

Wearable kinematic and physiological biofeedback system for movement-based relaxation.

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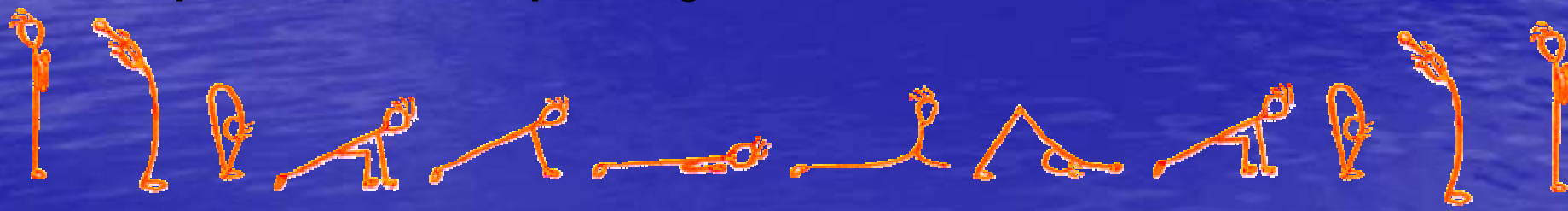
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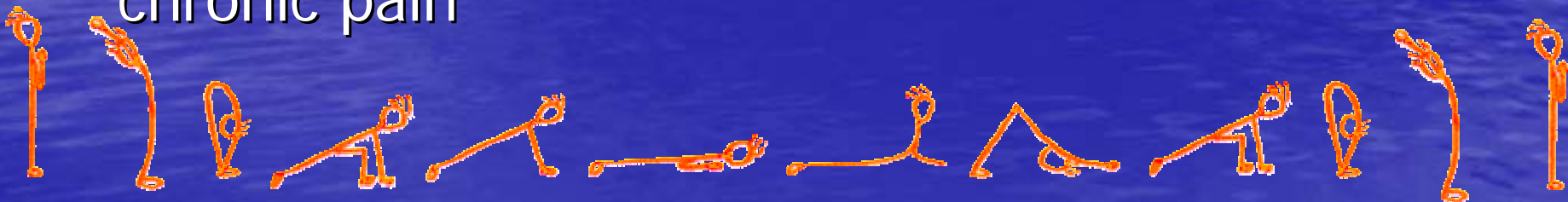
Introduction

- Promotion of mental and physiological relaxation
- Enhanced body posture and musculoskeletal function
- Improved cardiorespiratory function
- Improved psychological well being and perceived quality of life



Yoga

- A way of life designed to give the practitioner a healthy body and sound mind
- There are three main components to yogic practices;
 - Breathing exercises (pranayama)
 - Adopting different postures (asanas)
 - Meditation (dhyana)
- Other therapies - Tai Chi
- Benefit patients suffering from many conditions including hypertension, anxiety disorder and chronic pain

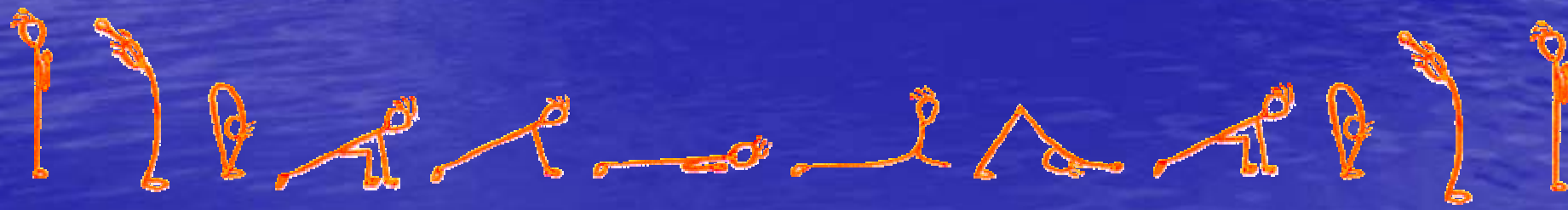


Physiological and Psychological Effects of Yoga

- Cardiovascular effects
 - Decreased heart rate, blood pressure (Telles et al, 2000),
 - Increased rate of recovery from exercise stress (Bera et al, 1998)
- Respiratory effects
 - Increased tidal volume and vital capacity (Birkel & Edgren, 2000),
 - Decreased breathing rate (Telles et al, 2000)
- Musculoskeletal effects
 - Increased muscle strength, endurance, and flexibility (Tran et al, 2001)
- Neural effects
 - Increased alpha waves on EEG (Satyanarayana et al, 1992),
 - Decreased sympathetic nervous system reactivity (Vempati & Telles, 2002)
- Psychological effects
 - Decreased self reported stress and anxiety Ray et al, 2001)
 - Improved concentration (Malathi & Damodaran, 1999)

