


The Science of Karate: AI-Driven Biomechanics for Future Masters

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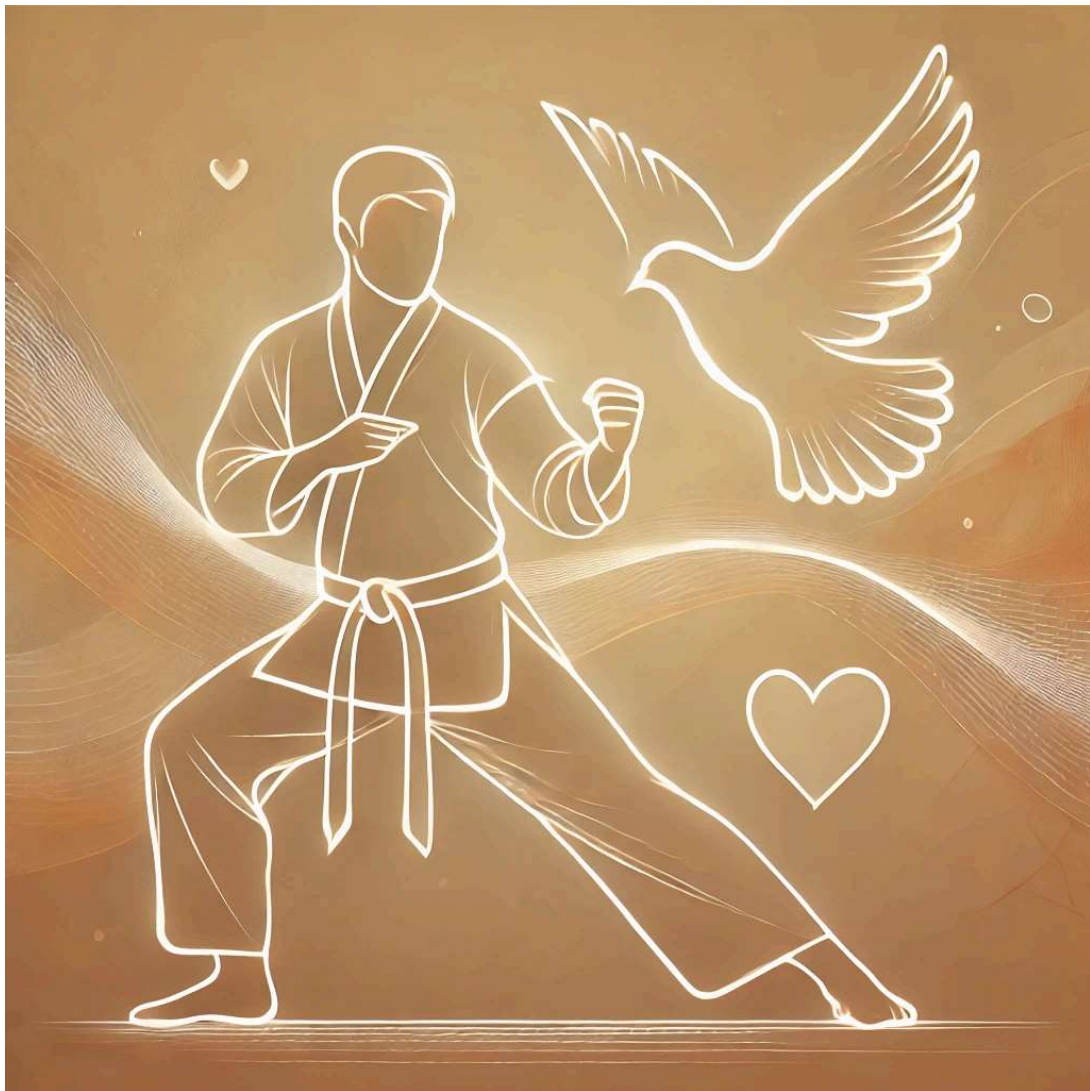
Dedication

To all karate masters, enthusiasts, athletes, and artists of every kind.

