Xin Xu

Medical device engineer

Philadelphia, PA - Email me on Indeed: indeed.com/r/Xin-Xu/938a707470ce5d93

WORK EXPERIENCE

Research and Development Engineer

Lenima Field Diagnostics - Philadelphia, PA - March 2014 to Present

Development of a Rapid Antimicrobial Susceptibility Test (AST)

● Co-invented a piezoelectric sensor for AST, which can significantly reduce the time of testing compared to commercial devices

● Built the prototype and established the testing protocol for preliminary studies

● Wrote the software in MATLAB to communicate with the hardware devices, analyze the data, and display the results in real time

Rapid, Accurate, and Low-Cost Clostridium Difficile Genetic Test Development

● Developed piezoelectric plate sensors (PEPSs) for ultra-sensitive DNA/RNA hybridization detection

● Built a multiplexed system to target different genes in Clostridium Difficile using an array of sensors

● Designed a flow system with local heating elements in SolidWorks and built a prototype of the system for pilot clinical study

● Achieved fast and accurate measurements by developing customized software in MATLAB

Skills Used

Programing (Matlab, LabView), CAD design (SolidWorks), FEA analysis (ABAQUS), and statistical analysis (SPSS)

Research Assistant

Drexel University - Philadelphia, PA - September 2009 to Present

Breast Cancer and Skin Cancer Detection and 3D Imaging Using Array Piezoelectric Fingers (PEFs)

● Designed and manufactured the piezoelectric cantilever sensors for tissue stiffness measurement

● Designed a hand-held PEF array probe using SolidWorks and built a prototype of PEF breast cancer detection system for pilot clinical study

● Validated the PEF measurements using Finite Element Analysis (ABAQUS)

● Developed the software to measure tissue stiffness continuously and create 2D color-coded maps in real time using LabVIEW and MATLAB

● Evaluated the PEF breast cancer detection system on both excised breast cancer tissues and patients

● Utilized the system to detect breast cancers for 40 patients in vivo

Skills Used

Circuit design, Programing (Matlab, LabView), CAD design (SolidWorks), FEA analysis (ABAQUS), and statistical analysis (SPSS)

Research Assistant

Shanghai Jiao Tong University - 上海市 - January 2008 to June 2009

Dermoscope Design and Instrumentation

● Designed a cross-polarized dermoscope using SolidWorks for visual inspection and digital imaging of skin cancers

● Designed an electrical circuit for the illumination system in the dermoscope
● Built a prototype of the dermoscope and imaged skin lesions invisible to naked eyes for early detection of skin cancers

Skills Used
Circuit design, Programing (C++, Matlab), CAD design (SolidWorks), and statistical analysis (SPSS)

Research Assistant
Shanghai Jiao Tong University - 上海市 - February 2007 to January 2008

Effective Inhibition of BRCAA1 Gene Expression in gastric cancer cells
● Utilized PAMAM-mediated RNA interference to inhibit the expression of the gene BRCAA1
● Demonstrated the results with fluorescence and Western Blot

EDUCATION

Ph.D. in Biomedical Engineering
Drexel University - Philadelphia, PA
2011 to 2016

Master's in Biomedical Engineering
Drexel University - Philadelphia, PA
2009 to 2011

B.S. in Biomedical Engineering
Shanghai Jiao Tong University - 上海市
2005 to 2009

SKILLS

CAD design (SolidWorks, AutoCAD), Finite Element Analysis (ABAQUS), Circuit design,Programing (C++, Matlab, LabView,.etc), Statistical analysis (SPSS, SAS).

AWARDS

Calhoun Fellowship
September 2009
Fellowship covering tuition and fees, living expenses for the first 2 years of the PhD Program in School of Biomedical Engineering, Science and Health Systems at Drexel University.

Provost Fellowship
September 2009
The Provost Fellowship is designed to encourage the recruitment of highly qualified students for Drexel’s doctoral programs. Each Provost Fellow will receive a sum of $10,000 distributed over two years in addition to whatever stipend is being offered to them by their program.

