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Reliability Design and Structural Analysis on IC Packaging Wearable Medical Device on Knee-Joint Disease

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Being an old ageing society in Taiwan, those who are older than 65 years in 2018, 25 % of females and 15 % of males will be diagnosed as osteoarthritis (OA) the so-called degenerative joint disease (DJC). Also, two thirds of outpatients are found to be associated with OA. Therefore, it becomes necessary and essential to detect the severity of OA Knee joints as early as possible and to release/ reduce the knee pain induced by OA.

With advantage of the miniaturization, thinning and circuit integration technologies, the developed novel packaging technology includes (1)design and fabrication the flexible printing circuit boards with passive components, (2)design and fabrication the module circuits, (3)microelectronic packaging and reliability test. In combination with these kinds of techniques, it is able to construct one wireless wearable apparatus for real-time diagnosis of initial DJC knee joints based on the vibration signals. Meanwhile, the other wireless wearable apparatus will be, based on the Chinese acupoint theory, established for releasing the DJC knee induced pain by certain electrical stimulation patterns.

This research includes the development of sensor, printing circuit design, sensing system design and set-up, and monitoring the detection properties… etc. As for, this integrated medical device contains the diagnosis, treatment and care systems (techniques) to the degenerative articular cartilage. With clinical application of the two kinds of wearable apparatus, it will be expected to achieve the objectives of this multidisciplinary research, 'Early diagnosis so as to early therapy' and 'To enhance joint's health care so as to improve life quality.'

Experience:

Professor Hsiang-Chen Hsu received his Ph. D. degree from Department of Mechanical and Aerospace Engineering, North Carolina State University at Raleigh, USA. Currently, Dr. Hsu is a full professor jointly appointed by the Department of Mechanical and Automation Engineering and the Department of Industrial Management, I-Shou University, Taiwan. Beside his teaching works, Prof. Hsu served as the department head, dean of student affairs, secretary general, director of center for incubating innovation and industry-university collaboration and director of continuing education in I-Shou University.

Structural analysis and laser application on IC Package are his current research preference. Prof. Hsu has published 48 journal papers, 28 IEEE Xplore papers and 41 international conference referred papers. He also owns 14 domestic invention patents. By his creativity and long-term endeavors, Prof. Hsu has been invited to deliver professional speech on IC packaging technology in many international conferences. He received many distinguished awards from Pittsburg, Seoul, Taipei international invention fairs. It is a great honor for Prof. Hsu to present his current research work on the ICATI 2017 conference in Thailand.