treatment. Integrating wearable technology into orthodontic retainers represents a transformative step in orthodontic care. As technology evolves, the potential for even more sophisticated and effective orthodontic solutions will undoubtedly expand, ushering in a new era of personalized and data-driven orthodontic care. In this project, we propose to develop and evaluate the components of an innovative smart orthodontic retainer system. By combining real-time data collection, patient engagement, and advanced analytics, these smart devices promise to improve patient compliance and treatment outcomes. With the advent of modern technology, the future orthodontic treatment approach will adopt all technology and adapt to the modern lifestyle of patients. The future of orthodontic education will blend into the flow of technology, and we need to prepare all future orthodontists to be well-rounded and practice in evidence-based patterns. With the project specific to future orthodontic treatment and the support from the American Association of Orthodontists Foundation, we will be able to develop and conduct this project in a scientific, evidence-based, and productive way, and lead the project to a realistic outcome as a commercial product to be used in the daily orthodontic practice.