



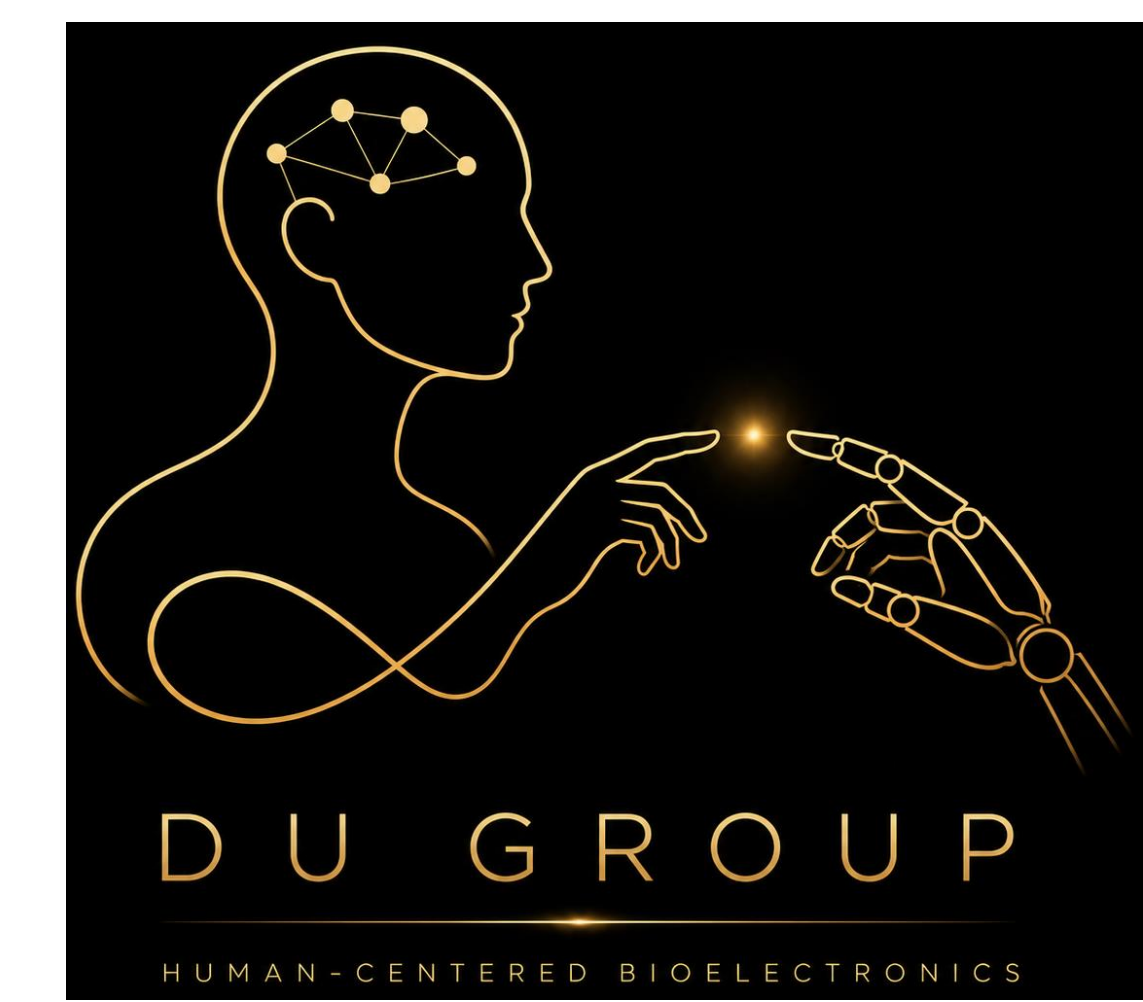
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Multimodal Wearable Physiological Intelligence for Human Readiness Monitoring in Dynamic Environments

