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RESEARCH ARTICLE

Child Activity Monitoring using Tri-axial Accelerometer

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Manuscript Info	Abstract
Manuscript History:	This paper presents a methodology to monitor children's activity using a tri-
Received: 18 April 2015 Final Accepted: 29 May 2015 Published Online: June 2015	axial accelerometer to reduce unintentional injuries at home. The babies usually start walking between nine to sixteen months which increases the risk of falling. This causes frequent injuries in children. Most of these accidents require medical care or hospitalization. Thus a new system should be
Key words:	developed to reduce these home accidents. This paper presents a method that uses tri-axial accelerometer and gives an indication when the child performs
Child monitoring, accelerometer, baby care, child care, activity recognition.	potentially hazardous activities.
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I. INTRODUCTION

Recognition of activities is based on monitoring the physical activity continuously in free living environment for long duration. Automatic recognition of human activities has drawn much attention in the last few years. It has various applications in variety of areas, including mobile computing, surveillance based security system, entertainment system etc. Over the last few years, the sensor technologies, especially low power, low cost, miniaturized sensors have made substantial progress.

Human activity recognition mostly uses wearable sensors such as accelerometers which recognize everyday activity such as walking, sitting etc. Accelerometers are used because they are inexpensive, require relative low power, and are embedded in most of the cellular phones [1]. Unintentional accidents in children are one of the leading health problems which can cause serious injuries or long term disability. A fear of fall of a child does not allow the caretaker to go away from the child and to perform his/her other concerns [8]. Currently in medical services, prevention is preferred over the treatments and health management is considered primarily instead of the disease-control efforts. Hence detection of a fall which can cause injuries makes prevention easier. Figure 1 shows the survey of death rate of children between 0-18 years.

This method uses a tri-axial accelerometer for fall detection. This is an easy and simple method to detect fall of children's. To detect a fall the challenging issue is to classify the daily activities of children into safe and dangerous activities.



Fig. 1. Death rate

The rest of the paper is organized as follows: after the introduction, section II gives a brief overview of the techniques used for monitoring the human activities to reduce frequent accidents in children's and section III includes the methodology and section IV concludes the paper.

II. OVERVIEW ON ACTIVITY MONITORING TECHNIQUES

This section covers a detail survey on the various proposed methods for detecting activities of children.

Activity recognition from user-annotated acceleration data used five biaxial accelerometers. All the accelerometers were worn simultaneously on the body. Data collected from all the sensors was processed for the activities such as walking, running and tooth brushing [4].

Sensor placement for activity detection provides a frame-work that gives ideal sensor location for a group of activities. The activities are classified from very low level activities, including lying down, to high level activities including running and walking [6].

Sensor based activity recognition included a survey of sensor based activity recognition techniques. Two techniques were discussed: vision based activity recognition used video cameras to monitor the behaviour. The video sequences or visual data was processed further to analyse the activity. Sensor based activity recognition used wearable sensors which generated different state changes which were processed by statistical analysis method [7].

III. SENSOR BASED ACTIVITY MONITORING

Figure 2 shows the methodology to monitor the children's activities which will reduce unintentional injuries



Fig. 2. Block Diagram

In order to recognize daily activity accelerometer is used. It is small, thin and consumes low power. It not only measures the static acceleration of gravity in tilt-sensing applications, but also dynamic acceleration resulting from

motion, vibration or shock.

The proposed method consists of three steps: i) collect the sensor data from accelerometer ii) process the collected data iii) indication through LCD, buzzer and LED. The tri-axial accelerometer transmits analogue inputs to various pins of microcontroller where they are converted to digital signals. This accelerometer module sends measurement of movement of activities of children in all the three directions: x, y and z directions. The buzzer is used to broadcast emergency alerts to parents or caretakers.

IV. CONCLUSION

This paper presented a review on previous methods used to detect human activities. Recognition of human activities is a challenging issue which mostly includes accelerometer as a wearable sensor. To reduce the unintentional injuries at home a safety method must be developed. The early warning will give the parents and the caretakers enough time to save their children.

V. REFERENCES

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