Indoor Fashion Navigation System for Radar

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Abstract— Patients in bed should be monitored continuously. Because of their tiredness and ill health, they may fall down or may be injured severely by dashing on the walls. So a dedicated nurse should watch them day and night. Innovative technology approaches have been increasingly investigated aiming at human-being long-term monitoring. In this project, a complete system for contactless health-monitoring in home environment is presented. It used a Radar technique to monitor the patient. The radar system consists of an IR transducer pair. The signal from the radar will be changed according to the position of the patient. If there is any deviation from normal position, the signal will be different for different actions. According to the signal from the sensors, the software analyses the position of the patient and accordingly the status of the patient. Thus it is very useful to find out the position of the patient without any dedicated nurse inside.

Key words: IR transducer, RADAR

I. INTRODUCTION

The senior citizen people of more than 60 years have been increasing regularly. This resulted in a growth for novel assistive technologies that enable routine long-term home monitoring [1]. The easy methods are based on device hold attached to the patient's body, involving pressing a button, e.g., worn a necklace in emergency situations [2][3].

Hence, A Senior Citizen in such situation may already be in unconscious. The ideal solution is to provide a contactless health monitoring system to provide a safety for the elder person [4].These academic developments are based on radar techniques implemented as a single device sensor, e.g., Continuous wave Doppler radar [5] or ultra wide band impulse radio radar.

In previous the attention has been focused mainly on contactless monitoring. In recent years, fall detection has become a primary need in connection to health monitoring in home environment. Some existing systems are based on video cameras, floor vibration, and acoustic sensors, by using the video camera systems there will be a failure due to low light environments and image processing, by using two cameras we can increase the efficiency up to 90%.

Similarly in both floor vibration and acoustic sensors has limited advantages due to environmental interference and background noise. They also have less effective in detecting the cases having "soft" human falls. Due to these disadvantages of existing fall-detection technologies, an alternative approach based on radar techniques has been demonstrated by the authors. This approach is able to detect the patient fall events and to localize a person without tag on the person

II. SYSTEM ARCHITECTURE

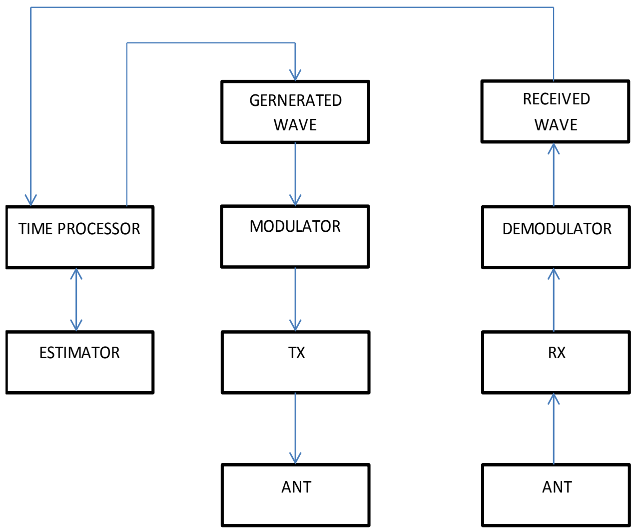

Fig. 1: Proposed Navigation System

Time processor analyzes the time taken between the transmission and reception. The time will be calculated for every complete rotation. Estimator detects the distance from the patient depends upon the time value changes. The time processor will controlled by the stopwatch.

High frequency waves will be generated and Carrier signal will be added with the waves in the modulator. Then the modulated signal is transmitted through the transmitter.

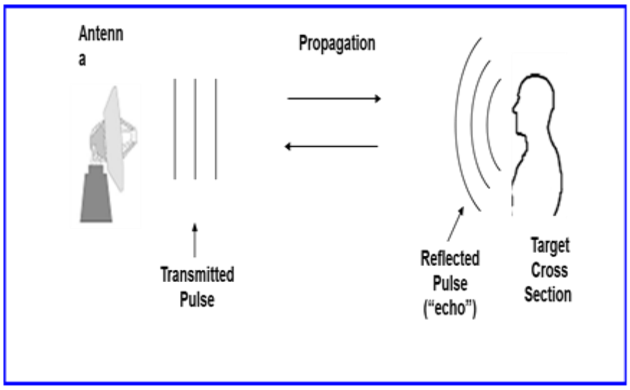

Fig. 2: Radio Detection And Ranging

Radar creates an electromagnetic pulse focused by an antenna, and then transmitted through the atmosphere. Object in the transmitted EM pulse called "target", scatter most of the energy and some energy will be reflected back towards the radar. The reflected echo will be captured by the receiving antenna.

The RADAR needs three piece of information to determine the location of the target. The azimuth angle, the angle of the radar beam with respect to the north. The elevation angle, the angle of the radar beam with respect to the ground.

III. EXPERIMENTATION AND RESULT

The system analyses the position of the patient and the status of the patient, signal from the radar will be changed according to the position of the patient (sleep, walk, fall, run).

