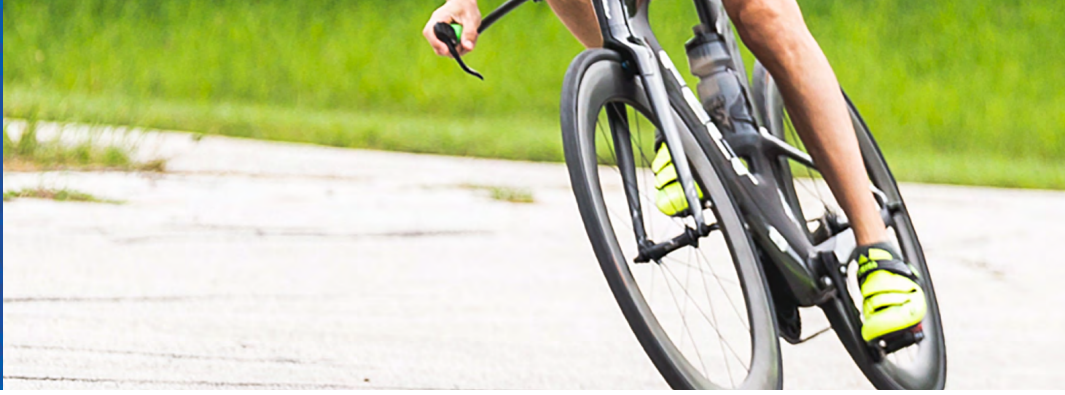




SOUTHWEST RESEARCH INSTITUTE



## Markerless Biomechanics for Cycling

The Human Performance Initiative at Southwest Research Institute® (SwRI®) applies a multidisciplinary scientific and engineering approach to better understand and quantify the complex biomechanical and physiological components of physical performance.

Building on more than 30 years of experience in modeling and simulation of complex systems for military and commercial clients, our team of scientists and engineers is advancing markerless motion capture solutions in biomedicine and sports science to better understand and predict the risk of injury, optimize rehabilitation, and develop innovative products.

### A New Tool for Sports Scientists

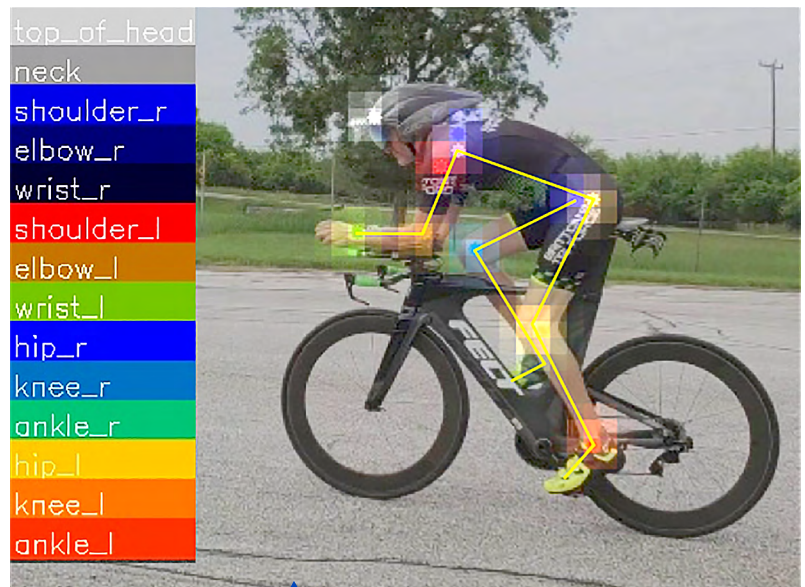
SwRI's research in markerless biomechanics is poised to be a game-changer in the field of cycling by providing an easy-to-use solution for biomechanical analysis whenever the athlete is on the bike.

This research breakthrough can be used to measure the athlete's biomechanics during pre-season and in-season training sessions, as well as during competition, which allows performance staff to use one tool throughout the entire competition cycle. Its ease of use, non-invasive nature, and repeatable results enable continual assessment without interrupting the training and competition cycle.

SwRI's markerless technology is the result of extensive research, development, and expertise in complex biomechanical modeling, machine learning, and sensor fusion techniques. By employing an athlete-specific biomechanical model, this markerless solution provides a level of accuracy that has previously been available only in the laboratory.



On-road analysis of rider biomechanics



Biomechanics available during the ride

## Laboratory Biomechanics in the Field

Our robust solution highlights features such as:

- Can be mounted to team car
- Operable in adverse weather conditions
- Functions on the road, on a trainer, in a wind tunnel
- No proprietary hardware
- Commodity-based video cameras (cell phones, action cameras, etc.)
- Data saved in an open format for import to your workflow
- Extensible and customizable
- Interface with cycling computers and other sensors
- Customized to your complex needs and challenges

## Applications

Examples of applications include:

- Optimal bike fitting to improve efficiency and performance
- On-road analysis of rider biomechanics vs. power output to improve efficiency and performance
- Custom high-fidelity biomechanically driven performance metrics
- Biomechanical modeling to optimize bike design



Commercial off-the-shelf hardware for easy deployment

**We welcome your inquiries.**  
**For more information, please contact:**

**Kase Saylor, PMP**  
Manager  
Decision Technologies  
210.522.3703  
[ksaylor@swri.org](mailto:ksaylor@swri.org)

**Dan Nicolella, PhD**  
Institute Engineer  
Musculoskeletal Biomechanics  
210.522.3222  
[dnicolella@swri.org](mailto:dnicolella@swri.org)

**[hpi.swri.org](http://hpi.swri.org)**

## SOUTHWEST RESEARCH INSTITUTE

Southwest Research Institute is a premier independent, nonprofit research and development organization using multidisciplinary services to provide solutions to some of the world's most challenging scientific and engineering problems. Headquartered in San Antonio, Texas, our client-focused, client-funded organization occupies 1,200 acres, providing more than 2 million square feet of laboratories, test facilities, workshops, and offices for nearly 2,600 employees who perform contract work for government and industry clients.

**swri.org**

SwRI Business Inquiries  
PO Drawer 28510  
San Antonio, Texas 78228-0510 USA

[ask@swri.org](mailto:ask@swri.org) • 210.522.2122



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Benefiting  
government,  
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