SURFBOARD INSTRUMENTATION

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INTRODUCTION: The measurement of biomechanics activities of surfers is a challenge for researchers. The aquatic environment is hostile for electronic equipments, which makes difficult the measurement of related variables. Therefore, the aim of this work is to construct an electronic system (M32C Mitsubishi single-chip microcomputer based) embedded in a surfboard for displacement measurements.

METHOD: Specificities of surfing: As for other surface vehicles, the surfboard sticks on a surface, in this case, the sea. Thus, altitude (*h*) is a priori known as well as the lateral (β) and longitudinal (γ) angles are. If the effect of the air is neglected, it is also possible to link the forward speed (V_f) to the gravity (*g*) using the equation: $m.g.\sin\beta = \frac{\rho}{2} Cf.S.V_f^2$. In this equation, *m* is the surfboard´s mass plus de surfer´s mass, ρ, the specific mass of water, *Cf* the forward surf specific drag and *S,* the wetted surface of the surfboard. Finally, the mean vertical speed (*Vh)* and lateral speed (*Vl)* can be considered negligible. **System Structure:** Considering the previous descriptions, it is possible to deduce the simplified localization system. It can be noted that the absolute position knowledge is often no used in surf analysis. So the GPS can be dropped. Another point is that the motion analysis is not conducted in real time, but only after a surf session. So it is also possible to ignore the link to outside (wireless or other link type) and simply memorize the measurements in a flash memory. This memory can then be read afterwards at the office and most part of the data treatment, the analysis and the visualization can be done on a desktop computer using specifically developed software.

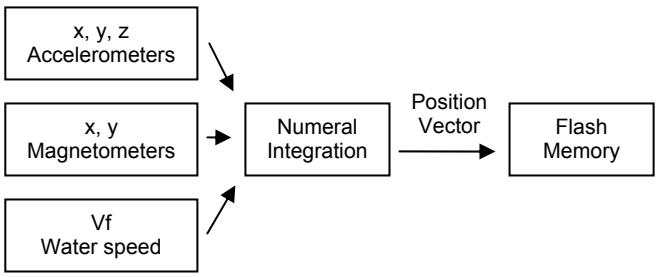

Figure 1 - Structure of Localization System

RESULTS: The system is still being tested in laboratory scale and has demonstrated satisfactory results of electronic integration and storage of information. However it is necessary to miniaturize some parts, with the aim to embed it in the surfboard.

DISCUSSION: This system will make possible to visualize the behavior of the surfboard, during the surfing sessions directly at the practical environment, the sea, giving quantitative data about the performance, movement and speed of the surfboard.

CONCLUSION: It was demonstrated that it is possible to develop a simple localization system giving precise localization information for biomechanics analyses.

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