

Improving Dental Bracket Application While Opening a New Market for Dentists Through Artificial Intelligence

How Deep Learning is transforming the orthodontic industry.



The Challenge

Resolving malpositioned teeth through the application of dental braces, a relatively straightforward process, can be expensive and requires long-term coordination with an orthodontic specialist. The complexity and challenge comes from the experience and precision needed to analyze a patient's mouth, correctly position the brackets and accurately track changes in teeth movement during the straightening process. While this complexity currently requires an orthodontist, a dentist could feasibly apply the brackets with proper training.

“A whole new market is being opened up to us. But, it's not just allowing us to expand our business. We are now able to bring high-quality care through braces at an affordable price.”

- Dentist in the Midwest

The Solution

4th-IR is collaborating with an orthodontic bracket technology company (OBT) to explore how artificial intelligence can be used to apply dental braces. By working with OBT to modify bracket design, computer recognition and measurement technology can now assist in bracket application, opening the door for dentists to apply braces at a significantly lower cost to patients.

Through the use of augmented reality (AR), Artificial Intelligence (AI) and Deep Learning, 4th-IR is able to simulate an orthodontist's decisions to guide in bracket placement and provide a second set of highly-trained eyes. Through several stacked Deep Learning algorithms, AI can recognize a patient's mouth structure, segment the teeth from the background, and suggest the correct bracket placement.

Key Product and Services Features

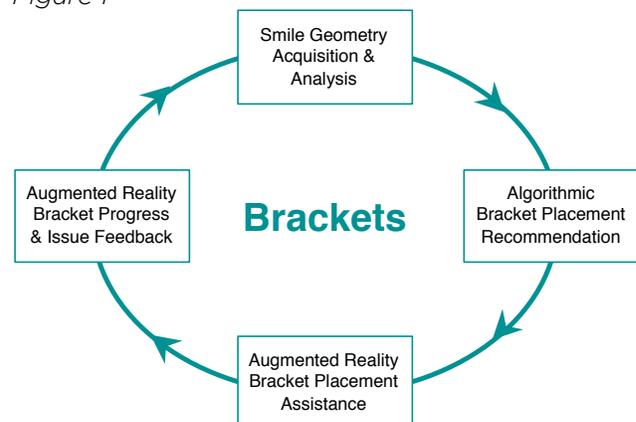
- Visualization of optimal bracket placement on teeth
- Quality control of actual bracket placement against suggested placement
- Ongoing progress monitoring against treatment plan
- Unique bracket design that facilitates high-quality placement
- Initial process and application training
- Multi-channel customer support

By applying this digital application, 4th-IR and OBT are able to train dentists in bracket placement and transform the orthodontic market.

Changing the Game in Bracket Placement

Collaborating with 4th-IR, OBT has modified the braces design to be compatible with AI technology. 4th-IR then developed an AI-backed, digitally enhanced placement and service capability, known as the placement ecosystem (see Figure 1) that makes it possible for dentists to apply braces.

Figure 1



Capturing Experience Through Trained Algorithms

Experience makes a big difference, but even the best trained orthodontists are not always able to do a perfect job. However, experience can be replicated and augmented by a trained algorithm that can approximate and exceed human knowledge and visual acuity to guide dental professionals in making correct decisions.

Once brackets are in-place, teeth begin moving. By observing the movement at a micro level, undetectable by the human eye, early deviations from the treatment plan can be seen and understood. This will guide the dental professional on the proper adjustments to the patient's teeth.

The collective observations from thousands of patients will result in a clearer understanding of the dynamics of teeth movement and bone growth. This benefits future applications.

An Easy-to-Follow, Step-by-Step Treatment Plan

At an appointment, a dentist takes a prescribed set of pictures of the patient's mouth and feeds them into the Digital Ortho Analysis System for recommendations. The system applies its trained algorithms and proposes next steps for treatment. The dentist interacts with the system to determine a final diagnosis and treatment plan.

This initial consult is fast and based on extensive AI analysis. The technology allows for infinitely complex reasoning and can draw differentiated inferences from the data and pictures provided.

With an App Dental Professionals Can Be Sure

After a dental assistant places the brackets on a patient's teeth, and before curing the epoxy, a final inspection is needed by the dentist. There

is a finite set of measurements that needs to be conducted.

“The efficiency and accuracy of this new approach to dental braces is amazing. It feels almost magical in the way treatment is applied today.”

- Dentist

Though an experienced orthodontist can assess the application, an augmented reality app can assist dental professionals when applying them. Brackets are now placed with even higher accuracy through image processing.

With the app, the dentist points a smart phone or tablet camera at the patient's mouth, submits the image and then receives recommendations on ideal bracket placement.

The Next Evolution

When introducing a new product like digital brackets, it's important to understand how the digital ecosystem around the physical product will evolve. Understanding what will become commoditized versus what will be differentiating in the future defines success. Looking at this layer-by-layer allows clients to make smart investment decisions in areas truly impacting business profitability.

Years of Experience Without Having Years of Experience

With our new AI systems, dentists with limited orthodontic experience can be taught and shown how to correctly place brackets on teeth with a higher degree of accuracy than a seasoned orthodontist. Even if there is a point where a dentist is unsure, or needs extra guidance, they can work directly with the AI team for customized service and assistance, giving dentists peace of mind.



4th-IR combines machine learning with business and healthcare expertise to develop practical technology solutions that enable healthcare organizations to deliver premium care while enhancing their bottom line.

Kreuzbuchstrasse 24 | 6045 Meggen, Switzerland | +41 79 9423303
122 Uptown Drive | Suite 204 | Bay City, MI, 48708, U.S.A. | 989.402.5441

www.4th-ir.com