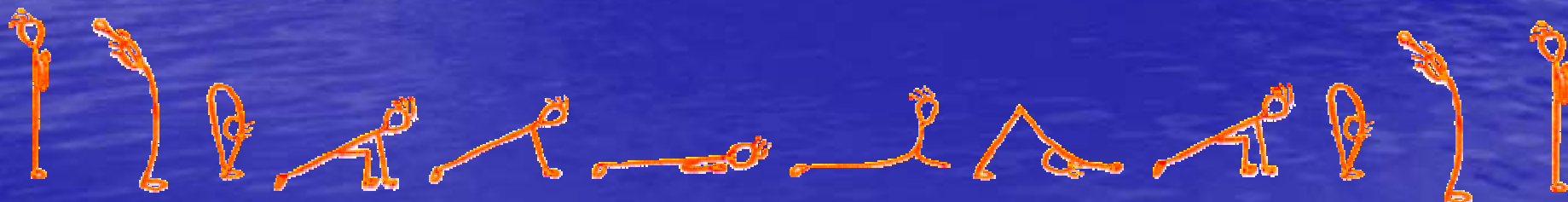
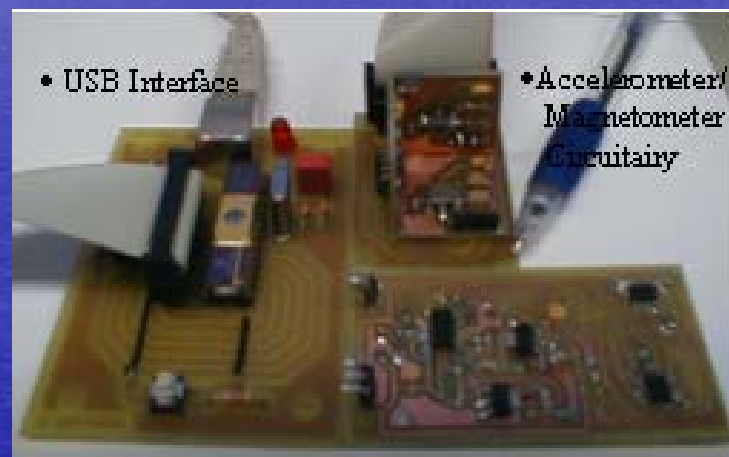
Project Summary

- Develop an effective feedback system for a human interface
- Promote mental and physical relaxation
- Yoga has been shown to have many therapeutic benefits in rehabilitation



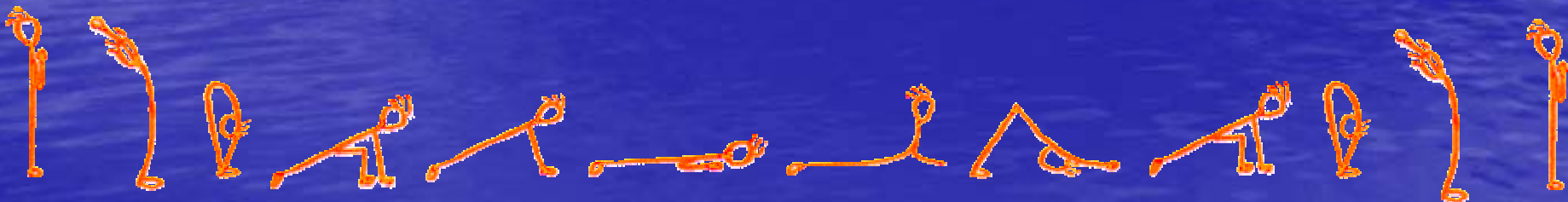
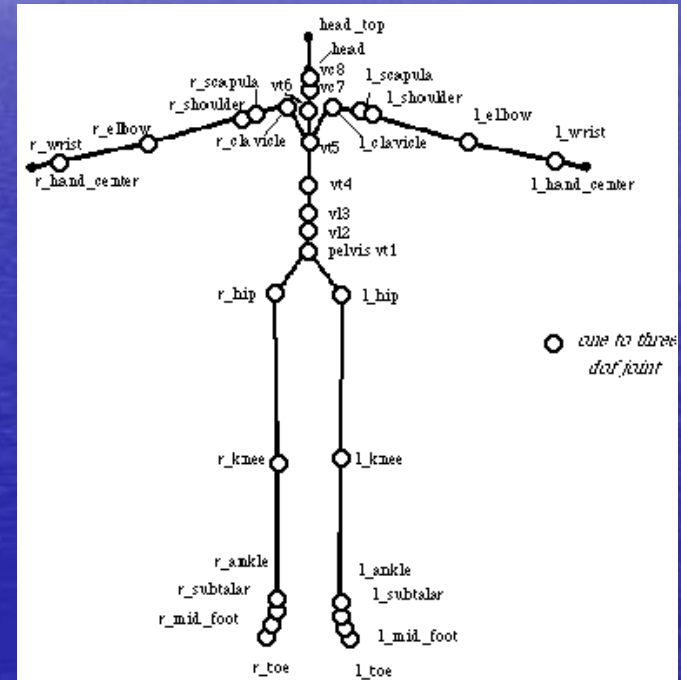
Project Summary

