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AUTOMATION IN HOUSEHOLDS' MATERIAL

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Abstract

In various locations, such as tourist destinations, shopping malls, hospitals, etc., counting pedestrians is important. But in literature, a method with lower costs still needs to be proposed. A stronger and new approach for counting pedestrians has been suggested in the report, which allows use of just a few advertisements off the workers sensors. The collection of real data for proper and successful decision-making is an essential task. Getting such data is a reliable and automatic way and also a burdensome task because it will depend on real time situations. A development which is work in progress for a low power mat sensor and is flexible has been proposed that counts people automatically.

Keywords: *Sensor – Mat, People Counter, Mobility, Wireless Networks, Arduino, Electronic, Household.*

I. INTRODUCTION

A lot of work has already been done to keep a count on the individuals getting in and out of the door. But because of the differences in human mobility, there are different issues that have arisen. In counting individuals for strategic research in industry, providing emergency support and protection, an automated and accurate approach is required. Events that need people to be relied on. These already established networks are having high accuracy in lower mobility of humans but the accuracy is reduced as the mobility is increased. Thus in future and complex establishment's automatic counting devices for people need to be established. Collection of data by making use of such devices can be used majorly in highly dense areas with very high mobility such as shopping malls, railway stations, and hospitals for task optimization. Thus it is desirable to come up with a device that can count people with minimum cost and employs a lesser number of sensors but does not compromise accuracy. There are already current camera-based systems that provide high precision, but they have higher costs, complex algorithms and high processing power usage. There are other solutions available, but they have lower precision and greater power consumption. Counters based on IR sensors have low cost, lower power requirements, simpler set-up procedures, but lower precision [1]. Providing a solution for the problem a novel system has been proposed that will count the number of people walking. Thus (COTS) commercial off the task sensors have been exploited having newly developed algorithms for performing the task of counting. The

algorithm is provided in two different manners. One is for the part where the stepping down in which the sole of the foot is put down first followed by the front part. The other part is where the stepping up of the system is discussed in detail where the heel or sole is picked up first then followed by the rest part of the foot. A complete count is done when the whole process of stepping down and picking up the footsteps is carried out. In Figure 1, the complete process is given out. Thus a real implementation of both the variants has been discussed in detailed manner performing a real evaluation of the user.

By using a small number of COTS sensors that are based on piezoelectricity for pedestrian counting, a comprehensive design and algorithm to identify the step-down phenomenon has been introduced. It was possible to count people travelling in two opposite directions.

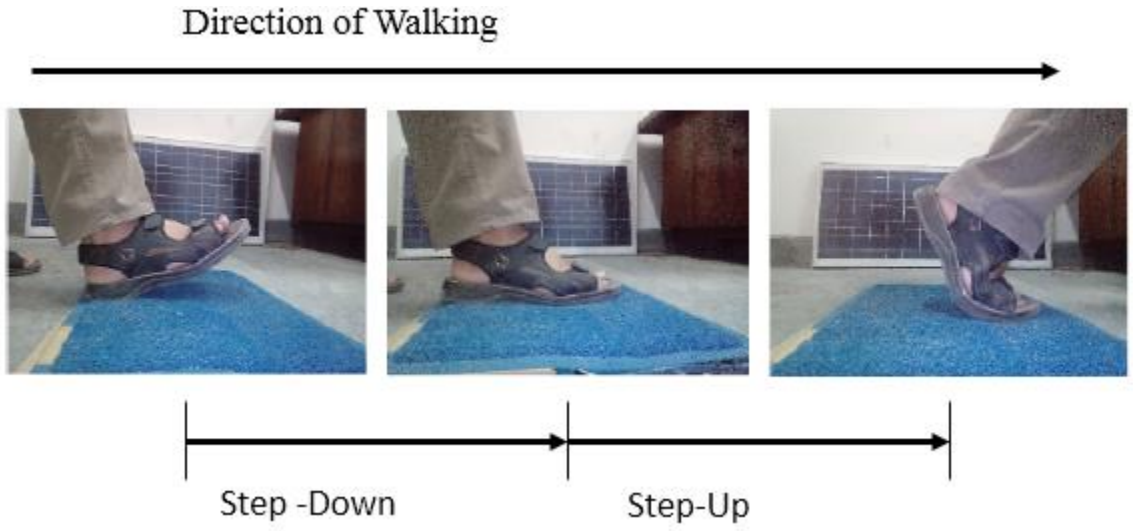

Fig. 1 Stepping Down and Stepping Up

The sensing module is the first part of the process as a whole. They are used for detecting the movement of humans because of the cost-effectiveness and high sensitivity of the piezoelectric sensors[1]. There are a number of rows, and each row is equally numbered and spaced with sensors. The style of the gird or number of sensors is altered for some further change. For sensing the direction of movement of person's walking on the mat, irrespective of their placement on the mat. The vibrations created by the foot sensors will be enhanced by the hardboard blocks. If any modification is done to the algorithm, then changes are made in pattern of these blocks too. In Figure 2, the block diagram of sensing module is given. Control unit in the controller module gets the output from the sensing mode as its input. Various components of control unit are oscillator, microcontroller, and various other components. An algorithm is executed on the basis of data given out by the sensor module. As per the algorithm, the direction of motion is decided. Output is shown on a LCD in display unit. The supply unit for power will give power for operation to the display unit and control unit[2].

