感受你的溫度—自動量測體溫系統
Touch Your Hot

隊伍名稱　感溫隊 / GonnaWin
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作品摘要

近年來醫療人力短缺，醫護過勞案例時有所聞。在臨床照護上，定期量測生理資訊是護理人員一大負擔。我們認為「量測體溫」如此機械性反覆的工作需要新的解決方案，使醫護資源獲得妥善利用，增進醫療品質。

我們設計了一套自動追蹤人臉及體溫測量系統。該系統透過 WebCam 得到影像，即時進行人臉追蹤，取得溫度及距離的資訊，建立數學模型進行體溫推估，最後透過藍芽將資訊傳到雲端。本作品結合溫度感測、影像處理及機械控制，提出以下創新的功能與特色：

1. 機構設計和 3D 列印
   客製化程度高，可隨時依喜好更改，成本便宜，推廣可行性高。
2. 人臉偵測及追蹤 - 使用 Raspberry Pi 2
   使用低成本的嵌入式系統 - Raspberry Pi 2，成功結合模糊理論利用影像偵測方法做出即時人臉偵測及追蹤。
3. 遠距離非接觸式溫度量測
   為了解決傳統偵測距離過短的問題，本團隊成功建立數學模型，在 50cm- 100cm 的範圍進行精準量測。
4. 雲端資訊監控系統
   透過 App 與電腦程式，降低醫護人員工作量的同時提高量測的次數，提供更好的服務品質。
5. 專業人員訪談及需求探勘
   到醫院徵詢醫師意見，發現現行病人安全通報系統 (TPR) 之生理資訊採樣不足。本裝置可大幅提高量測次數，提供醫師更佳資訊進行診斷。

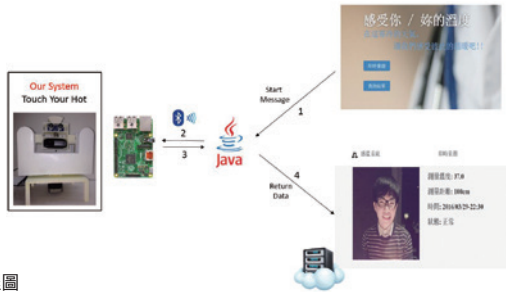

圖 1. 運作流程圖

Abstract

In recent years, problems of medical manpower shortage and overworking getting worse. Regular measurement of physiological information is one of the main reasons for these cases. We believe that such a repeated mechanical work like "temperature measurement" needs to be automated. In this way, we can use the health care resources more efficiently, and enhance quality of care simultaneously.

We designed a system which can track the human face and measure body temperature automatically. Images are captured by the WebCam and processed in the embedded system,"Raspberry Pi2", to track the face in real-time. Moreover, we add the Pan-Tilt System designed by ourselves to make our system rotate smoothly. After focusing on the face, our system will obtain the temperature and distance through the ultrasound and the infrared module. Combing these data with established mathematical model, we can estimate the body temperature. Finally, the temperature information will be transmitted to the cloud via Bluetooth, displayed on app or web instantly. Our system integrates the technologies of temperature sensing, image processing and machine control. The following is the innovative features and characteristics of our product:

1. Mechanical design and 3D printing
2. Face deection and tracking - with Raspberry Pi 2
3. Non-contact temperature measurement in long distance
4. Cloud Information Monitoring System
5. Consultations with medical specialties

Fig 2. App system