Patient Movement Tracking using Mems and Cloud computing

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***Abstract*—**The main objective of project is to develop a Patient Movement Monitoring system and alert the caretaker to eliminate injuries and sometimes death. In many researches patient health is only been monitored using wired, wireless and internet of things techniques. This proposed methodology majorly helps the elderly people, people with Coma etc. These vulnerable patients in many cases they urinate and without their knowledge they tend to move away from the bed, So assist elderly, vulnerable, coma patients we proposed a hybrid patient movement monitoring system integrating ultrasonic, PIR, MEMS sensor to detect the movements and alert the caretaker. Also medical persons can able to login into the cloud server and can able to monitor all the patient movement data's remotely using internet of things. Thus this avoid the doctors, nurses manually visit each patient rooms and avoid disturbing the patients during night times. For programming we have used arduino uno microcontroller to perform the condition and data transmission.

Keywords—Human detection, Ardiuno ide, Patient Monitoring

I. INTRODUCTION

A motion detector is a type of security system that use sensing in the form of sensors to detect the movement and this will triggers an alarm or activates another circuit. So, motion detectors are basically used to protect the indoor places, conditions can then be observed slowly. Detectors which we use in homes for security purpose only detect movement in a closed space area of little feet-by-feet. In real world time, detectors for heavy range sheds can protect areas which have dimensions as (24 x 37)m (80 x 120)ft. The motion detectors are useful in places like banks or lockers where important assets are kept. As such, motion detectors can detect break-in at vulnerable points walls, doors, windows and other areas. Here some motion detectors are used to protect the inside of exhibit cases where items like diamonds arc placed. To detect the slightest touch, they are focused on a narrow area of coverage, somewhat like a curtain, which is projected in front of a patient.

Normally, an ultrasonic sensor consists of one or more ultrasonic transducer which will transform the electrical energy into sound and vice-versa, a casing which encloses the ultrasonic transducer, connectors, and some electronic circuit for signal processing if possible.

II. STATE OF THE ART (LITERATURE SURVEY)

Here the author[1] presented a contactless body movement recognition (CBMR) method via WiFi signals. First, CBMR uses commercial off-the-shelf WiFi devices to collect channel state information (CSI) data of body movement and segment the CSI data by sliding window. The context information of the segmented CSI data is learned by a bidirectional recurrent neural network (Bi-RNN).Finally, the author recognized and classified the type of body movement by the softmax function. Algorithm used here is Random Forest Algorithm.

Here the author[2] aims to help the public in protecting and avoiding criminal cases that are likely to occur in their neighbourhood. Intruders can unlock the house unknowingly by anyone. This device has been created for home security systems. The Arduino Security System is a technology that uses PIR (Passive Infrared Sensor) sensors to detect such motions. When the PIR sensor detects the movement, an alarm is triggered after the data is processed by Arduino. Then the data is also sent via Wi-Fi modules to the owner using the application that is set by user's smartphone. Here, they designed the system that only owners can off the alarm using the application.

Here, the author[3] proposed a wireless environmental monitoring method for aquaculture based on ZigBee technology, and the hardware and software hardware design for the monitoring network and sensor nodes. It has 3 parts: the sensor nodes for aquaculture monitoring, the server, and the mobile app. The aquaculture monitoring sensors transmit the collected culture environment information data to the ZigBee wireless nodes via the CAN bus, and this data is then transmitted from the sensor nodes to the primary node on the PC server via the ZigBee wireless network. Once the server monitoring platform receives the data, the mobile monitoring app obtains the aquaculture environmental data by logging in to the

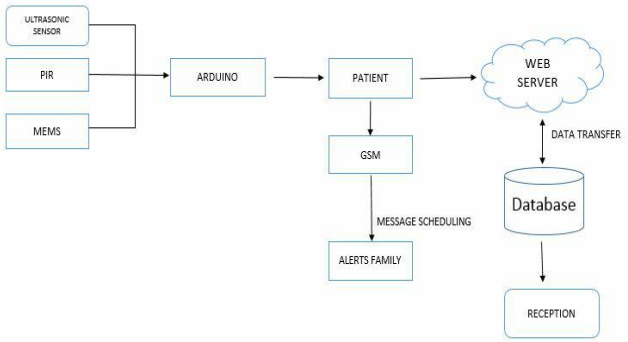
server. The mobile app can also control the monitoring sensor devices via the server.

