EVALUATION OF EXPERIMENTAL RESULTS FOR DIFFERENT CENTRIFUGES AND PURPOSES FOR OPTIMIZATION

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Abstract

Construction and development of the improvements based on medical results and data taken by experiments. Establishing a functional and save environment for the experiments to take place is the first task, it's no secret that for the improvements to be successful the equipment and the environment are going to play a crucial point. The first challenge is to keep the condition in which the improvement is going to be implemented as unchangeable as possible because the results have to be as close to the real environment as possible. After that the types of medical centrifuge difference by the type of mechanisms used in the current hospitals so the type of mechanism improved is the second problem that needs to be solved.

- *Evaluation of experimental results for different centrifuges and purposes for optimization.*
- *The author has done evaluation of experimental results for different centrifuges and purposes for optimization.*
- *Achieving a thorough experimental study experimental results for different centrifuges and purposes for optimization. In this paper the subject of simultaneous use of infrared thermography and EEG are investigated. Two different diagnostic methods are reviewed in terms of standard sessions.*

1. INTRODUCTION

Features that can quantify human gait play a major role in the studies of injury rehabilitation, improving athletic performance, and the design of prosthetic limbs. Human gait has long been an active area of research, and many system shave been proposed for observing gait irregularities. Thu sfar, most of these systems are based on image information from video sequences. When used in conjunction with biomechanical models, these features can allow quantitative analysis of many specific gait characteristics such as joint moments and powers (kinetic analysis), joint angles, angular velocities, and angular accelerations (kinematic analysis) [1].In these systems, optical markers are placed near anatomical landmarks of the body and features related to gait are extracted from video sequences. Parametric models have been used extensively to describe a set of image observations. An example is 3-D modelling of moving people which can be achieved by using volumetric bodies based on elliptical cylinders [2] [3].In general, methods that consider the use of kinematic constraints can handle more complex motions and occlusions. [4] use soft constraints in a hierarchical structural model of the human body to analyse video sequences captured in a home environment. Reviews on human motion analysis based on video, including summaries of modelling, tracking and recognition, are provided by Dariush [5] and Aggrawal et al.[6].

An alternative to vision based gait analysis is the use of body worn sensors to obtain motion data. The variables that can be measured during gait analysis depend on the technique selected. The most commonly measured variables include initial contact (IC) that defines the beginning of a complete gait cycle and thus cycle duration and frequency, and terminal contact (TC) that marks the start of the swing phase. Gyroscopes, which measure angular velocity, and accelerometers which measure linear acceleration, have been used as a wearable option to measure these variables [7] Coleman et al. [8], Aminian et al. [7] and Selles et al. [9] provide methods of measuring both TC and IC timing information. On the other hand, Yoshida et al. [10] use an accelerometer attached to the patient's waist and observe frequency peaks in the anterior plane to detect leg injury. In reality, however, injury causes changes in both the temporal and frequency domains and this variation is not normally limited to one direction of motion. After developing an experimental platform for studying the mechanical parameter of medical centrifuge we realized that the condition in which we conduct our experiment are not even supposed to be fixed. Why because you don't have fixed conditions in the pilot's cockpit, everything including: temperature, acceleration, air pressure, every condition is not constant. That why we conducted our experiments at free constantly changing environment. We basically left the same centrifuge conditions on open environment where every parameter was unpredictable and change able as natural as it comes. Living the platform in open conditions with a test subject allowed us to discover one of the first possibilities for optimization temperature take big effect in how our vestibular system reacts. It plays a keen roll in how long it is going to take your vestibular system to require. The reason for that is very simple the fluid in your vestibular system contracts depending on that temperature.

Figure 1: Medical centrifuge experiments conducted in open field with life test subject subjected to different temperatures by day and night.

