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Interactive Vital Measurement System based on Autonomous Mobile Robot and GUI Application

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Background: Followed by the increasing elderly rate and decreasing birth rate, the Japanese society faces difficulties to secure labor resources to satisfy the requirement for nursing care supports. Through the experiences of hearing investigation in care facilities, we revealed that care staffs working in facilities devote their time to support facility users in eating, bathing and toileting, while they spend much less time for vital measurements except for limited facility users in poor health conditions and terminal cares.

Purpose: We propose an interactive vital measurement system based on autonomous mobile robot and visualization with a GUI (Graphical User Interface) application sytem. A target of this study is realize interactive management of vital information to maintain the health conditions of all facility users. In order for the vital measurement, we designed autonomous mobile robot that holds an interactive arm equipped with vital sensors. Moreover, the measured vital signals are visualized by a corresponding GUI application system.

Method: The interactive arm is composed of two joints actuated by electromagnetic motors and a simple cylinder-like grip equipped with a probe of vital sensors. This vital sensor supports the measurement of SpO_2 (percutaneous oxygen saturation) and heart rate signals. The measured vital signals are transmitted via Wi-Fi connection to remote servers that manage the vital information database of the whole facility. The vital information is visualized by a GUI application system of mobile devices that care staffs are taking along.

Results: In experiments of human-robot interaction, we examined that the autonomous mobile robot successfully reached a user's hand by using its arm. The user then grasped the grip of the robot arm and vital signals were correctly measured. Finally, the signals were visualized by the GUI application system. In the future, we will introduce server systems to share the vital information between multiple care staffs.

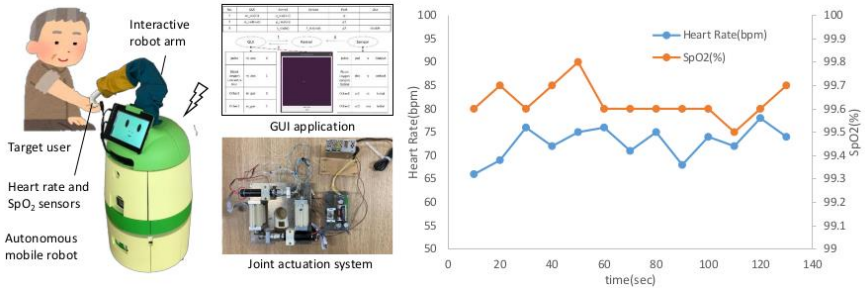


Figure: the interactive vital measurement system (left figure) and measured vital signals (right figure).



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