Ruei-Jr Wu

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Educations

- **National Taiwan University**   **Taipei, Taiwan**
  Physics, B.S.   *2001-2005*

- **Indiana University of Bloomington,**   **Bloomington, IN, USA**
  Physics, M.A.   *2008-2011*
  - Motion Planning and Non-Linear Dynamic Control

- **Boston University**   **Boston, MA, USA**
  MS, Biomedical Engineering   *2012-2014*
 - Hybrid System, AI and Machine Learning

Experiences

I am a scientist with training in physics and biomedical engineer. I have participated in multiple scientific projects, primarily by contributing to design of new devices, approaches, and methods for signal processing. My work has led to scientific publications as well as to new systems for experimental studies in visual neuroscience.

- **National Taiwan University Hospital**   **Taipei, Taiwan**
  Research Assistant   *2007-2008*

  - Quantitative Determination of Photoaging

  I have investigated skin aging by means of multi- photon fluorescence (MPF) and Second Harmonic Generation (SHG) microscopy. I obtained the auto fluorescence (AF) and SHG images of superficial dermis to quantify the age of human facial skin by applying object recognition of different tissues of skin.
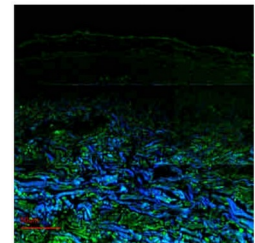

  - Cancer Detection by Label-free microscopy

  Using Second Harmonic Generation microscopy, I have participated in the development of non-invasive label-free cancer detection.

- **Indiana University Bloomington**   **Bloomington, IN, USA**
  Teaching Assistant   *2008-2011*

  - Simulation of Collective Construction in Mound-building Termites Robot

  I created a package to simulate the collective behavior of mult-agents termites robot. This simulation provides a motion plane for each termite robotics to build a given 3D structure.
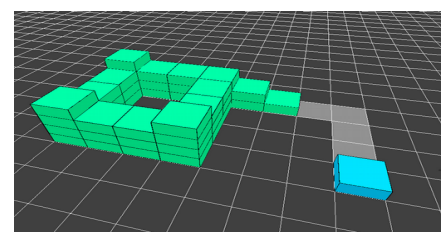
For more details, please visit my portfolio

- Computational Simulation of Skin Formation

I built a computational Reaction-diffusion model for studying the mechanical properties of skin with aging. The simulation provides visual results demonstrating the formation and density of collagen of skin under the various conditions. This can help in the consideration of proper measures for a cosmetic product for the skin.

- **Boston University**   **Boston, MA, USA**
 *Research Assistant*   *2012-2014*

  - Digital Dual Purkinje Image Eye-tracker (**DDPI**)

  I have developed a new eye-tracking system that enables precise measurement of microscopic eye movements. This system consists of the integration of optical, electrical and computational approaches to optimize resolution.

  - Binocular-EyeRIS

  The DPI eye-tracker (Generation 6 by Fourward Technologies) is a device that can measure ocular motion with high spatial and temporal resolution. I have participated in the development of a system for gaze-contigent display that enables simultaneous control of the stimuli on the two retinas. developed the interface in C++ to control Binocular eye tracker and measure eye movement.
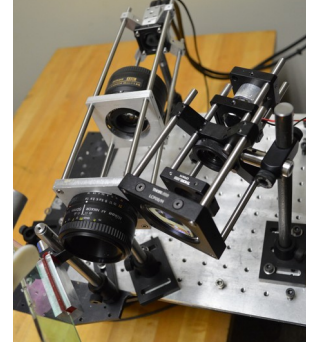
- **APLab, Boston University**   **Boston, MA, USA**
 *Biomedical Engineer*   *2015-*

  - Head free eye movement perception

  Most eye trackers measure the eye movement without head movement. To achieve head free eye movement measurement, we construct the rotating magnetic field search coil system to measure head free eye movement with high resolution. I participated in the development of a magnetic-induction eye-tracker capable of measuring eye movements without head immobilization.

  - Dualtrack

  I developed Dualtrack by Nivida CUDA. Dualtrack is an hight speed object recognition and tracking algorithm implement on Nvidia GPU.

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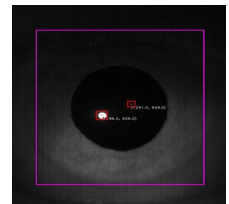
- PhaseSpaceVirtualReality (**PSvr**)

I prototyped Psvr which integrates PhaseSpace and Head Mount Display (HMD). PhaseSapce system use active infrared optical markers to capture precise body motion. PSvr is able to measure small head motion at high speed and present image to HMD to achieve precise Virtual Reality.
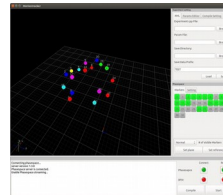
- APEnv

I developed APEnv. APEnv is an OpenGL based experimental 3D software. APEnv can render image to Virtual Reality or monitor. It is design to integrate DDPI, Psvr and Binocular-EyeRIS and facilitate the process of experiments designe.

Earned Patent

US 20110178410 A1: Method of Quantitative Analysis Utilizing Multiphoton Microscopy

Skills

Programming Languages: C, C++, Fortran, Java, Javascript, Labview, Matlab, Python, VHDL

Libraries: Boost, Eigen, OpenCV, OpenGL, Qt, SDL, Volkan

CAD: Solidwork, Freecad

Publication

1. *Wang CC, Wu R Jr et al.*, **Label-free discrimination of normal and pulmonary cancer tissues using multiphoton fluorescence ratiometric microscopy**, Appl. Phys. Lett. 97, 2010

2. *Lin SJ, Hsu CJ, Wu R Jr et al.*, **Quantitative multiphoton imaging for guiding basal-cell carcinoma removal**, Proceedings of SPIE, 2007

3. *Lin SJ, Wu R Jr et al.*, **Evaluating cutaneous photoaging by use of multiphoton fluorescence and second-harmonic generation microscopy**, Opt Lett. 2005

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