

Technology-assisted Personalized Yoga for Better Health

Streamlining Deployed, Extensible, and Reproducible AI Assessment

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Health Worldwide – Increasing Cost, Little Control

- Unsustainable**
- Modern health management is reactive by design, not preventive
 - Incurs high cost with low long-term outcome
 - Institutionalized with little personal control
 - Growing epidemic of lifestyle conditions like diabetes and cardio-vascular ailments

Why Yoga ?

- Holistic Health**
- Yoga has a large set of techniques to offer for a person's holistic health divided into eight branches - YAMA – restraints, NIYAMA – observances, ASANA – posture or exercise, PRANAYAMA – Breathing Techniques, PRATYAHARA – sense withdrawal, DHARANA – concentration, DHYANA – meditation, SAMADHI – enlightenment.
 - Modern research has validated its efficacy in areas of stress management, lung, heart, and digestive health.
 - Allows a person to take control over their preventive health

Our Focus

- Surya Namaskar (SN), a set of orchestrated Asanas (poses) and Pranayama (activities). We collectively call them items to recommend to a person.
 - VAIBHAV** Fellowship (2025-2028; 17 proposals from among 216 selected globally)
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- Credit: Sivananda Yoga Vedanta Centre tradition.
 1. Pranamasana; 2. Hasta utharhasana; 3. Pada hastasana; 4. Ashwasanchalanasana; 5. Phalاکasana or Chaturanga Dandasana; 6. Ashtanga namaskara; 7. Bhujangasana; 8. Adho mukha svanasana or Parvatasana; 9. Ashwasanchalanasana; 10. Padaahasthasana; 11. Hasta utthirasana; 12. Pranamasana

Why Technology ?

- Missing for Yoga**
- Data along with Artificial Intelligence (AI) methods can provide **highly personalized recommendations**. Studied extensively in AI discipline.
 - Sensors can provide **rich contextual data**. Studied extensively in pervasive computing discipline.
 - These trends are transforming athletics and performance sports.

Knowledge and Data Challenges

Evaluated 3 AI travel assistant pipelines generating 3-day Paris itineraries (text plans, images, audio):

- Knowledge**
- Many SN variants, which one to use as reference?
 - How to map and consolidate knowledge across variations?
 - Develop methodologies and tools
- Sensor Data**
- How to handle large volume, multimodality scalably?
 - How to annotate data for semantic (knowledge-based) queries?
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Sensing Challenges

- Many possibilities in form (wearable, non-invasive), technology (accelerometer, gyroscope, magnetometer) and capabilities (measuring pulse, motion, heartbeat).
- How to measure performance ?
 - What are the sensing desiderata?
 - Which minimal subset gives the best results?

Initial Approach

- SN-YO: an ontology to model SN and variants
- SN-YE: a tool to explore SN, powered by SN-YO, supporting 28 languages (6 UN and 22 Indian official)

Graphical representation of the SN-YO ontology. Overview of the SN-YE tool: (1) Predefined Questions interface (2) Natural Language interface (3) SPARQL interface

Initial Approach

SENSING SETUP

DAG GENERATION

Ongoing and Future Work

- Custom sensor design
- Item (Yoga) recommendation
- User evaluation
- Release open source resources
- Community engagement – hackathons, workshops

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