

# Ideas Lab “Intelligence in Motion”



Winston Yang,  
Founder and CEO

In sports, an athlete’s technique, speed, agility, and control could mean the difference between scoring a goal and a career-ending injury. Understanding the body’s position at impact during a golf swing or release point for a pitch has traditionally been the work of trained coaches or biomechanics specialists. However, with the ubiquity of sensors embedded in uniforms, shoes, footballs, and equipment like a tennis racket or helmet, quantifying human motion analysis is now available for anyone with enough budget. Sensors, however, are largely banned from competitive play, and even for those sports which can use sensors, transforming that data into actionable insights is often difficult and unwieldy.

To address these challenges, new optical-based technologies have emerged in sports arenas around the world, tracking the movement of individual players or the balls themselves being hit, thrown or passed. This has predictably resulted in an explosion of data. The “sabermetric” revolution in baseball (named after the acronym SABR or the Society for American Baseball Research and popularized by

the Hollywood success of Moneyball), has been copied across nearly every other athletic endeavor by ingesting data points into actionable insights on the field. Similarly, frictionless, high-speed photometric-based technologies using both traditional and AI computer vision techniques, meant that videos themselves could become the format for game analysis. This provided the opportunity to not only analyze live games, but also to “time travel” back by analyzing historical footage or sports recordings anywhere. While this represented a significant leap forward in sports analytics, an integrated approach linking player dynamics, from the lower body starting with foot positioning to the release or impact point given a bat, golf club or other instrument analysis, was still critically missing. Enter Ideas Lab.

“We translate the way athletes move, perform and play into actionable insights in order to improve safety and achieve better performance”

Ideas Lab has built the first-ever proprietary artificial intelligence model providing a holistic, end-to-end analysis of an athlete. Integrating a range of AI technologies, including machine learning, human motion analysis, semantic segmentation, pattern and predictive analytics, Ideas Lab works with sports teams and other vendors within the sports ecosystem to help

connect movement with insight. “We translate the way people move, perform, and play into measurable data to achieve optimal outcomes, both in terms of improving performance and increasing safety,” says Winston Yang, founder and CEO of Ideas Lab.

Ideas Lab was founded in 2017 as an innovation lab, developing leading-edge technologies and AI-based solutions for generating quantitative insights from body movement without the need for sensors. This means that anyone with a smartphone can capture, quantify and understand human movement. “While the applications for this technology vary widely, we have chosen to focus primarily on sports/athletics given the product/market fit, market potential, high barriers to entry and relatively few competitors and how nascent our addressable market is,” remarks Yang. The company engages clients through tailored AI solutions, software development and licensing. Today, Ideas Lab is creating a network of corporate and academic partners who will support its mission in improving human performance and safety through cutting-edge technologies.

## MOTION TRACKING TECHNOLOGY SOLUTIONS FOR EACH SPORT

The Ideas Lab team typically works with the analytics teams or coaches of professional teams to understand how player motion analysis can help drive measurable and actionable improvement. For instance, to help the performance of PGA players in golf, the company’s solution can track the tilt, turn, bend and displacement of the body throughout the swing. By using video capture like a smartphone, anyone, anywhere, can track and compare their hip movement through the swing with

## TECHNOLOGY

The technology we are developing has the capability to perform both human motion analysis and instrument (bat, golf club, tennis racket) tracking without the use of sensors. Recent advances in AI and deep learning now allow us to perform motion analysis recognizing both body and instrument key points using machine vision only. Current solutions use sensors which are not only cumbersome but in real live sporting situations, prohibited.

Ideas Lab has developed a proprietary AI model which allows us to process real-time movement providing situational context (e.g. is the golf player set up in the proper position to swing the golf club, has our most beloved parent fallen and has not moved).

### Human Motion Analysis

Analyzes body position and joint location without sensors

### Sentiment Analysis

Identifies range of emotions based on video

### 3D Mesh Technology

Provides human topographic data in movement

### Head Pose Estimation

Analyzes head and neck movement and facial gestures

### Object Recognition

Recognizes diverse objects with text & audio identification

### Bat Tracking Technology

Analyzes bat movement and orientation

that of professional players or even their former selves in earlier games. In the case of hockey, larger stride length in skating is known to correlate with better performance. In soccer, the company is able to measure the proper angle of attack to kick a ball or potentially avoid getting injured on the field.

When it comes to baseball, motion capture technologies have enabled granular analysis of the ball like spin rate, while increasingly sophisticated human limb analysis captures the movement of the baseball player. In early 2019, Ideas Lab developed the first-ever swing tracking technology that uses a proprietary AI model to simultaneously track the batter’s joint locations and the baseball bat’s spatial orientation using only images or videos. For the first time, player analysis can be combined with both human motion dynamics and the bat itself, providing an entirely new level of analysis for players, managers, fans, and multiple other stakeholders in baseball, such as global brands sponsoring individual athletes.

In American football, kickers play a critical role in each game. Typically, annual contracts with the NFL can range from several hundred thousand to over a million dollars—choosing the right kicker, applying the right level of training, and managing kickers is an expensive business. The Tampa Buccaneers (The Bucs) is among the top franchises in the NFL, a position they reached by applying advanced analytics to player-specific strategies. In late 2018, The Bucs started having discussions with Ideas Lab to apply its human motion analysis technology to understand player behavior. Both companies agreed to work on tracking and analyzing kicker biomechanics. Together with the Bucs, Ideas Lab will complete its white paper in October 2019 to be presented at a conference or published in academic literature.

“Ideas Lab’s human motion analysis technology has allowed us to evaluate player performance and biomechanics in a way that was never possible before”

- Tyler Oberly, Director of Football Analytics at the Tampa Bay Buccaneers

## THE FUTURE INTERSECTION OF HUMAN MOTION ANALYSIS AND PREDICTIVE DATA ANALYTICS

Since Ideas Lab’s technologies lie squarely at the intersection of human movement and data analytics, there are multiple use cases where it can be transformative. Ideas Lab is planning to venture into healthcare as motion tracking is an important aspect in this sector as well. For example, the company can leverage motion analysis for a wide variety of medical contexts, from measuring gait performance and patient recovery to improving clinical training programs in surgery, and more.

From an AI perspective, Yang says, “Today, we are living in a technology arms race. Those teams who possess vast amounts of data, develop the most accurate AI predictive models, and able to draw meaningful insights will be the ones in the best position to win.”