OralAI: A Fluorescence Based Mobile System for Dental Disease Prevention

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45% of people today are affected by oral diseases such as periodontal (gum) disease and dental caries (cavities). These can lead to tooth loss and have been linked to fatal diseases like cancer and diabetes. Due to high costs and inaccessible technology, oral care resources are often not available for those who need them, especially in developing countries. To help solve this problem, we propose OralAI, a novel dental detection system for at-home monitoring of users' oral health. By creating a dataset of over 200 tooth images with a custom physical prototype and by utilizing a novel UV-A fluorescence biomarker, we trained two YOLOv8 models to annotate areas of the user's mouth on which dental biofilm is present. We also created a full stack mobile application to allow for the real-time use of our models. Our models achieved high accuracies with a precision of 98.4% for teeth extraction and 93.4% for plaque identification. The mobile app was also tested qualitatively and achieved the same level of accuracy as seen in the dataset. Our data shows that the development of an affordable RGB image based system is feasible and produces accurate results that can be used by individuals to improve their oral health. We also examine the future business prospects of OralAI on the market. OralAI marks a significant advancement in oral health monitoring and has the potential to help billions of people globally.

Awards Won:
First Award of $5,000
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $58,000 each)
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