Ambient Intelligence for Patient Care Environments

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The current nurse to patient ratio in medical-surgical units spans from 1:4 to 1:6, however in long-term care units, this number can range anywhere from 1:15 to 1:30. Additionally, instances where a care unit may be understaffed create detrimental consequences for the patients residing in the unit. Studies have shown that patient care is compromised when nurses are to supervise patients in an unsafe ratio, including increased errors, injuries, and falls. We strive to eliminate preventable medical harms and extend care capabilities of staff through ambient intelligence in a hospital care setting. Ambient intelligence implements unobtrusive technologies to automate the collection of data, monitor real-time status, and act as needed. An inertial measurement unit sensor and pressure sensor strip were mounted on to each section of the bed. Together, all sensors were connected to a Raspberry Pi to allow for the collection and analysis of data. Repeated test runs of different bed positions with varying weights were conducted. The bed position data combined with pressure sensor readings were used to refine the algorithm to determine bed and patient state. Tracking hospital bed positions and patient status can be useful for real-time clinical situational awareness, care management, and research purposes. Ultimately, this can be used as reminders for care staff to move a paralyzed patient, for recovering patients as a reminder to move and quicken discharge, or to alert a potential bed fall. Implementation of ambient intelligence systems beyond the bed position monitor will extend care capabilities of staff outside the general hospital setting such as nursing homes and home-care scenarios to improve the overall health of society.

Awards Won: