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A RSSI LOW ENERGY TRACKING SYSTEM FOR DEMENTIA PATIENTS

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Abstract

The paper presents the health care monitoring system for dementia patients and to track their location using RSSI low energy tracking system. This describes the system RSSI which gives tolerant confinement and observing administrations through a wireless sensor network. The system is composed of three functional blocks: a localization tracking block and monitoring block with sensors (Glucose, heartbeat and sound sensor) which acts as transmitter and the doctor's receiver with RSSI.

Keywords: Indoor localization; E-health; Wireless sensor network; Glucose sensor; Respiration sensor; Heart beat sensors.

Introduction

One of the key challenges in wireless sensor networks (WSNs) is localization. Localization of sensor nodes in WSN is essential since it reflects spatial context with the data gathered by sensor nodes and used in applications

Distinctive movement following advancements are utilized as a part of solution, game and military applications to assess motion patterns, e.g., gait analysis for patients with neurological disorders, such as Parkinson. The most common motion tracking device is a motion sensor that consists of accelerometers and gyroscopes to measure the accelerations and angular velocities, respectively

Wireless Sensor Network (WSN) is an ad-hoc network generally used to perform various monitoring tasks. The improvement of health care systems and infrastructures is one

of the most challenging and compelling goals of today's society. This project focuses on one such important application of continuous, non-invasive, and wireless monitoring of the patients with Dementia disease. This can prevent potential

falls and injuries and records the number of occurrences of Freezing of Gait (FOG) over single or multiple days. We propose a home based monitoring system which involves embedding of wireless sensors in the patient's room and analyses the RSSI values. e-Healthcare is a popular healthcare application of Remote Body Area Sensor Network (WBASN). Today home checking of patients with development issue, observing of elderly for early fall identification are extremely well known applications.

The Scope of the System

A.PATIENT LOCALIZATION AND TRACKING:

The exact knowledge of the location of patients is a valuable asset and urgent assist is needed in emergency cases.

B. PATIENT STATUS MONITORING:

The current status of dementia patients must be continuously available to the medical staff, when they can roam around the premises of the hospital. Depending on the specific pathology, different pieces of information on the patient's status may need to be collected (movement characteristics, heartbeat, breath, etc.) PIC micro controller is used as a base where the LCD, sensors (heartbeat sensor, sound sensor & glucose sensor), RSSI, GSM are connected to it.

 As the PIC micro controller can work on 5volts of voltage so that the toll voltage is rectified and given to it. Using the RSSI values the time can be calculated and thus the distance can be known from it. And hence the location can be tracked and the signals are transmitted using the GSM. Another RSSI is attached to the PC of the doctor and the UART is used to transfer these signals. Thus the heartbeat, respirational count, glucose level are calculated with the help of sensors. Finally the location can be tracked and the health condition (i.e.) the heartbeat, glucose and respirational counts are displayed with the use of LCD.

Literature Survey

Helen [1] used calibration as a magnifying method for the positioning system and have also used the "wall count" technique it. Minimum algorithm [5] is utilized and the framework is effectively stretched out to overhaul the position valuation. RSSI (Received Signal Strength Indicator)-based techniques [3] or the time essential to deal with the distance between transmitter and receiver.[2]This enhances the indoor localization accuracy ceasing the computational complexity and additional hardware support. Several former strategy ply computationally demanding methods, such as convex optimization[6],systems of complex equations[7],Minimum Mean Square Error(MMSE) methods[8] and Kalman

Filters[9].In this strategies, the measurement model is not sufficiently analyzed. Xiuyan Zhu, Yuan Feng illustrated that less efficiency due to no additional hardware. RSSI-based tracking exploit diversity of measurements and motion models. Classical approaches for tracking are based on Kalman filters or more general Bayesian filters like particle filters. RSSI-based & calibrated centralized localization technique [5] exploits information due to increase in the number of anchor. The works described in and provide more advanced RSSI handling techniques, for example, histogram examination and measurable filters that enhanced range precision.

Enhanced RSSI-based high accuracy real time user location tracking system for indoor and outdoor environment [4].Existing RSSI-based tracking systems are affected by the channel conditions and provide a resolution in order of meters, which is not adequate for precise motion tracking needed for medical applications.

Access point localization using local signal strength gradient proves that the methods of indoor localization are generally in light of observing the radio flag quality, the alleged Received Signal Strength Indicator (RSSI). The radio signals are broadcasted by transmitters (normally Wi-Fi get to focuses, be that as it may, e.g., Bluetooth Low Energy reference points are likewise a choice) covering a particular area.

