

Application Group A17-057

北極星穿戴式游泳輔助裝置 A Wearable Swimming Aid Device with Navigation

隊伍名稱 自游視
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研究領域
嵌入式系統設計、影像處理壓縮、VLSI 晶片設計、人工智慧 AI 應用、資訊系統開發。

作品摘要

本團隊致力於開發一款可用於偵測游泳狀態的穿戴式裝置。本作品為一個無線裝置，且可以將它配戴在後腦勺下方，其主要功能如下：

游泳速度 - 偵測及紀錄

換氣次數及速度 - 偵測及紀錄

除此之外，游泳這項運動不單只是一般明眼者能夠進行的活動，更應該讓視障者能夠一同體驗這項運動。本產品提供了視障者進行游泳時的輔助，彌補視覺上的弱勢並能夠提升安全性，且使用上不會影響到其他人進而增加視障者的自信心。

根據研究指出游泳能夠改善視障者姿勢不良的情況，然而通過訪談幾位視障者在游泳方面的經驗，發現視障者進行游泳運動時會有的困擾，包含無法判別方向、需要專屬的引導員及撞擊池壁等風險。視障者既希望可以單純的享受游泳的愉悅，也想在享受的同時盡量避免對自己的傷害或對別人的影響。

我們希望可以透過設計相關的輔助工具來提升視障者在游泳時的安全與信心程度，針對訪談提到的幾項問題，思考可以實現的協助方式，使視障者可以自由自在的享受游泳樂趣的同時，也能獲得更安全的游泳經驗。在多方思考後，本團隊將原本的作品衍伸出可讓視障人士使用的游泳輔助裝置的功能。因此，除了主要功能以外，我們另外設計增加三個功能協助視障人士進行游泳運動：

左右偏移提醒 - 偵測並提示視障者左右偏移

抵岸預警 - 當即將抵達岸邊時，提示視障者

緊急呼叫 - 當發生溺水狀態時，發出警報提醒救生員

本作品是一項結合了多功能智慧終端的穿戴式科技產品，不僅僅適用於視障者，也同時適用於一般民眾。綜觀本作品的價值，它讓普通使用者可以獲得提升體能的依據，同

時帶給視障人士也能享受科技的便利，因此預期本作品將會打破科技只能讓「大部分」人使用的觀念，而是讓「所有」人都能被科技照顧的新概念。

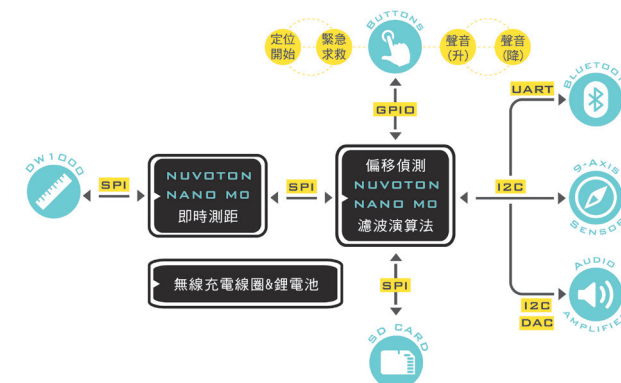


圖 1. 系統架構圖

Abstract

We dedicate to develop a wearable device which provides the status of swimming. This is a wireless device that can be worn at the back of the head. The main function is as follows:

- Detection and recording of the swimming speed
- Detection and recording of the count and frequency of breaths taken.

Swimming is a sport that is not only for general people, but should also be an exercise experienced by the visually impaired. This project provides a supplement tool to assist those with weak vision and consequently increasing the safety of those who are visually impaired during swimming. In addition, it builds confidence of the visually impaired as it will not disturb or interfere with other people while in use.

Based on research, swimming can improve the incorrect posture of the visually impaired. By interviewing several visually impaired swimmers, and discussing the experience of swimming, we discovered some difficulties they experience during swimming which include: being unable to determine their direction; needing somebody to help; and risk of hitting the wall end of the pool. The visually impaired not only hope to enjoy the pleasure of swimming purely, but also want to avoid the dangers they might experience, and avoid disturbing other people.

We hope to increase the safety and confidence of the visually impaired during swimming by designing this supplement tool. With regards to some questions we discussed above, we thought of some realistic ways to help these swimmers with special needs enjoy swimming freely, and feel safer simultaneously. After many considerations and thought, our team expanded our original project to a swimming supplement device which can be used by the visually impaired. Therefore, we designed three more functions, in addition to the original main function, to help the visually impaired during swimming:



Fig 2. Basic functions needed by the visually impaired during swimming

1. **Reminder for left or right deviation** – detect and remind the visually impaired swimmer when they have left or right deviation (in the middle of picture2)
2. **Alert of reaching shore** – reminds the visually impaired when they are about to reach the shore. (in the left of picture2)
3. **Emergency alarm** – alarm and notify lifeguard when drowning. (in the right of picture2)

This project is an ultimate high tech wearable device with many intelligent functions, which is not only for the visually impaired, but can also be used by general people. Looking at the value of this design, it not only can allow common users to acquire records of raising physical agility, but also bring the convenience of enjoying technology for those who are visually impaired. Therefore, this project is expected to break the concept of technology being only of use to "most" people, and create a new concept of technology being accessible to "all" people.

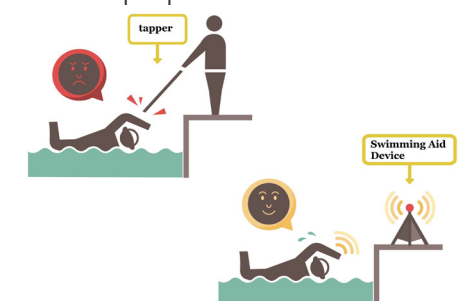


Fig 3. Guide uses tapper to notify the visually impaired upon reaching the shore of the pool