Synchronized Sensing. Interpretable AI. Actional Insights

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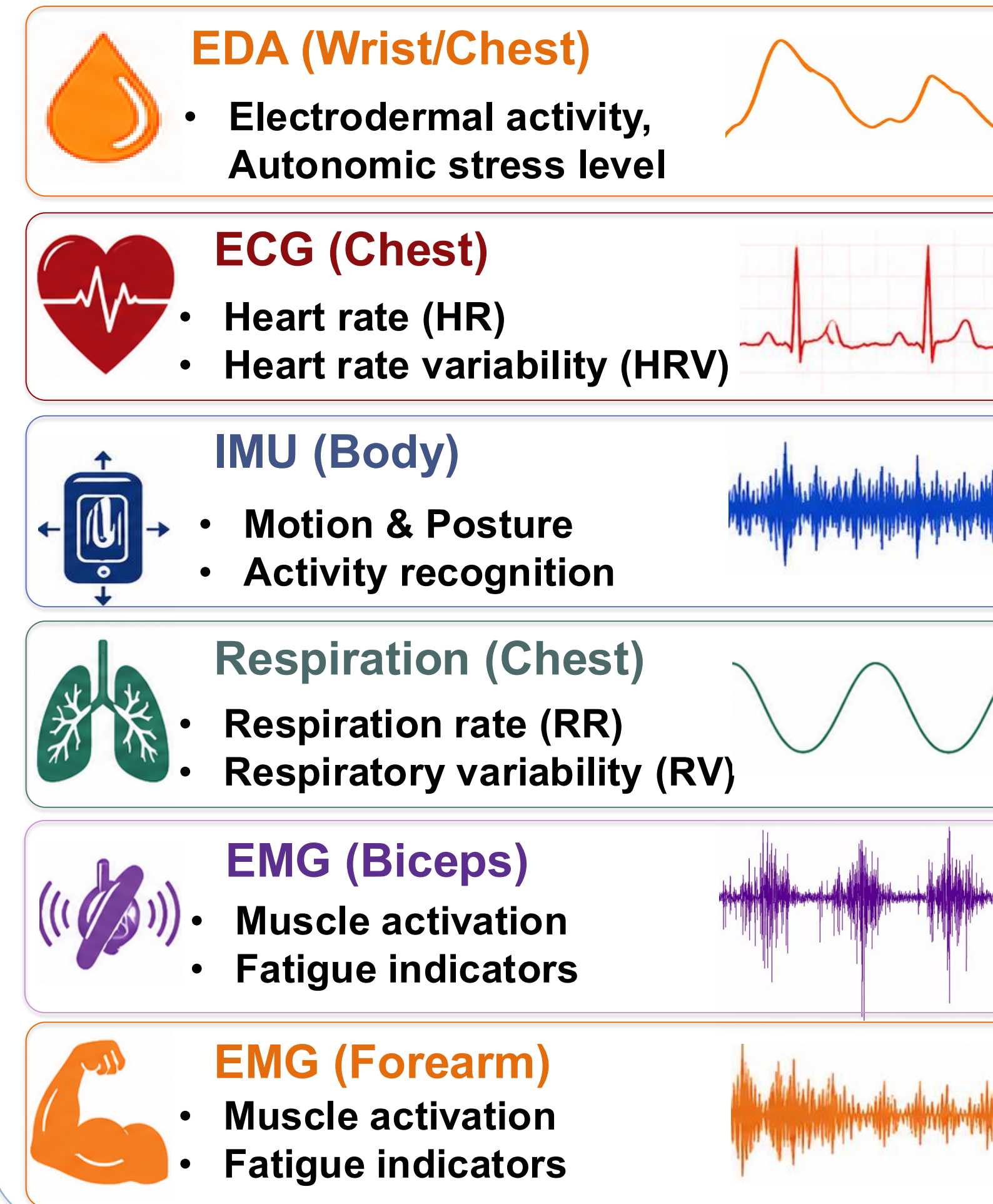
MHSRS
2026

