**Dr. Melih Motro**
**2026 Biomedical Research Award**
**Boston University**

**Short Biography**

Dr. Melih Motro is a Clinical Professor and Director of Research in the Department of Orthodontics and Dentofacial Orthopedics at Boston University Henry M. Goldman School of Dental Medicine. His academic and research interests focus on the integration of artificial intelligence, computer vision, digital orthodontics, and augmented reality into orthodontic diagnosis, treatment planning, education, and clinical care.

Dr. Motro has developed and mentored multiple projects involving AI-based image segmentation, orthodontic imaging analysis, real-time video object detection, and digital workflows for orthodontic applications. His long-term goal is to build clinically useful, evidence-based AI systems that support orthodontic education, improve treatment accuracy, and help residents and clinicians make more consistent decisions in patient care.

**Brief Description of the Project**

This project proposes the development of an AI-driven augmented reality system for real-time orthodontic bracket placement guidance. Accurate bracket placement is essential for efficient orthodontic treatment. Even small errors in bracket position can lead to prolonged treatment time, additional wire adjustments, bracket repositioning, and less predictable outcomes.

The proposed system will use real-time artificial intelligence to segment teeth, gingiva, and brackets from intraoral video. Based on this live segmentation, the system will overlay ideal bracket position markers directly onto the clinician's view through a smartphone, tablet, or augmented reality device. Unlike static digital setups or indirect bonding guides, this approach is designed to dynamically adapt to each tooth and to camera or patient movement in real time.

The project has three main goals. First, we will develop and optimize a real-time AI segmentation model for intraoral video. Second, we will build an augmented reality overlay system that provides live visual guidance for bracket positioning. Third, we will evaluate the system using typodont trials and a pilot clinical study involving orthodontic residents. The outcomes will include bracket placement accuracy, bonding time, user feedback, and early evidence of clinical usefulness.

**How Orthodontic Education Will Benefit From the Award**

Orthodontic education will benefit directly from this project because bracket placement is one of the most important technical skills residents must learn, yet it remains highly dependent on experience, visual judgment, and repeated practice. An AI-driven AR guidance system can serve as a real-time educational tool that gives residents immediate visual feedback while they perform bracket bonding.

This technology can help residents understand ideal bracket position more clearly, recognize errors earlier, and improve consistency across different tooth morphologies and malocclusions. By using the

system on typodonts and later in clinical settings, residents can receive objective feedback on their accuracy, including linear and angular deviations from the planned bracket position.

The project also creates a new model for orthodontic education in which clinical skill development is supported by computer vision, augmented reality, and measurable performance data. This can help bridge the gap between simulation-based learning and real patient care. In the long term, the system may become part of resident training curricula, allowing programs to teach bracket placement in a more standardized, objective, and technology-enhanced way.

**Why the Foundation Is Important to the Project**

The American Association of Orthodontists Foundation is important to this project because early-stage educational and clinical innovation requires support before it can attract larger external funding or industry partnership. This project involves several development steps, including AI model refinement, AR software development, typodont testing, resident participation, and pilot clinical evaluation. Foundation funding would provide the critical support needed to move the project from concept and preliminary development into a functional prototype that can be tested in an orthodontic educational setting.

The Foundation's mission is closely aligned with this work because the project is designed not only to improve clinical bracket placement but also to advance orthodontic education. By supporting this project, the Foundation would help create a training tool that uses emerging technology to improve resident learning, clinical consistency, and future patient care.

Foundation support would also make it possible to generate pilot data, refine the system based on resident and faculty feedback, and prepare the project for larger grant applications, publications, and broader dissemination within orthodontic education.

**How Foundation Funding Is Expected to Benefit My Career**

Foundation funding would have an important impact on my academic career by allowing me to expand my research program at the intersection of orthodontics, artificial intelligence, computer vision, and augmented reality. This award would support the development of a novel educational and clinical technology that reflects my long-term goal of building practical AI tools for orthodontics.

The funding would also help me generate preliminary data for future larger grants, publish the results in peer-reviewed orthodontic and dental education journals, and create opportunities for collaboration with residents, dental students, engineers, and computer scientists. Most importantly, it would strengthen my ability to mentor trainees in emerging digital technologies and help position our department as a leader in AI-supported orthodontic education.

This support would therefore not only advance one project but also help establish a sustainable research direction focused on technology-enhanced orthodontic training and patient care.