To the brave women and men of Iran, especially the women who continue to fight for freedom under tyranny—[Woman, Life, Freedom](#).

And to those who sacrificed everything for justice, including the courageous young karateka, [Mehdi Karami](#), who stood tall during the Mahsa Amini protests. A true warrior, whose words to his father still echo with love and resilience: “پسرم گریه می‌کرد و می‌گفت به مامان چیزی نگو” (*My son was crying and said, ‘Don’t tell Mom.’*)—spoken when he knew he was about to be executed.

May their strength and spirit inspire us all.



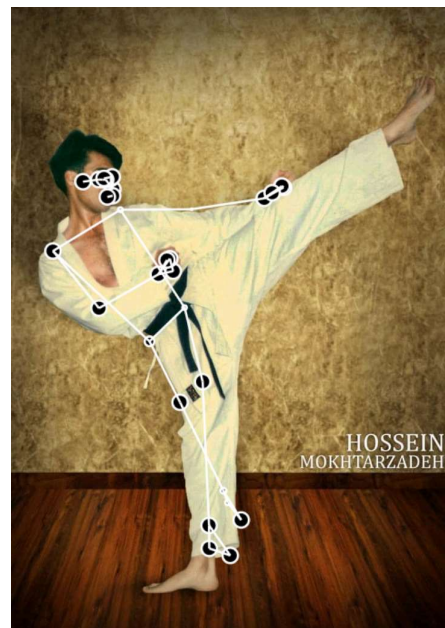
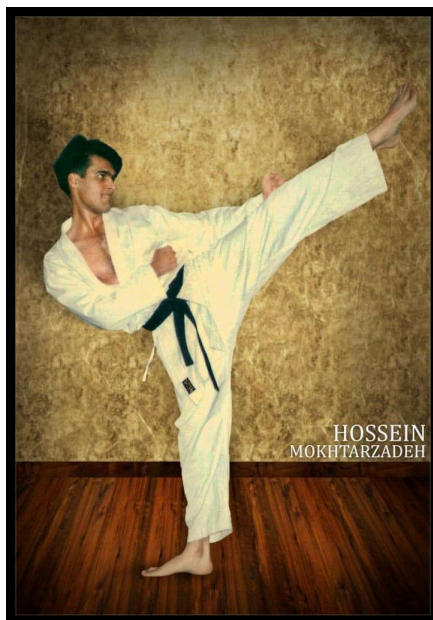
Preface: AI Martial Arts PoseIQ™

Martial artists, like Karatekas, are amazing—strong, focused, and fit in both body and mind. But what if you could take it further? With AI-driven biomechanics and PoseIQ™, you can explore your movements, sharpen your forms, and truly understand your performance. We're here to help you discover your full potential. Let's take this journey together!

About the Author

Dr. Hossein Mokhtarzadeh is a black belt in Shotokan karate, an international medalist, and a former member of Iran's national team (Shotokan). He has served as both a coach and the captain of the University National Competition team. In addition, he was a referee representing Team Australia at the [2012 Sydney International Karate Championships](#), part of the prestigious Karate International World Cup. With a PhD from the University of Melbourne and over 20 years of experience in biomechanics, Dr. Mokhtarzadeh is a leading expert in human movement science and AI-driven technology.

As the founder of PoseIQ™, a flagship brand of ARENGS, and a director at ARENGS, he has developed cutting-edge tools that integrate biomechanics, AI, and rehabilitation. His distinguished career includes a Postdoctoral Fellowship at Harvard University and numerous consultancies with global leaders like [Motek Medical](#) (*DIH Brand*). He has an extensive publication record and is an enthusiastic advocate for advancing sports and human movement through innovative engineering solutions. Dr. Mokhtarzadeh's unique expertise bridges martial arts and biomechanics, offering invaluable insights for athletes, coaches, and engineers alike.