03-06 August, 2026
Kissimmee, Florida

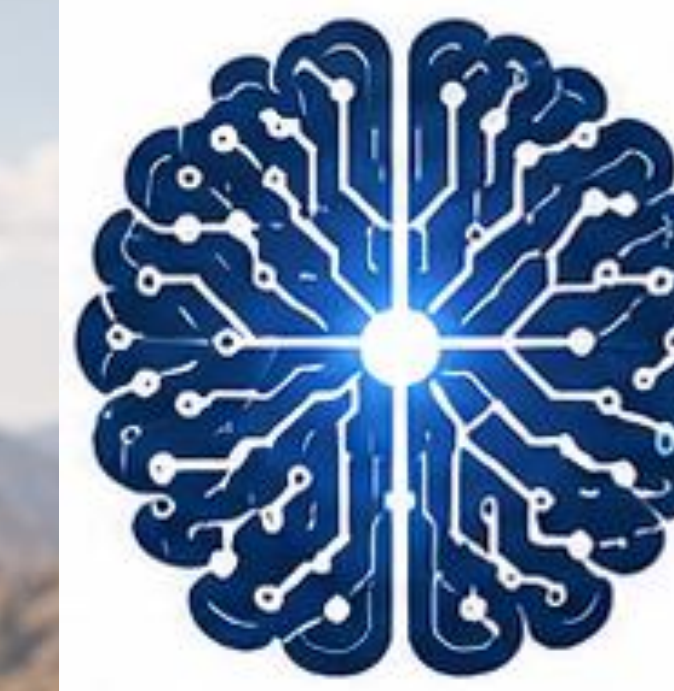
THE CHALLENGE

- Physiological state fluctuates rapidly in operationally unpredictable environments
- Fragmented single-sensor approaches lack full physiological context
- Fatigue and stress are often detected too late and are subjectively assessed
- Lack of continuous, interpretable monitoring to support safe decision-making
- Need for scalable, wearable solutions that work under motion and real-world conditions

