



NYU



## Smart Braces

**Improved orthodontic bracket design allowing for more precise movement of target teeth without significantly effecting adjacent teeth.**

### Technology Overview

Orthodontists and researchers from NYU College of Dentistry have designed an orthodontic system that can apply a force to a tooth in a targeted manner, which can be easily adjusted based on the needs of the clinician and required tooth movements during treatment. The system consists of a bracket designed with rotating wheels that can slide on the wire without external forces using compressed coil as a source of energy. The wheels are locked until the clinician releases the spring, when, due to friction between the wheel and the wire, the spring gradually releases its energy by rotating the wheel. There are two springs in each bracket that are able to rotate in opposite directions, providing the opportunity for clinicians to achieve movement in short or long distance. This design can be incorporated in both standard self-ligating or non-self-ligating bracket design or a special bracket that is fully adjustable and can rotate in 3D, move up and down, and perform all the required movements in clinical orthodontics independent of each other. Using the bracket as the source for activation of force and moments instead of the wire will significantly advance the practice of clinical orthodontics, allowing the clinician to easily improve the position of the braces based on the needs of the patient as treatment progresses. In addition, this will allow a significant increase in use of flexible wires, since bends are not necessary and the desired forces and moments can be incorporated by changing the angulation of braces instead of the wire. This design can be used with conventional rigid wires or with a corrugated wire, specifically designed for use with this design to increase the efficiency of the wheels.

### Background

In orthodontics, in order to close or open space, it is necessary to move the teeth toward or away from each other. Traditional braces are passive and need to be pushed or pulled along a wire by external forces, such as metal closing springs or rubber materials. This design suffers from several shortcomings: 1) Elastic material require constant renewal; 2) All external forces from one side of a brace are attached to target teeth, while the other side is attached to anchor teeth, which allows for unintentional movement of the anchor teeth; 3) Some of the external force tools, such as springs, are bulky and often cause discomfort and irritation for the patient; 4) Renewal of external forces is time consuming for orthodontist. Therefore, there is a clear need for a source of energy inside the bracket that can move the bracket on the wire without significantly affecting adjacent teeth.

### Benefits

### Category

Life Sciences/Medical devices

### Authors

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### Learn more



- Eliminates the need for application of springs, power chains, power treads, or any other source of external forces.
- Eliminates the need for constant replacement of power chain and power thread that have a quick force decay.
- More comfortable than traditional braces that use external force application such as springs, which can cause irritation.
- Eliminates the need for excessive force on anchor teeth
- Saves significant chairside time for orthodontists by eliminating the need for reactivation

### **Applications**

- Closure of space after extraction
- Protraction of whole dental arch
- Retraction of whole dental arch
- Canine retraction
- Correction of overjet
- Expansion of the arch
- Constriction of the arch
- Orthopedic screws for expansion or constriction

### Patents

[Ultra-Adaptable Orthodontic System - U.S. Patent No. 11,197,741](#)

[Orthodontic System and Device - US. Patent No. 11,259,898](#)