This image showcases a traditional karate kick performed by Dr. Hossein Mokhtarzadeh. The second image highlights how MediaPipe Pose and AI analyzes movement by detecting key body landmarks. While the results can be impressive, some inaccuracies in joint detection serve as a reminder that these tools are continuously improving. Overall, this technology provides incredible insights into movement, making it a valuable resource for athletes and enthusiasts alike.

Who Is This Book For?

This book is for anyone passionate about karate, martial arts, or human movement, and curious about how AI can serve as a powerful mentor. Whether you're a seasoned athlete, a coach, or simply intrigued by biomechanics, this book offers accessible insights—no prior knowledge required.

Parts of this book are freely available on my GitHub. To support the full version, you can purchase it on [Amazon](#) as part of the *AI Mastery Series*. Think of it as buying a coffee to fuel innovation and learning. For deeper insights, explore my [AI-driven podcasts](#), packed with exciting discussions on technology and sports.

Some parts of this book are free on my [GitHub](#). To access the full version, support it on [Amazon](#)—it's like buying me a coffee. Also, check out these two AI-driven podcasts for more insights via [Google NotebookLM](#) :

 **Check out the AI-Driven Podcast on the Book!**  

 Listen here: [Podcast Link](#) 

I hope you find it insightful and enjoyable. Thank you for your support! 😊

How to Use This Book

Welcome! This book is here to help you explore how karate, biomechanics, and AI can work together to improve your training. Whether you're a karateka, a coach, or just curious about movement, you'll find practical tips and tools you can use right away.

Each chapter breaks things down step by step, showing how technology like PoseIQ™ can help you refine your techniques, move better, and even avoid injuries. You don't need any special knowledge to get started—just an open mind and a love for learning.

Feel free to experiment, try the exercises, and see what works best for you. This is your journey, and this book is just a guide to help you along the way. Let's dive in and see what we can discover together!

Interactive Tools for Real-Time Training

To enhance your practice, we've created interactive apps that connect directly to the techniques in this book. These tools help you refine form, improve balance, and reduce injury risks using cutting-edge AI technology.

Access the Apps Here: dojoiq.netlify.app

App Highlights

1. Joint Angle Feedback

- *Purpose:* Track live joint angles to perfect punches (Zuki) and kicks (Mae Geri).
- *How to Use:* Stand in front of the camera, perform the move, and get instant feedback.
- *Example:* "Check your shoulder alignment while practicing Zuki."

2. Weight Shift Detection

- *Purpose:* Analyze balance and weight distribution for dynamic stances like Kiba Dachi.
- *Example:* "Ensure symmetry by monitoring your weight shift during Kiba Dachi."

3. YouTube Feedback + Pose Analysis

- *Purpose:* Upload your videos or compare them with YouTube masterclasses for form correction.
- *Example:* "Record your Mawashi Geri and compare it to a masterclass to improve hip rotation."

How to Integrate These Tools

- **Group Training** (*Unavailable for now*): This feature will allow setting up a laptop or tablet with good lighting for dojo or gym sessions in the future.
- **Solo Practice or With Your Coach:** Use the apps to track your progress and refine techniques at home or in the dojo, getting real-time feedback to perfect your moves.

Quick Access: Scan the QR codes or click the [provided link](https://dojoiq.netlify.app) to start using these tools in your training.

Scan for Real-Time Training Tools!



Acknowledgments

Thanks to OpenAI and ChatGPT for helping create this book, and to Canva, Notebook LLM, and Mermaid for their contributions.

Special thanks to interns Haochen Zhou, Sijia Wang, Jack Huang, and Edan Taplin for testing the apps and providing invaluable feedback, helping refine PoselQ™. Your input guides our continued improvements.

I am also deeply grateful to my colleagues, friends, and the martial arts community for their ongoing support and encouragement. Your contributions and enthusiasm continue to inspire this work. Finally, a heartfelt thank you to all those who believe in the potential of AI-driven biomechanics to transform sports and martial arts.