The M7 is dedicated to processing and translating the inputs provided to it by the discrete sensors; the gyroscope and electrometer and electromagnetic compass mounted throughout the main printed circuit for the eccelerometer and the gyroscope while the electromagnetic compass would again be Asahi to be STMicroelectronics. But to our surprise the accelerometer is actually a design win for Bosch Sensor tech with their BMA220 3-axis accelerometer (the first Bosch we've ever seen in an Apple product). We dive deeper into the M7 and it's children in the next section. The previously unknown MEMS devices that had us so interested when we first cracked open the iPhone 5s one with marking B361LP and another B320. The first is a 3-Axis Accelerometer. Based upon the die markings observed in the 2mm x 2mm device, the first unknown MEMS device has been ID'd as a Bosch Sensor tech BMA220 3-axis accelerometer. This is the first time in our experience looking at Apple products that we see a Bosch! The second is a 3-Axis Gyroscope. The device with package marking B329 has been identified as an STMicroelectronics 3 – axis gyroscope, as expected. Holding the compass socket for another round is AKM's AK8963 3-axis electronic compass IC. The AK8963 combines a magnetic sensors to detect X, Y, and Z axis, a sensor driving circuit arithmetic and signal amplifier.

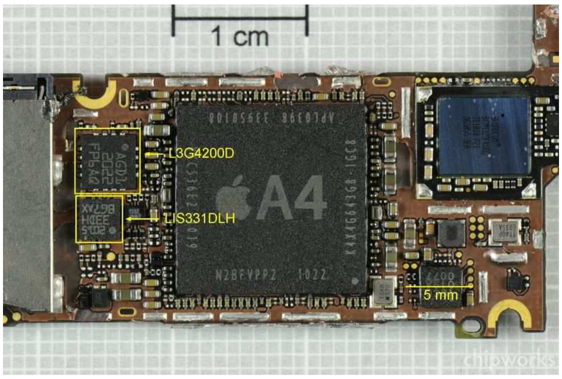


Figure 2: The AK8963 combines a magnetic sensors to detect X,Y, and Z axis. {Model 1}

Developing and wiring a special program along with a wireless transfer system was one of our biggest challenges, yet Apple did provide most of the solutions. Unfortunately it didn't provide all the solutions for us. So we developed our own personal software and equipment for wireless transfer of mechanical parameters. [1]

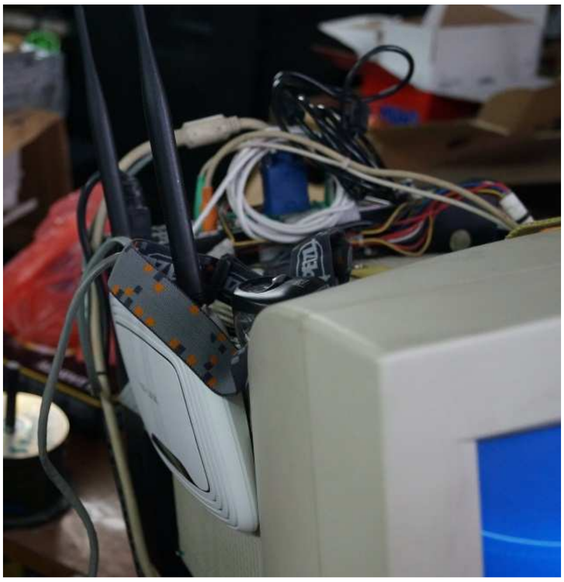


Figure 3: System for data re of mechanical parameters {Model 2}

The electronic management system and collecting information Rotostol 1 consists of the following components:

Access point Server /controller Server/ controller software for 32 clients gTouchpad is an open touchpad project aimed at comfort, low latency, and portability. All touchpad functionality is implemented in JavaScript and HTML5, which makes it very easy to implement new features or modify existing. The server side consists of a high performance, multi-threaded WebSocket server implemented in C++. The server supports hundreds of parallel connections. Scrolling and zooming is adapted to the currently active program, giving a smooth and comfortable experience in any program. The software supports auto-reconnection, no user action is needed if the server program gets restarted. – Software developed by from Eng. Dokt. Georgi Valkov

Figure 3: System for wireless transfer of mechanical parameters. {Model 3}

2. EXPERIMENTAL SETUP

Earlier in the day we established from the look of the die that the A7 was manufactured by Samsung. In the meantime our guys have been grafting away in the lab, and came to the "boring" conclusion that the chip looked exactly the same as the last one. The devil is in the details, however, and we have to do some measurements to see the difference. Below is an electron microscope image of a cross-section of a group of the transistors in the A6 (APL0598) chip, fabbed in the Samsung 32-nm high-k-metal gate (HKMG) process. For convenience we have measured ten, so the dimension of the "contacted gate pitch" (a standard industry measure) is 123 nm. Now if we look at a similar image of the A7 (APL0698), and we see that the contacted gate pitch is 114 nm. So, even allowing for measurement error (we figure +/- 5nm), we're pretty sure that we see a shrink, and that the A7 is made on the same process as the new Samsung Exynos 5410, the 28 – nm HKMG process. That doesn't sound much a mere 4 nm, but again if you do the math and remember that we're talking area shrink, not linear dimensions, then 28^2 divided by 32^2 (784/1024) comes out at about 77% of the area for functions in a slightly bigger area.