Synchronized Multimodal Wearable Platform



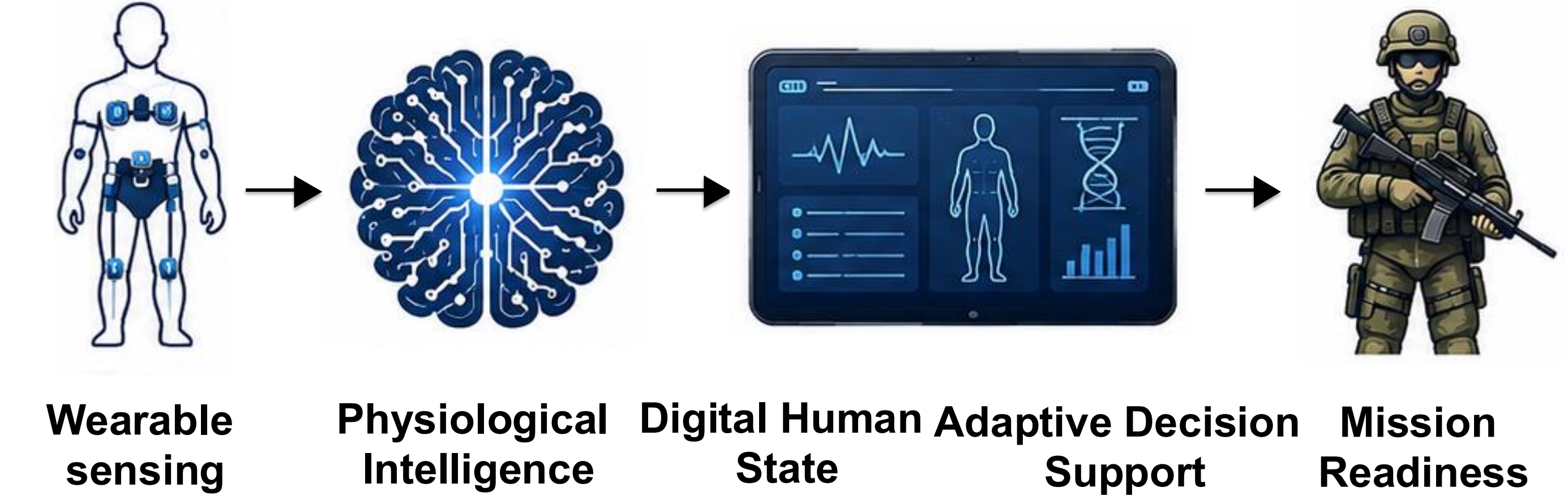
Physiological Intelligence



Actionable Insights for Human Readiness

1. Fatigue Monitoring
2. Stress Assessment
3. Safety Assurance
4. Recovery Guidance
5. Performance Support
6. Readiness Assessment