PATENTS

Depth Measurement in Tissue Suing Piezoelectric Sensors Having Different Probe Sizes (#WO2015105827 A1)

July 2015

An apparatus and method for determining the depth of an object below a surface or the thickness of the dermis. The apparatus and method use a plurality of piezoelectric fingers having probes with differently sized contact areas. A plurality of measurements is taken using each of the probes with differently sized contact areas in order to determine the depth of an object below a surface or the thickness of the dermis.

PUBLICATIONS

Systematic Design of a Cross-Polarized Dermoscope for Visual Inspection and Digital Imaging

http://lifesciences.ieee.org/articles/76-systematic-design-of-a-cross-polarized-dermoscope-for-visual-inspection-and-digital-imaging

December 2011

A dermoscope is a diagnostic device that can image the skin in situ and is used for early diagnosis of melanoma and pigmented skin lesions. In this paper, we describe the design and construction of a cross-polarized dermoscope including the illumination evaluation, imaging design, and the mechanical setup. By using the cross-polarization dermoscope, specular reflection from the superficial layer of the skin is largely eliminated. Therefore, deeper layers of the skin, such as the inner pigments and the capillary blood vessels, can be visualized.

Portable and Low Cost Breast Cancer Detection for Dense Breasts

2011

Conference poster presentation

Cancer Detection & Diagnostics Technologies for Global Health Conference (2011)

Breast Tumor Detection Using Piezoelectric Fingers: First Clinical Report

http://www.sciencedirect.com/science/article/pii/S1072751513001683

June 2013

We have developed a radiation-free, portable, low-cost detector --Piezoelectric Finger (PEF)-- that does not require skilled interpretation to be used as a first-line prescreening test in women who do not receive the maximum benefit from mammographic surveillance. This report describes our first clinical experience with this device.

An electrospun PVDF-TrFe fiber sensor platform for biological applications

http://www.sciencedirect.com/science/article/pii/S0924424714004944

November 2014

Flexible, self-powered materials are in demand for a multitude of applications such as energy harvesting, robotic devices, and lab-on-a chip medical diagnostics. Electrospinning piezoelectric fluoropolymers into nanofibers can provide these functionalities in a facile method. PVDF-TrFe was electrospun in an aligned format and interfaced with a flexible plastic substrate in order to create a platform for voltage response characterization after small force cantilever deformations. Voltage peak signals were an average of ±0.4V, and this response did not change after platform sterilization. However, when placed in cell culture media, piezoelectric response was dampened. This platform can be used for measurement and analysis of electromechanical behavior in a variety of applications, including cellular-powered nanodevices

Under review: Development of Array Piezoelectric Fingers towards In Vivo Breast Tumor Detection

February 2016

We have investigated the development of a handheld 4×1 piezoelectric finger (PEF) array breast tumor detector system towards in vivo patient testing, particularly, on how the duration of the DC applied voltage, the depression depth of the handheld unit, and breast density affect the PEF detection sensitivity on 40 patients.

The tests were blinded and carried out in four phases: with DC voltage durations 5, 3, 2, to 0.8 s corresponding to scanning a quadrant, a half, a whole breast, and both breasts within 30 min, respectively. The results showed that PEF detection sensitivity was unaffected by shortening the applied voltage duration from 5 to 0.8 s. Nor was it affected by increasing the depression depth from 2 to 6 mm. Over the 40 patients, PEF detected 46 of the 48 lesions (46/48) --with the smallest lesion detected being 5 mm in size. Of 28 patients with mammography records, PEF detected 31/33 of all lesions (94%) and 14/15 of malignant lesions (93%) while mammography detected 30/33 of all lesions (91%) and 12/15 of malignant lesions (80%), indicating that PEF could detect malignant lesions not detectable by mammography without significantly increasing false positives. PEF’s detection sensitivity is also shown to be independent of breast density, suggesting that PEF could be a potential tool for detecting breast cancer in young women and women with dense breasts.