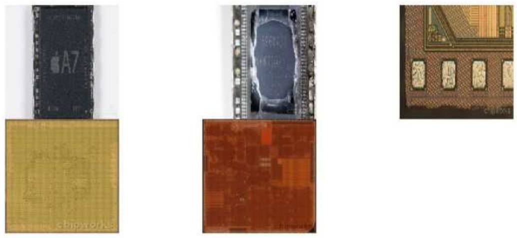
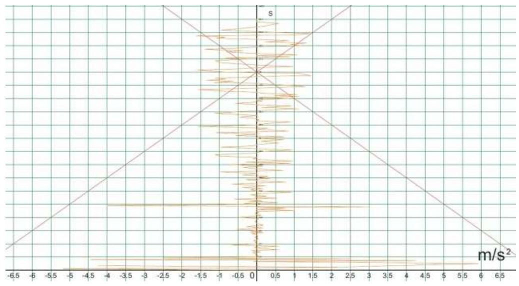
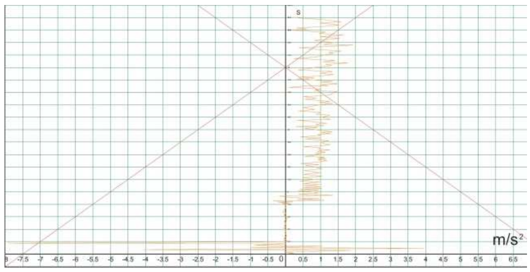


Figure 4: A7 Processor {Model 4}

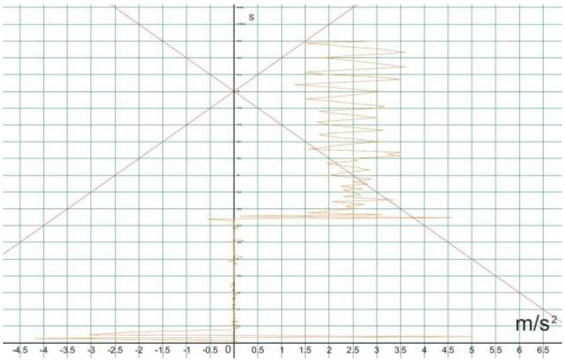
From the experimental results we took in constantly changing conditions the acceleration charts give us good visual idea of what is going on with fluid in the inner ear of the vestibular system. [11] Experimental results for the axis X, Y, Z with medical centrifuge the data was collected in real life conditions with live test subject. The constantly changing acceleration haves a tremendous effect over our sense of balance what we have managed to learn so far is that the conditions and temperature on with it actors and on which we restore our sense of balance played a crucial role to our regeneration and restoring time for our sense of balance. The acceleration conditions established by experiments with live test subject are:



(A) The acceleration change over X for 1 min duration.



(B) The acceleration change over Y for 1 min duration.



(C) The acceleration change over Z for 1 min duration.

Figure: 5 Experimental results of medical centrifuge with life test subject

3. CONCLUSIONS

Instead of defining pre-fixed parameters that can distinguish injured from normal walking, an automatic feature selection method was proposed using the Discrete Wavelet Transform for feature extraction, and the Iterative Search Margin Based algorithm for feature selection. The results on data collected from 2datasets of impaired gait show a good separation between classes, especially with the use of ICA to perform source separation on the wavelet features before the feature selection stage. The method also performs well when different subjects with varying walking patterns and speeds are combined together. The observation of data from a patient with a leg injury shows a good separation between classes. It also shows that the features obtained can be observed to indicate recovery. A further extension of this work could include the study of the relationship between the time-frequency features extracted and those used traditionally by gait-analysis labs(such as initial and terminal contacts), as well as validating results with vision based techniques. It would also be interesting to investigate the use of wearable sensors for observing the progress of some diseases that affect walking patterns, such as Parkinson's disease.

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