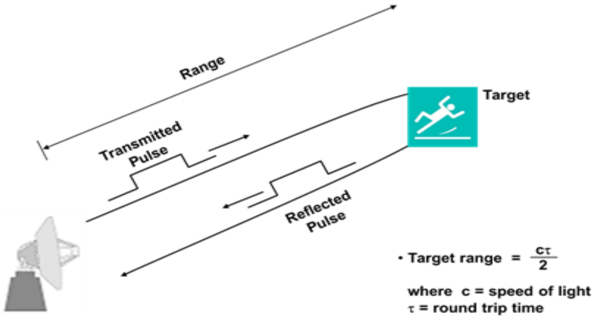

Fig. 3: Patient Falling Position

When the patient falls forward the radar distance value is suddenly decreases from the starting point. When the patient falls reverse the radar distance value is suddenly increases from the starting point. When the patient fall down, the radar value reach to zero. Thus the system detects the fall position. The transmitted signal is allowed to incident on the patient in which a part of the signal is received back as a result of reflection. Figure 4 represents the transmitted signal from the RADAR.

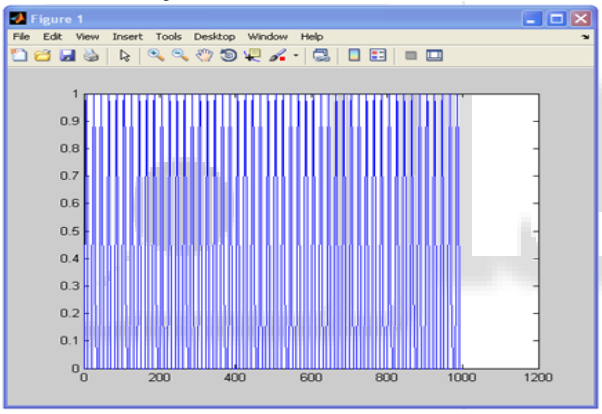

Fig. 4: Transmitted Signal

The reflected signal is collected back by the receiver end in which the transmitted and received signal are compared and is shown in figure 5. During the comparison process, the peaks of both the signals are taken into consideration and the decisions are made based on the variations in the peak levels.

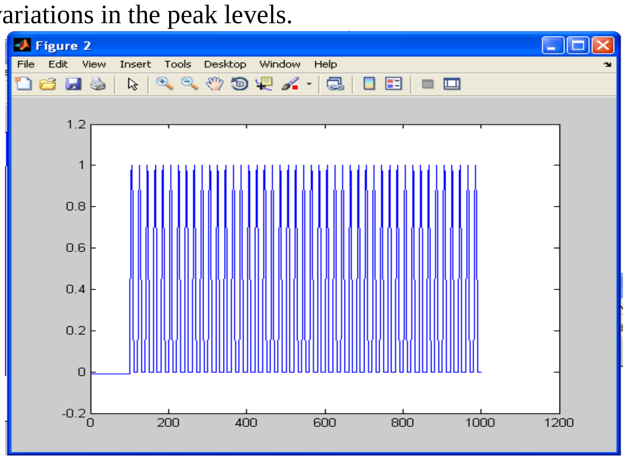

Fig. 5: Received Signal

The variation or the difference in the peaks of the transmitted and received signals depends on the forward and backward fall of the patient and the combined output is shown in figure 6. Based on the results obtained from the combined output the position of the patient is determined. However the system also displays the distance between the RADAR and the patient under a condition that if he doesn't fall which is shown in figure 7.

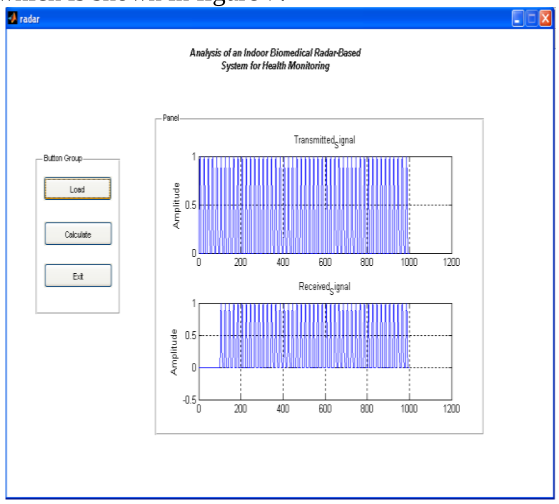

Fig. 6: Combined Signals

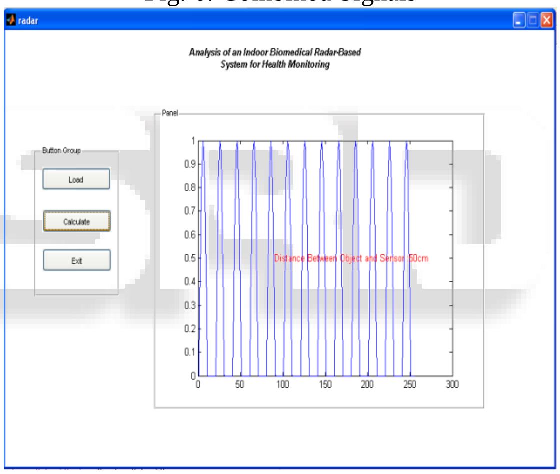

Fig. 7: Output Signal of RADAR

IV. CONCLUSION

In this paper, a complete system for contactless health-monitoring in home environment is presented. It used a Radar technique to monitor the patient. The future work is to combine a multiple sensors in a wireless sensor network configuration, in order to monitor multiple persons and to increase the accuracy and coverage area, beyond one room. The final application is automated remote monitoring in private homes, although it can also be adopted for nurse-call solutions in nursing homes.

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