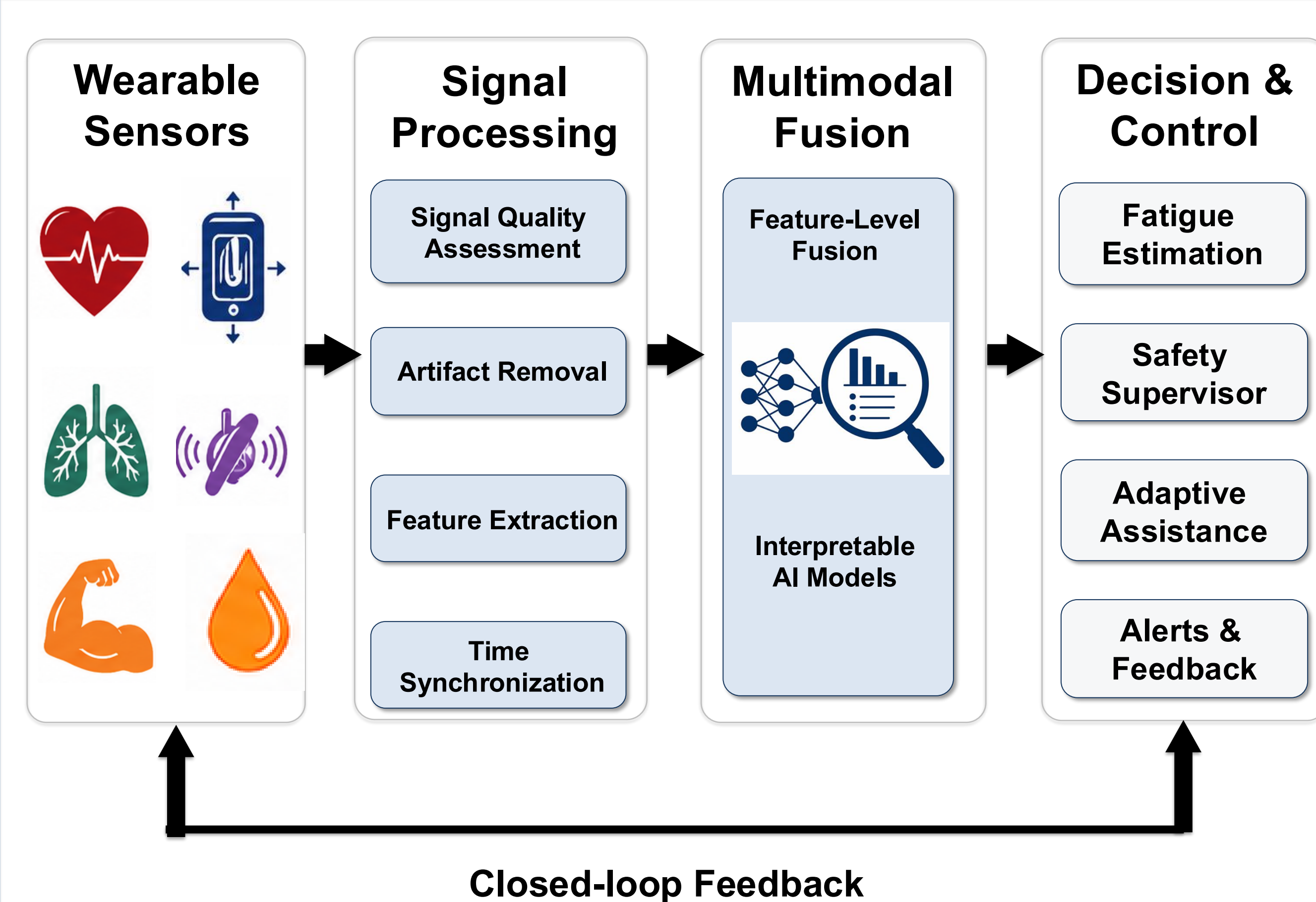
SYMBIO-X VISION



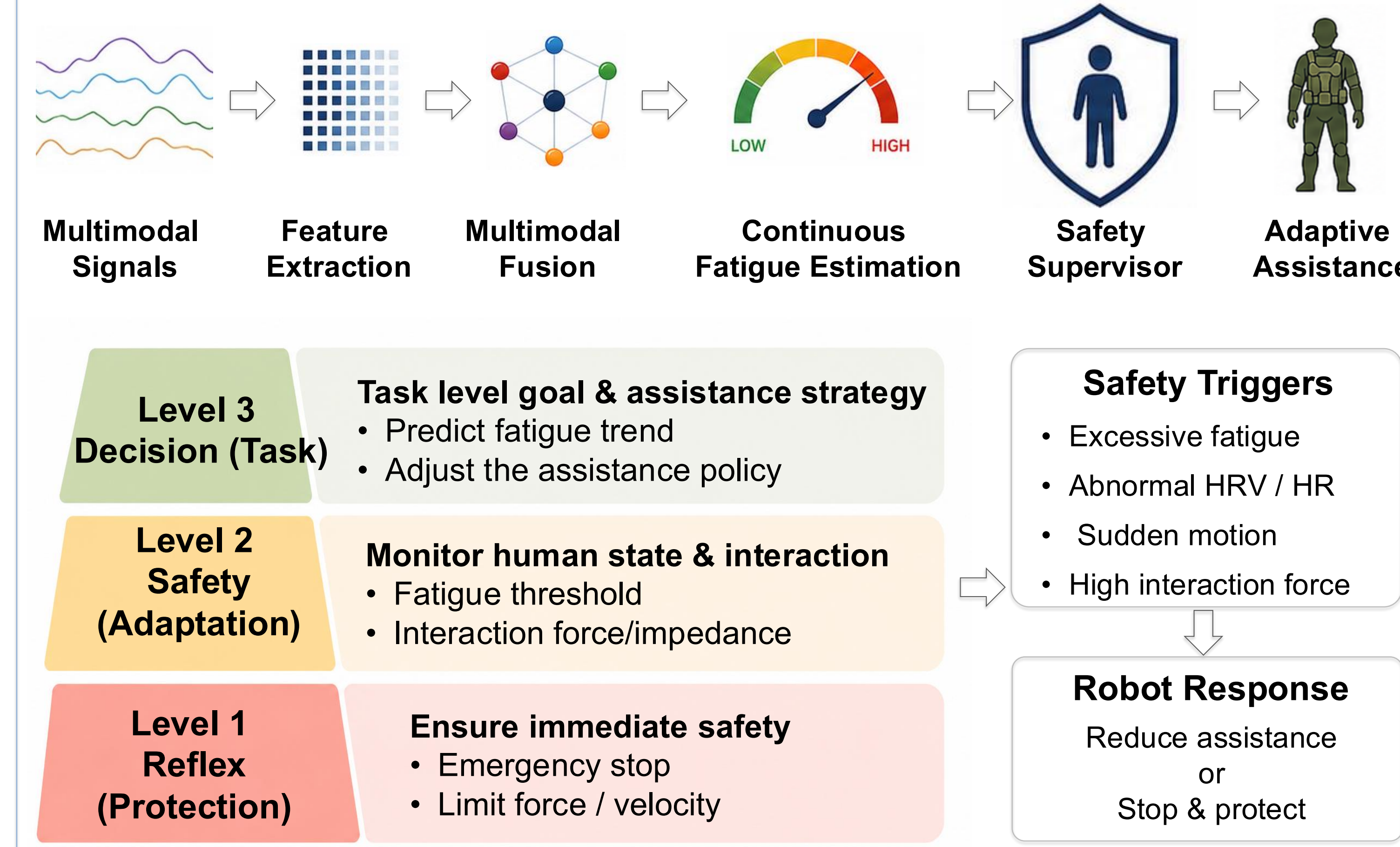
KEY CAPABILITIES

- ✓ Synchronized multimodal wearable sensing in dynamic conditions
- ✓ Interpretable AI for continuous fatigue and stress estimation
- ✓ Hierarchical safety supervisor for adaptive robotic assistance
- ✓ Robust signal quality and artifact handling under motion
- ✓ Scalable, flexible platform supporting additional physiological streams
- ✓ Designed for transition to military training and operational settings

