Harold Lee

Mechanical Engineer

Philadelphia, PA - Email me on Indeed: indeed.com/r/Harold-Lee/bfe7b9fd41e7fd24

Highly motivated mechanical engineer seeking full-time entry-level opportunities in Product Development and Machine Design. Interested in GD&T, DFMA, FEA, and CAD experience to positively contribute to corporate or departmental objectives, while gaining valuable industry experience. In pursuit of EIT and open to relocation.
Willing to relocate: Anywhere
Authorized to work in the US for any employer

WORK EXPERIENCE

Engineer II - Visual Inspection

(Lab Support) Merck & Co. - February 2016 to Present

• Support to aseptic manufacturing operations with a focus on Merck manufactured sterile pharmaceuticals and liquid and lyophilized vaccines.
• Support of visual inspection process improvement and new process development.
• Support of visual inspection process qualification testing.
• Support of tracking and management of inspection process data.
• Support of aseptic manufacturing, testing and release.

Research Assistant - Bio-medical Devices

Temple University Mechanics of Composites Dry Lab - May 2015 to February 2016

• Researched and implemented shape memory materials such as shape memory alloys and shape memory polymers for the development of a controllable needle.
• Conducted experiments using data acquisition systems and experimental methods with LabVIEW and MATLAB software and National Instrument's hardware.
• Designed a two-way actuating needle induced by joule heating.
• Utilized Solidworks which reduced design time and improved communications between all team members.
• Machined and tested multiple prototypes and models.
• Assisted in Python Programming for controls.
• Invited as a finalist in the 2015 SMASIS Hardware Competition
• Presented research at the 41st Annual Northeast Bioengineering Conference & the ASME 2015 Conference on Smart Materials, Adaptive Structures, and Intelligent Systems.
• Publications list available upon request.

Teaching Assistant - Engineering Graphics

Temple University College of Engineering - September 2014 to December 2014

Assisted in the instruction of 'Engineering Graphics', an undergraduate course, where one learns Computer-aided geometrical construction, solids modeling, charts, orthographic and isometric drawings, dimensioning, auxiliary views, sectioning, geometric tolerancing, and elementary drafting problems using AutoCAD and Solidworks.

EDUCATION

Bachelor of Science in Mechanical Engineering

Temple University, College of Engineering

May 2015

SKILLS

Microsoft Office (10+ years), Solidworks (4 years), Autocad (4 years), C (1 year), Python (1 year), labview (2 years), Matlab (4 years)

LINKS

http://www.linkedin.com/in/haroldlee88

PUBLICATIONS

Towards the Design and Development of an Active Needle for Therapeutic Procedures

April 2015

This project involves the design of an active needle with enhanced mobility, flexibility, and control within tissues during diagnostic and percutaneous medical procedures. The design utilizes the shape memory, super-elastic, and thermo-mechanical properties of Nitinol, a smart memory alloy (SMA) made of nickel and titanium, to construct a steerable needle during insertion. The design of the needle includes a Nitinol needle body, Nitinol wires attached to the body as actuators, and a nylon flexure joint to provide electrical insulation. With the current design, the prototype was able to achieve unidirectional control of the needle's deflection during insertion into a tissue-mimicking gel. However, further studies must be performed to improve needle's maneuverability as well as verify the feasibility of the SMA properties. The goal of this design is to achieve real-time control of the needle as well as to build a more minimally invasive tool for percutaneous procedures. With an active steerable cannula, minimal damage to tissue and risk to patients can be lowered significantly.

Nitinol based flexible smart needle design

April 2015

The accuracy of many needle-based therapeutic procedures depends on the placement of the needle tip to desired locations. In many of these procedures, lack of actuation and dexterity of the device limits the surgeon’s capability to compensate for the probable errors. To overcome these limitations shape memory alloy (SMA) wire actuators were attached to the needle body to provide contraction forces to bend the needle tip. In this paper a miniature prototype of a SMA activated needle was designed and developed. To obtain an enhanced deflection a flexure element was included in the design. A shape memory polymer (SMP) was used as the flexure component to provide dexterity and to electrically insulate the two segments of our needle. The SMP’s properties to recover its initial shape, upon applying heat above its glass transition temperature, was utilized to bring the device back to its original configuration after each time of activation.

Design, Development and Evaluation of a Two Way Actuated Steerable Needle

September 2015

Over the last two decades, researchers have been interested to provide actuation and control for surgical needles. It has been recently suggested to utilize shape memory alloy (SMA) wires to provide bending forces to activate the conventional straight needles. In this paper a design of an active needling system has been proposed where actuation forces of SMAs as well as shape memory polymers (SMPs) were incorporated. SMP elements provide two major additional advantages to the design: (i) recovery of the SMP’s plastic deformation by heating the element above its glass transition temperature, and (ii) achieving a higher needle deflection by having a softer stage of SMP at higher temperatures with less amount of actuation force. The feasibility of providing actuation forces using both SMAs and SMPs for the surgical needle was demonstrated in this study.

Robotic needling system for brachytherapy procedure

September 2015
This paper presents a robotic needling system for needle-based percutaneous procedures. This is a novel noninvasive approach being used in many therapeutic surgeries such as brachytherapy where surgeons insert radioactive seeds in a cancerous prostate to kill the unhealthy parts of tissue locally. Studies presented in this work would assist the prediction of bevel-tipped passive needles while being inserted into the patient's body. These needles are deflecting inside the tissue due to the natural viscoelastic resistance of the tissue and the overall reacting forces on the needle's bevel surface. The main aim of this work was to study the effect of having different tip angles at the tip on the final deflection using numerical and experimental methods. This study could be very helpful in path planning and optimizations. Our results showed a higher deflection by a sharper angle at the tip.

ADDITIONAL INFORMATION

TECHNICAL SKILLS

Software Tools & Languages:
MATLAB & Simulink • C • Python • AutoCAD • Solidworks • NI LabView • NI Multisim • NI Vision Assistant • ImageJ • LaTeX
Machining & Welding:
TIG Welding • CNC Router • Milling Machine • Lathe Machine
Bilingual: Korean (Basic reading, writing and speaking) • English (Fluent)