- A garment based physiological and kinematic measurement system
- USB unobtrusive kinematic transducer with minimum instrumentation



Kinematic and Physiological measurement

- Kinematic sensor based on combination of accelerometry and magnetometry
- Key points on body
- Heart rate, respiratory rate sensors
- Wireless communication

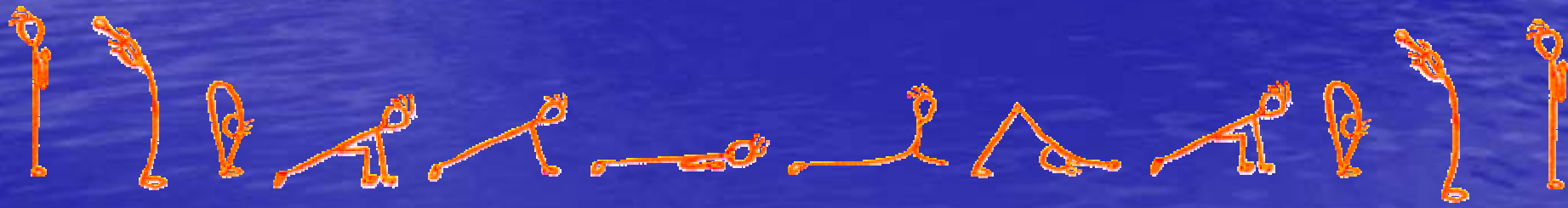


System

- Communication with the video game
- Lightweight garment will monitor biometrics and alignment of body segments
- Player must reproduce physical postures
- Quality of movement and posture, and degree of mental relaxation monitored
- Such input will be processed to provide changes in display to provide feedback to the user
- The purpose of this feedback is such that they may more easily achieve targeted postures

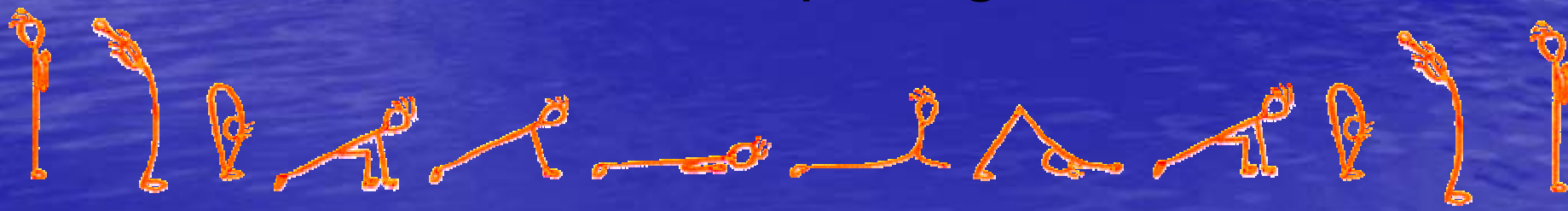


- Marry ancient practices with modern multimedia and sensor technology to provide a new virtual environment for enhancement of body and mind



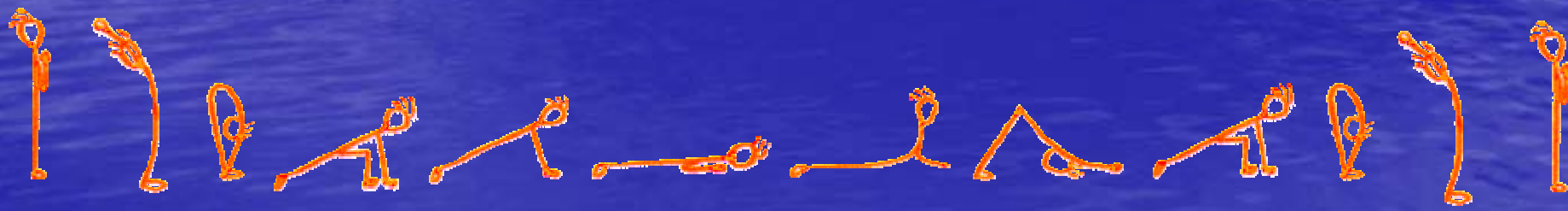
Potential Benefits

- Educational tool for learning techniques and gaining control over movement
- Integration of the user's performance into a computer game
- Offers routes and incentives for progression at all levels
- Use of wearable computing



User Feedback

- Voice - guiding you through the exercises and adjustments
- Display - adjusts according to progress and correct alignment
- Images to be displayed on screen



Adaptive Displays

- Distorted images to clear images
- Calamitous images to calming images
- Rewarding images
- Body on screen with areas of incorrect alignment highlighted
- Colours from dark to light
- Adaptive displays can be adapted depending on context



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