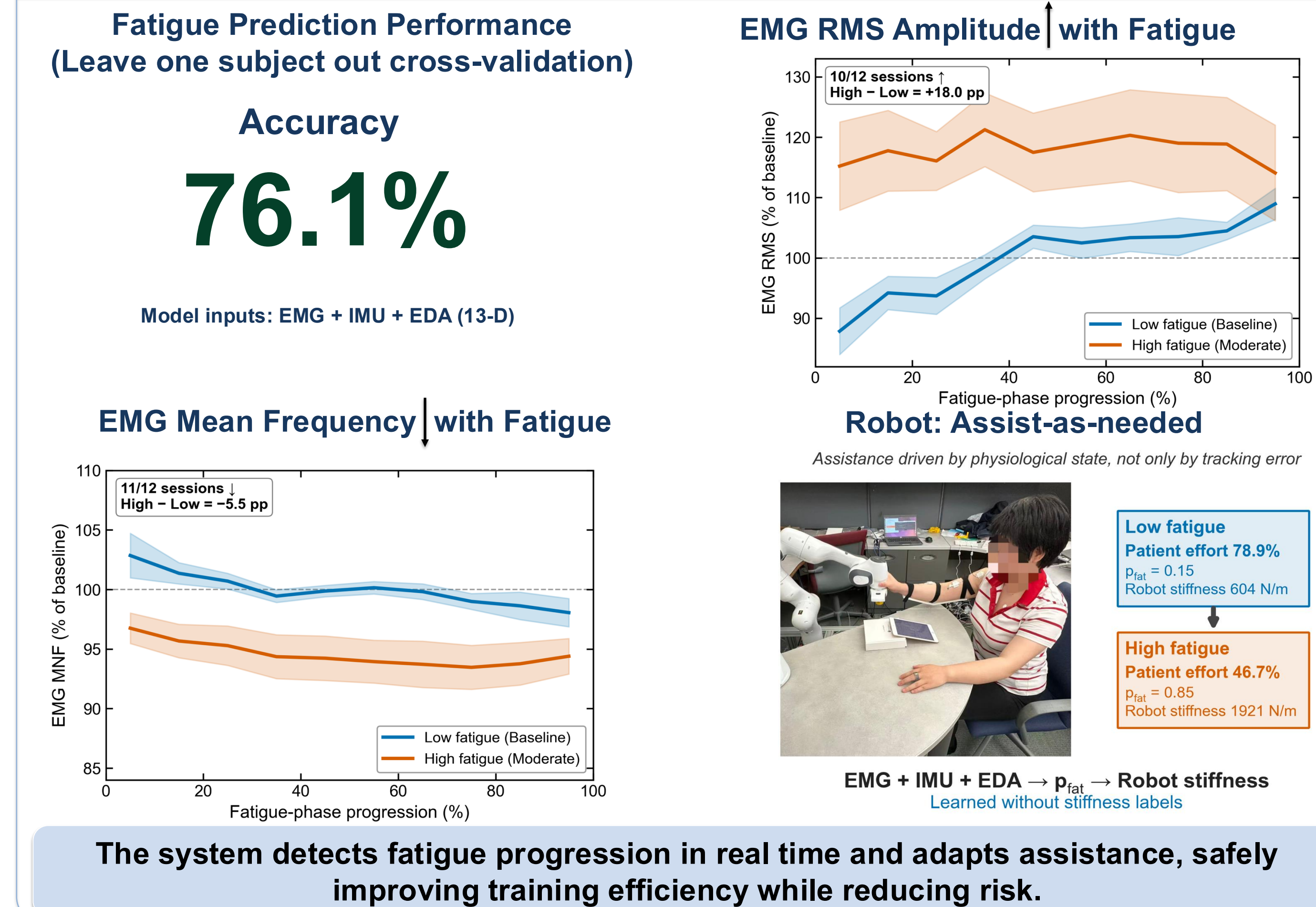
SYSTEM ARCHITECTURE



INTERPRETABLE AI & HIERARCHICAL SAFETY SUPERVISOR



EXPERIMENTAL RESULTS

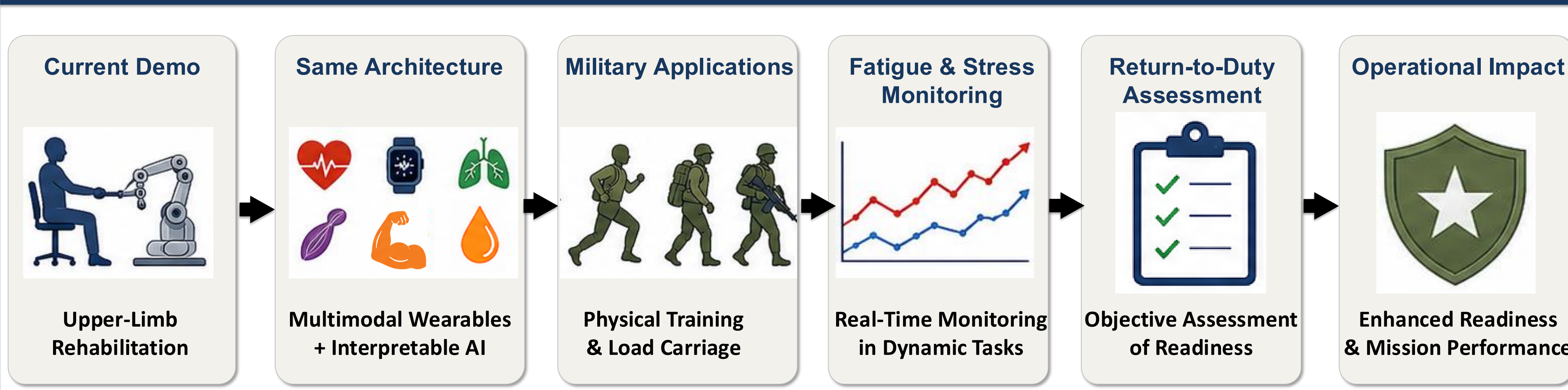


CLOSED-LOOP DEMO



Watch Demo on our Lab website and YouTube Channel
<https://duyayun.github.io/>

FROM REHABILITATION TO MILITARY READINESS



FUTURE CAPABILITY EXPANSION

1. Integrate additional physiological streams (e.g., BP, PTT, temperature)
2. Expand to sleep stage monitoring and recovery assessment
3. Closed-loop neuromodulation for sleep and autonomic regulation (future)
4. Personalized model and digital twin of human state
5. Field validation in military training and operational environments
6. Integration with decision support systems for commanders and medics

TRANSLATIONAL ECOSYSTEM

