MICRO:BIT-INTEGRATED INTERACTIVE BRUSHING GLOVE FOR GAMIFIED PEDIATRIC ORAL HYGIENE AND MOTION TRACKING

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Abstract

Oral health issues are prevalent among young children and children with special needs, often stemming from a lack of engagement and incorrect brushing techniques. To address these challenges, this project developed an innovative interactive glove designed to transform mundane routine brushing into an engaging, gamified experience. The core of this innovation is a micro:bit-integrated system that utilizes machine learning and motion-tracking technology to monitor brushing behaviors in real-time. The methodology involved using the micro:bit's built-in accelerometer to detect movement across three axes. Through the micro:bit CreateAI platform, machine learning models were trained to recognize three essential brushing poses: the right cheek area, the left cheek area, and the chewing surfaces. The hardware configuration includes a micro:bit, sensor bits, a Grove WiFi adapter, and a monitor running the Blynk application. To ensure the movements are performed correctly, the device tracks repetitions, requiring ten strokes for each side and twenty for chewing surfaces, displaying progress on an integrated screen. Auditory feedback, including celebratory music upon completion, serves as a positive reinforcement to encourage habit formation. Results indicate that the innovation successfully increases children's motivation to brush their teeth, potentially reducing long-term oral health problems. Furthermore, the accompanying mobile dashboard allows parents to monitor brushing frequency and history, providing peace of mind. While the current prototype effectively demonstrates the concept, future developments will focus on waterproofing the components, optimizing the device's size for smaller hands, and refining the machine learning accuracy to provide a more seamless and user-friendly experience.

Keyword: Interactive Brushing Glove, Micro:bit, Machine Learning, Oral Health