Intraoral Dental Scanner

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Background

- Traditional analog dental molds are a dying practice due to their limitations with accuracy, ease of use, and time
- Modern dental scanners contain extrenuous software features and retail for upwards of $195,000

Objective

- Design a user-friendly and cost-effective dental scanner to generate 3D models for purpose of dental implant design by dental labs
- Capable of real-time visual feedback during acquisition

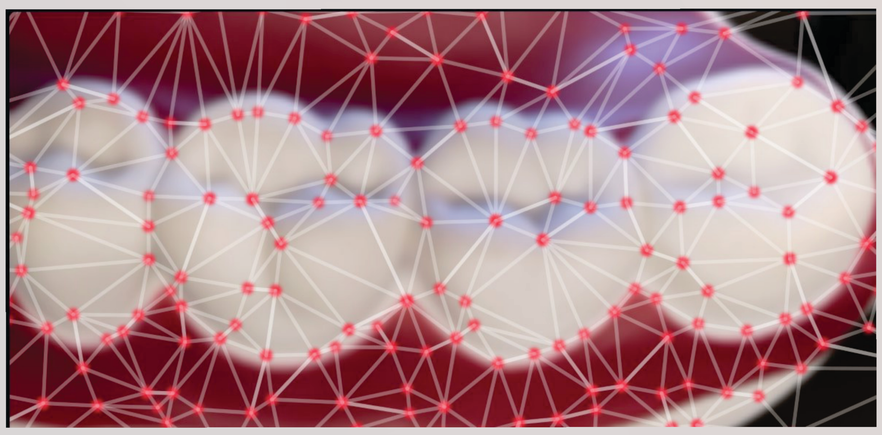
Design Solution

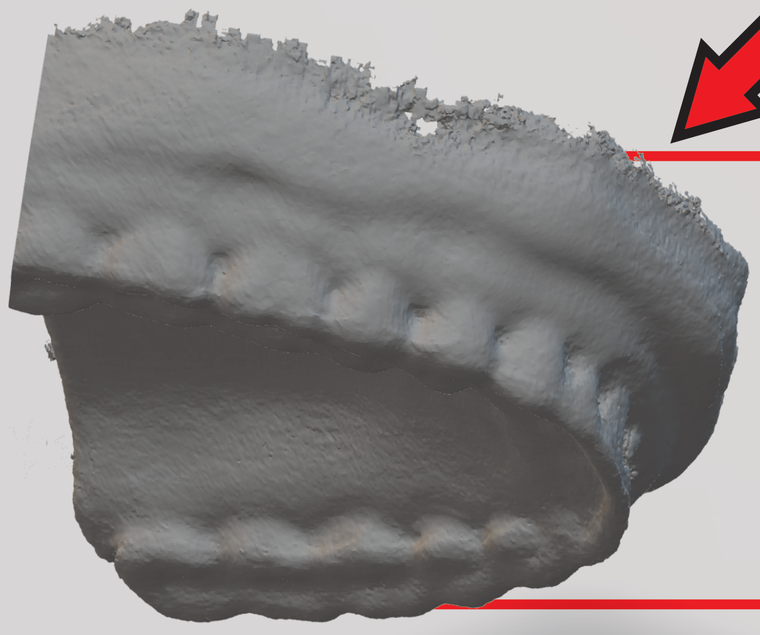
Step 1: Light Projection and Image Capture

- Structured light in a phase-shifted pattern is projected onto the teeth
- Deformation of the projection due to the 3D structure is captured by the camera

Step 2: Depth Calculation

- Triangulation is used to calculate depth from the captured images
- The projector can be used effectively as a camera, providing the secondary view necessary for the calculation



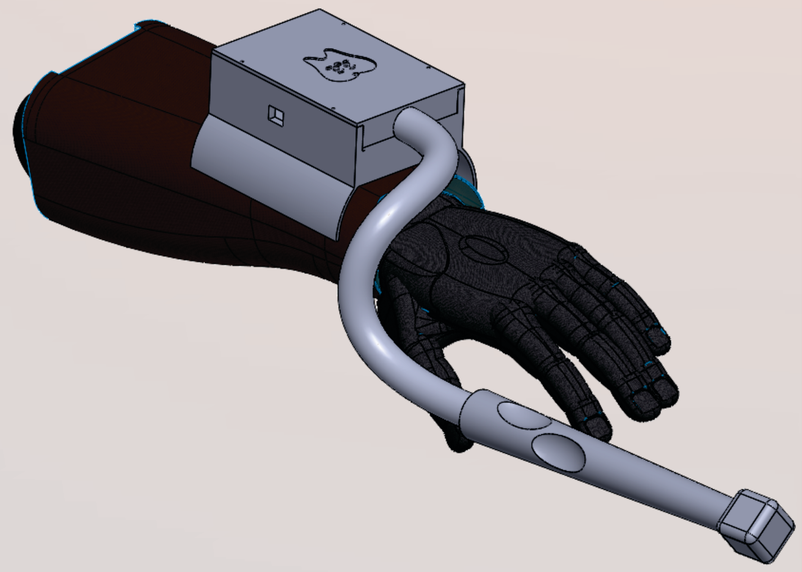


Step 3: 3D Reconstruction

- Combining the depth maps calculated above using feature registration to create the final mesh
- Generated 3D model can be sent to dental labs for orthodontics design

Design

- The DLP module is encased in a shell strapped to the users arm
- Projector and camera are housed in a probe on the end of a stylus
- This orientation gives the operator ideal maneuverability during acquisition and minimizes flex cable length which reduces electrical noise



Future Work

- Manufacture a flex circuit cable to increase range of motion and ease of the stylus
- Invest in costlier, smaller components in order to scale down the size of the final product
- Water and humidity proof the camera and projector lens
- Assure the final prototype meets health and safety standards for industry scanners through in vivo testing and validation
- Aim for price point in the range of $10,000 to $15,000 to be market competitive

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