



Implementing A Smart Bed System for Patients With Impaired Mobility

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ABSTRACT

Healthcare demand for hospital beds is a concern in both private and public institutions. The normal hospital beds are burdensome and do not consider both caregiver's health and patient's stress and discomfort that have consequences on the rehabilitation process. For these reasons, a Smart Bed system is proposed. Implementing the smart bed with a user-friendly interface empowers the patient and caregiver to move the bed into complex positions 45° degree. This reduces the risk of death and also enhances the person's quality of life. The arrangement in bed consists of a appropriate hole in the bed top & mattress which is normally covered by platform with mattress during idle position. This platform slides out by manually operated servo motor to clear the hole. Simultaneously, a downside bucket through the hole & is ready to use. A bucket arranged with level indicating sensor. When the sensor reaches it threshold level, the LED light indicates the current level. Vacuum motor turns on to clean the all wastages and connected to drainage pipeline. All controls are within patient's reach. Conditions can be indicated on RGB LED lights and buzzer notifications. After use, arrangement is reversed and bed is brought back to its ordinary position.

Keywords : Health Care, Complex Positions, Level Indicator, Vacuum Motor, RGB LED.

I. INTRODUCTION

In the hospital, care-givers need to transfer a immobile patient from medical bed to others places, such as x-ray laboratory, MRI laboratory, another ward etc. In general two nurses are needed to transfer the patient. The task becomes more exigent when shifting an overweight patient. The Musculoskeletal disorder (MSDS) including back injuries is the major risk in the long run. If the task is carried out repeatedly, most likely the nurses will experience a persistent back pain. Smart Transfer Patient Bed is designed to solve the nurse's problems in transferring patient. Hospitalizing the bedridden patients is a vital

issue with the clock assistance as many people are involved in it. Any reduction in the number of people involved and the amount of efforts required is going to benefit a large section of the society.

II. LITERATURE SURVEY

[1] T. Yoshikawa, N. J. Livesley, and A. W. Chow, "Infected pressure ulcers in elderly individuals," *Clinical Infectious Diseases*. If an elderly individual is in the same position for too long, whether in bed or a wheelchair, the friction between the skin and the surface may stop the blood flow, causing the pressure area to receive less oxygen and thus causing the cells

to die in that area. This is how bedsores will develop. Pressure ulcers in elderly individuals can cause significant morbidity and mortality and are a major economic burden to the healthcare system.

[2] “Mattress Sensing MAP System,”mattress- sensing-map-system-prevents-pressure-ulcershtml.MAP system involves a special electronic sheet placed over a mattress that has thousands of sensors that detect the pressure distribution of the patient’s body over the bed. It is very similar to our proposed method. However, our proposed system uses 1/20 times fewer sensors than MAP. In addition, depending on the upper body and lower body, different types of sensors are deployed efficiently considering the incidence of bedsores. Notice that the incidences of bedsores are relatively low in the areas with frequent movements such as legs.

[3] Y. S. Delahoz and M. A. Labrador, “Survey on fall detection and fall prevention using wearable and external sensors,” Sensors. The work in proposed a computer vision-based fall detection system for monitoring an elderly person in a home care application. It suffers from occlusion since subjects can sometimes be behind a sofa or furniture while being monitored.

III. III. OBJECTIVE

In order to give support to caregivers in nursing and elderly patients who are not able to move freely, in this project, we propose a design and implementation of a smart bed. In this bed, ultrasound level sensors are fitted underneath the mattress. Our experimental results make obvious that a prototype smart bed works well for several human models of various heights and weights.