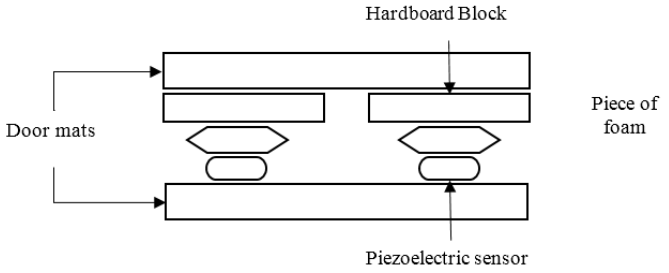

Fig. 2 Sensing Module

In Figure 2, the flowchart for the algorithm is given for the proposed system. First the sensor's sensitivity is analyzed in response to the pressure exerted by the foot on the hardboard. The effective area of coverage that can be sensed by the sensor is determined[3]. A foot is placed over the hardboard block which has a sensor below it at different radial distances. With the addition of sensors, the number of hardboard blocks are also varied[4]. Generally, one hardboard block will consist of four sensors but to increase the sensitivity it can be increased to six or more sensors but they need to be placed uniformly throughout the board. Generally, a person will place the heel on the surface followed by the toe while stepping down. There will be a time-delay between the time at which heel and toe have been placed on the foot. The attempt was to count only from one footstep thus the mat has a dimension of 6.5 inch and thus can accommodate only one foot at a time because average foot size is around 11 inches. The analysis of sensitivity of the sensor is done as per the response given by the pressure exerted over hardboard cover. This has been done for determining the area that is effective in calculation of the steps passed through the sensors. For this footstep is placed over the hardboard block that has a sensor under it at the center and a number of places around it. The output voltage produced because of the sensors placed at various locations in the form of the bar graph. This methodology deals with technology of temporal sensors by varying time response and the accuracy of the counting of pedestal crossing[5].

The proposed design was evaluated by a group of seven male adult persons. It has an accuracy of more than seventy percent. The error for twenty-five percent is because of the propagation of vibration from the part of the hard block which is stepped to the part which is still yet to be stepped. Not all humans are right-handed and variation in gender and age will have an effect on the accuracy[6].

II. LITERATURE REVIEW

Authors Zhu Qiuyu, Tang Li, Jiang Yiping and Deng Wei-jun have presented a unique approach to count people that pass through a region whose surveillance is done by a binocular that is fixed parallel. For extracting overlapping of an object integrated algorithm has been designed which will take advantage of the two-dimensional and three-dimensional information. The system was capable of operating real time with more than 96% count of accuracy even in crowded places [2]. Authors Christof Kutschera, Martin Horauer, Markus Rayy, Daniel Steinmairz and Peter Gorski have presented a report on the sensor-mat which is in under development phase and will aid in keeping automatic count of the person passing the mat. It can be used indoors as well as outdoors

where the traffic of humans is very high. Authors Thiago Teixeira and Andreas Savvides have developed a light people counter that works online and utilizes the motion histogram. It is stiff to fluctuations of intensity in pixels, changes in gradual lightning and repositioning of furniture. Future scope of this field is that with usage of more than seven cameras it can be employed in a two-bedroom apartment. Authors Vincent Rabaud and Serge Belongie have carried out algorithms based on multi body segmentation based on motion. A more complex model has been proposed which will identify the motion and appearance of the object or person in motion and also have a work method for the camera which is handheld. Authors H. Zhao R. Shibasaki have proposed a system to monitor and track the pedestrians in open and wide areas. Single row scanners are used on the floor with a scan elevation of more than 15 cm. Four LMS200 along with a video camera is put near the passing point. Christophe Milon, Lannion and Krolletal Jean-Claude Dubois have patented a device for detecting the passing of individuals[7][i].

III. CONCLUSION

The paper has a smart mat that measures the direction and number of pedestrians crossing that area, low-cost, novel, easily deployable and named. In relation to the face direction, a person can also do a count of the individuals getting in and out of the given house. However, a smaller number of sensors per square foot have been used in the smart mat compared to any other current mat that serves the same function. Sensors based on piezoelectric vibrations have also been used that can allow achievement at very lower costs. Only human counting has been done in the document. Thus, kids of various age groups and heights can be done in potential women's jobs. Even when a person has placed all of his steps on the mat, the path should be decided. The accuracy of the system is a function of various factors such as pattern in which footsteps are placed, speed of walking and much more leading to two persons putting their foot in different ways. In the future, experiments can then be carried out that will separately detect and quantify all the necessary values forward as well as backward movements for both failed and effective detection. This knowledge will assist in deterring the project's accuracy and precision. It was also noted that if three rows are put, then in the middle portion of the board the data would vary significantly.

IV. REFERENCES

[1] R. R. Hoffman, M. Johnson, J. M. Bradshaw, and A. Underbrink, “Trust in automation,” *IEEE Intell. Syst.*, 2013, doi: 10.1109/MIS.2013.24.

[2] R. P. Novick and E. Geisinger, “Quorum sensing in staphylococci,” *Annual Review of Genetics*. 2008, doi: 10.1146/annurev.genet.42.110807.091640.

[3] R. Parasuraman, T. B. Sheridan, and C. D. Wickens, “A model for types and levels of human interaction with automation,” *IEEE Trans. Syst. Man, Cybern. Part ASystems Humans.*, 2000, doi: 10.1109/3468.844354.

[4] D. Woods and E. Hollnagel, “Automation Surprises,” in *Joint Cognitive Systems*, 2006.

[5] S. J. Tang, Q. Zhu, W. W. Wang, and Y. T. Zhang, “AUTOMATIC TOPOLOGY DERIVATION FROM IFC BUILDING MODEL FOR IN-DOOR INTELLIGENT NAVIGATION,” 2015, doi: 10.5194/isprsarchives-XL-4-W5-7-2015.

[6] D. F. Adams *et al.*, “Open 3rd Party Transfer,” *Compos. Struct.*, 2015, doi: 10.1017/CBO9781107415324.004.

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[7] S. C. Abrahams, "Automation," *Phys. Today*, 1964, doi: 10.1063/1.3051370.