Sanjeevani: A Novel Automated System for Hospital Acquired Infection Monitoring and Prevention

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According to the World Health Organization (WHO), 1.7 million people suffer from hospital-acquired infections each year in the United States alone, which accounts for 99,000 deaths. The most prominent reason for spreading these infections is poor hand hygiene compliance in hospitals. I designed an automated system which can monitor and enforce proper hand hygiene compliance in hospitals as stipulated by WHO. My system, Sanjeevani, is a multi-module system based on microcontroller and multiple sensors that tracks hand hygiene compliance throughout a hospital, sends real-time compliance alerts to staff for immediate corrective actions, and also provides automated compliance report generation for the hospital staff. This system is based on four modules, one module is worn by staff, it provides staff's unique ID to other modules and receives real time hand hygiene compliance alerts. The other three modules detect staff and use unique algorithms to do detailed hand hygiene compliance checks at patient beds, sinks, and alcohol dispensers. A custom Arduino based software was developed to control all modules and is also used to upload data to the central server. All the module enclosures were 3D printed to meet specific module requirements. I tested my system for near hospital-like scenarios and received an accuracy of 94% in detecting pass/fail events and sending reports to server. This system makes hospital hand hygiene compliance monitoring and tracking fully automated, real-time, and scalable. Once deployed it has the potential to significantly reduce the rate of infections and save many lives. With minor changes to the algorithms my system can also find applications in other areas like restaurants, shops, and households for hand hygiene monitoring.