IV. BLOCK DIAGRAM

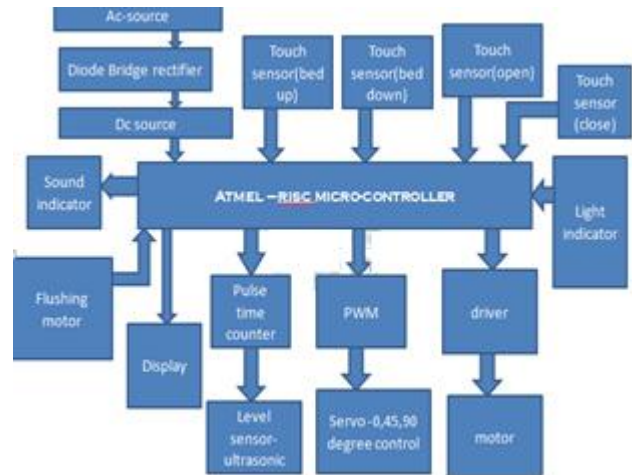


Fig 1. Block diagram

V. BLOCK DIAGRAM DESCRIPTION

In this proposed system, the main power supply is the ac source. Since the ATMEGA RISC microcontroller works on dc source, to convert ac to dc the Diode Bridge Rectifier is used. To achieve the objective of tilting the bed over a particular angle, the Servo Motor is used. The Servo motor is accompanied with Pulse Width Modulator (PWM) to control the amplitude of the digital signal in order to control the servo motor. The Ultrasonic Level Sensor is used to measure the range of the waste collected in the bucket which is fixed under the mattress. To achieve the clock assistance, Pulse Time Counter is assisted with the Level sensor. This is mainly used here to monitor the history of excretion of a patient. The removal of wastages collected in the bucket is done by the centrifugal action of the Flushing motor. The ATMEGA RISC Microcontroller processes the signal from level sensor and make the decision either to ON or OFF the flushing motor through Relay Valve, it is also assisted with the display to notify the level of waste collected. The RGB LED indicates the current status of levels of waste collected. Sound Indicator

(buzzer) alerts the care-taker whenever the wastage level gets to maximum. The ATMAL RISC Microcontroller processes and controls all the signal fetched from the functional blocks. The Touch Sensors are used as Controls.

VI. CIRCUIT DIAGRAM

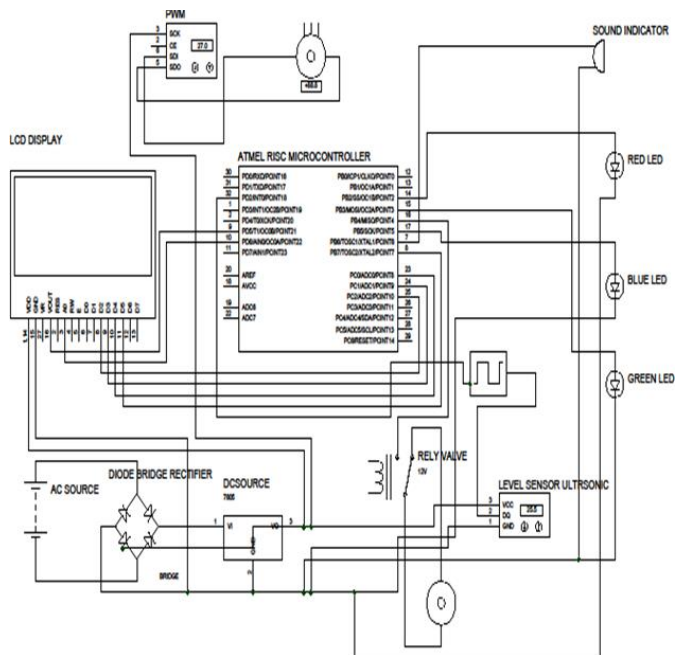


Fig 2. Circuit diagram

VII.RESULT



VIII. CONCLUSION

Smart medical beds are integrated solutions for patient care, assistance and monitoring, based on a inclusive, multidisciplinary design approach. Smart beds, flawlessly incorporated into the healthcare, have a exclusive prospect in enabling more efficient efforts for caregivers, and more approachable environments for patients.

IX. REFERENCES

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Cite this article as :

S. Archana, D. Devapriya, P. Pradeepa, G. R. Yogeshwari, "Implementing A Smart Bed System for Patients With Impaired Mobility", International Journal of Scientific Research in Science and Technology (IJSRST), Online ISSN : 2395-602X, Print ISSN : 2395-6011, Volume 5 Issue 5, pp. 106-108, March-April 2020.
Journal URL : <http://ijsrst.com/EBHBM009>