

Posture Sensor: Cross Leg Detector at Knee Level

Gudi Siva Leela Krishna Chand, *Soo Young Shin

Department of IT Convergence Engineering, WENS Lab, Kumoh National Institute of Technology,
Gumi, South Korea

Email: leelakrishnachand@gmail.com, *wdragon@kumoh.ac.kr

ABSTRACT

This paper presents a wearable posture device that can detect and alert when a person tries to attempt a cross leg at the knee level. Generally having a cross leg is considered as normal but if it is done regular then it can create large number of problems such as damaging the veins, increasing the blood pressure, temporary paralysis and sometimes long term numbness. The main problem is that we don't even realize that we are doing it. So, to overcome this problem, we have developed a prototype, that can alert the user. We have developed two types of prototypes where the first one is with feedback and other one is without feedback of our activity regarding cross leg.

KEYWORDS

Wearable device; Posture Sensor; Intel Edison

INTRODUCTION

Cross leg messes with the nerves as it cause more pressure on the peroneal nerve which is the major nerve in our leg that passes below our knee and along the outside of the leg. This pressure causes numbness and temporary paralysis of some of the muscles in our foot and leg. Cross leg was tested on forty two participants for 12min in [1]. It was shown that, it has increased the systolic blood pressure significantly by 6.7mmHg in the hypertensive patient and 7.9mmHg in the treated diabetics [2]. Till now in the market no devices are available to detect and alert if a person is having this kind of posture.

PROPOSED MODEL

We have proposed two models for our device. In the first method, our device alerts the user by vibrating. Also, user can see the feedback of his activity while in the second method the device just alert the user by vibrating. We have followed the principle of induction coupling which uses an electromagnetic field to transfer energy between two objects. Our prototype is as shown in the below Fig. 1.



Figure 1. Prototype of proposed cross leg detector with feedback

On the back of right knee, we have placed the coil with the vibrator along with our developed circuit using Intel Edison. On the other knee, we are adding a coil with a battery. When these two devices are coming near then the voltage is induced through an inductive coupling to the other side. So, when a person is trying to attempt a cross leg at the knee level then our device starts vibrating. While attempting cross leg, if the back of the knee of one leg is a little bit far then it starts to vibrate little and when it comes near or if it touches then it starts vibrating more. The amount of vibration and the time depends upon the transfer of energy through coupling. The Intel Edison calculates the number of times we have tried for cross leg. We can see the feedback of by connecting our mobile to Intel Edison. In the second method, the device gives vibrations without any feedback activity. So the size of the prototype became smaller as it is not going to use the Intel Edison. The device without feedback is of use and throw type. Our device with a cross leg with near and far along with feedback activity is as shown below in Fig. 2.



Figure 2. a) A bit far to have cross leg b) Near to have cross leg

CONCLUSION

Our prototype tries to avoid the cross leg at the knee level by alerting the user. It is going to help the user indirectly to prevent varicose veins, weakening or damaging the veins, causing numbness etc.

ACKNOWLEDGMENTS

This research was supported by the MSIP (Ministry of Science, ICT and Future Planning), Korea under the CITRC (Convergence Information Technology Research Center) support program (IITP-2015-H8601-15-1011).

REFERENCES

- [1] Velthoven, Michelle Helena, Suzanne Holewijn, Gert Jan van der Wilt, Theo Thien, and Jaap Deinum. "Does wave reflection explain the increase in blood pressure consistently leg crossing?." *Blood pressure monitoring* 19, No. 3 (2014). 129-133. DOI=<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2702.2009.03148.x/full>
- [2] Pinar, Rukiye, Siddika Ataalkin, and Roger Watson. "The effect of crossing legs on blood pressure in hypertensive patients." *Journal of clinical nursing* 19, no. 9-10 (2010): 1284-1288. DOI=http://journals.lww.com/bpmonitoring/Abstract/2007/06000/The_effect_of_crossing_legs_on_blood_pressure.9.aspx