Here, the author[4] presented a design concept of a smart sensing system, named Dr. feces, for colorectal cancer detection. It is combines a hardware device with a mobile application through Internet of Things and monitors the condition of feces to provide visualized data.

III. PROPOSED WORK

This proposed methodology majorly helps the elderly people, people with Coma etc. These vulnerable patients in many cases they urinate and without their knowledge they tend to move away from the bed, So assist elderly, vulnerable, coma patients we proposed a hybrid patient movement monitoring system integrating ultrasonic, PIR, MEMS sensor to detect the movements and alert the care taker. Also medical persons can able to login into the cloud server and can able to monitor all the patient movement data's remotely using Internet of Things (IoT). Thus this avoid the doctors, nurses manually visit each patient rooms and avoid disturbing the patients during night times. For programming we have used Arduino uno microcontroller to perform the condition and data transmission. In this, ultrasonic sensor to detect obstacles, Mems sensor to detect the patient monitoring, PIR sensor to detect the other humans, care taker presence inside the patient room.

Architecture Diagram:

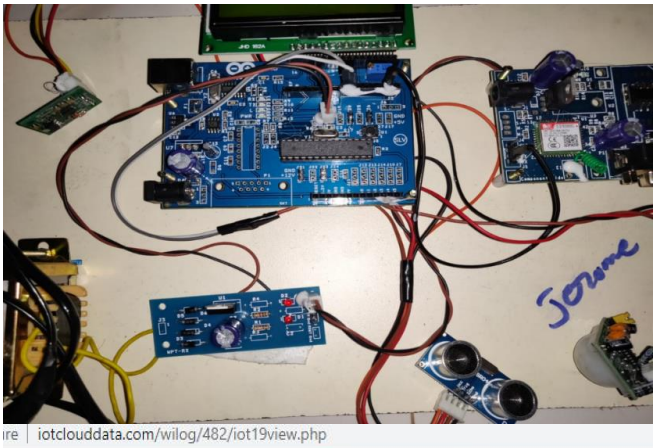


Kalman filter algorithm:

In this study, captured movements will undergo a series of steps in classification and filtering. The discrete KF algorithm is implemented using ATMega 328p microcontroller on Arduino board. The captured movements will undergo series of steps for classification and filtering. The study will be using the KF algorithm for reducing noise in the movements.

IV. IMPLEMENTATION

The purpose of the project study is to assist elderly people, people with Coma, vulnerable patients with effective patient monitoring system. The objective of the project is to develop a smart device integrating ultrasonic sensor to detect obstacles, Mems sensor to detect the patient monitoring, PIR sensor to detect the other humans, care taker presence inside the patient room. Also this application can be monitored across globe by using IoT technique. Also during initial stage of abnormality itself the care takers, patients family would be alerted by automatic alert message from the GSM module.



V. RESULTS DISCUSSION

This proposed methodology majorly helps the elderly people, people with Coma etc. These vulnerable patients in many cases they urinate and without their knowledge they tend to move away from the bed, So assist elderly, vulnerable, coma patients we proposed a hybrid patient movement monitoring system integrating ultrasonic, PIR, MEMS sensor to detect the movements and alert the care taker. Also medical persons can able to login into the cloud server and can able to monitor all the patient movement data's remotely using Internet of Things (IoT). We have real time hardware components to execute the proposed system and check the performance.

VI. CONCLUSION

In this project study, we have developed a patient assistant based embedded system to monitor the patients using sensor and Internet of Things (IoT). In THIs proposed work, we used ultrasonic, PIR, MEMS sensor to detect the

movements and alert the care taker. Thus the patient can be tracked 24*7 reducing the manual dependency.

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