Block Diagram
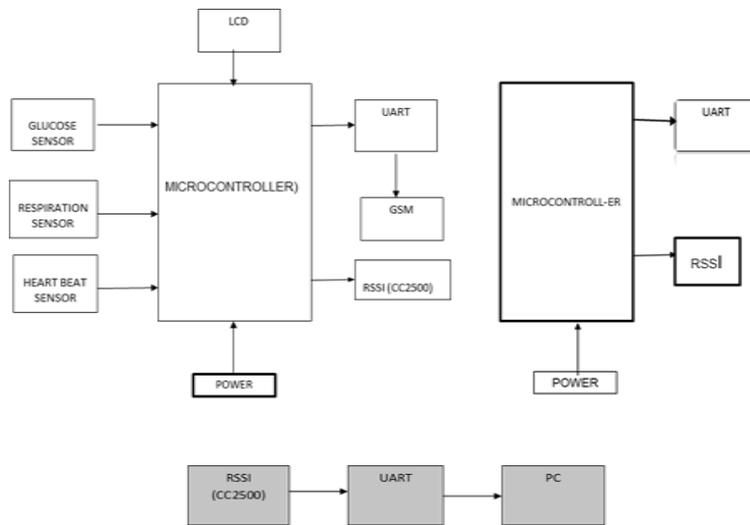

Fig.1.Block Diagram.

Description of the Block Diagram

The exact knowledge of the location of patients is a valuable asset and urgent assist is needed in emergency cases.   The current status of dementia patients must be continuously available to the medical staff, when they can roam around the premises of the hospital.

Depending on the specific pathology, different pieces of information on the patient's status may need to be collected (movement characteristics, heartbeat, breath, etc.). PIC micro controller is used as a base where the LCD, sensors (heart beat sensor, sound sensor & glucose sensor), RSSI, GSM are connected to it. As the PIC micro controller can work on 5volts of voltage so that the toll voltage is rectified and given to it. Using the RSSI values the time can be calculated and thus the distance can be known from it. And hence the location can be tracked and the signals are transmitted using the GSM.

Another RSSI is attached to the PC of the doctor and the UART is used to transfer these signals. PLTS increases the localization and tracking accuracy by particle filtering to level the fluctuations of the RSSI sample. Thus the heartbeat, respirational count, glucose level are calculated with the help of sensors. Finally the location can be tracked and the health condition (i.e.) the heartbeat, glucose and respirational counts are displayed with the use of LCD.

Hardware Display
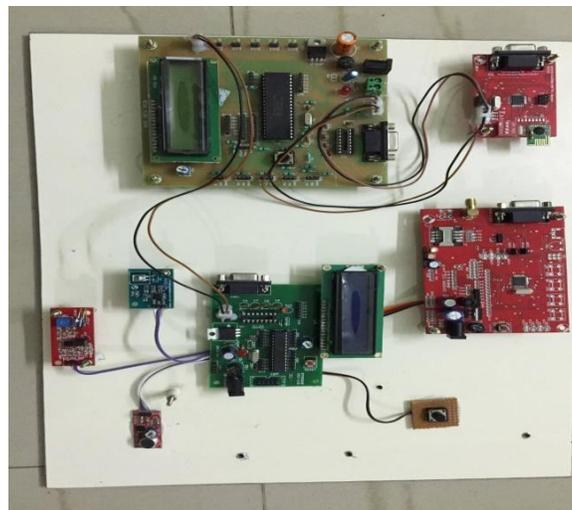
Fig.2.Hardware Setup.
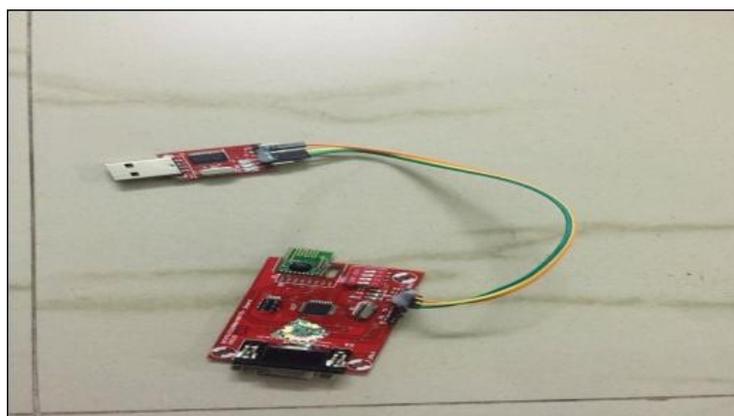
Fig.3.RSSI Circuit (CC2500).

Performance analysis

The Visual Basic (VB) map gives the location of the patient in x and y axes, that is the longitude and latitude directions. Here, from the center the above points are taken as y-axis (168) and below ones are taken as x-axis (82).The red dot indicates the location of the patient which varies by his/her movement.

Table-I: Tabular Column of Patient's Health condition.

DATE&TIME	Glu1	Res2	Hbt3
MAR 3,2017 4:40 PM	470	1023	61
MAR 10, 2017 9:08 AM	455	154	64
MAR12,2017 12:20 PM	381	132	67
MAR 22, 2017 6:43 PM	460	106	64

The processing time is measured with the number of anchor nodes. The above tabular column is giving the sensor data details in the webpage through IOT module. It is updating the sensor data's for each and every minute to the doctor's server. That data's are only tabulated. Thus the patient's health condition is monitored and through GSM it is updated with the nursing institute or directly.

Conclusion

Our system would enable a more accurate estimation of degree of gait disability in an individual and provide the doctor with more information about the patient. This can help to determine the course of activities to take after for the specific patient. The framework would be totally subtle and inconspicuous to the patient. This would eliminate the problem of over consciousness in the individual when he/she is being examined at the hospital.

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