

The Intelligent Amelioration System for Postural Deformities

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Introduction

Postural deformities are spreading among people at the meantime. In postural deformities, there is an imbalance in the loads imposed on different areas. Various types of postural deformities are Spinal curvature, Flat foot, Knock knees, Bow legs, Round shoulders. Where loads exceed normal physiological limits consistently and over prolonged periods of time, structural changes occur in the skeletal bones. These structural changes cause postural deformities, such as: genu valgum, genu varum, asymmetric shoulders, kyphosis and etc. Diagnosing and curing these deformities instantaneously not only optimizes the treatment, but also reduces the remedial expenses. Yet many people ignore these deformities for several reasons like: lack of knowledge, lack of time or heavy fees for the doctor's referral.

Lordosis is the inward curvature of spine which creates problem in standing and walking and 'Bow legs' is also a postural deformity which the knees are widely apart (Figure 1).

Our purpose for doing this project was to present a proper solution, to simplify and promote the quality of both diagnosis and treatment phases of the postural deformities and still is more accessible than other solutions. In the diagnosis phase the system is programmed to receive the coordination of the joints of user's body by connecting a computer device to a Kinect camera, and also by using a marker-based method recognition for the joints that weren't recognized meticulously by the Kinect device. So combining these two methods

and using the most accurate results obtained in each, has improved the accuracy of the diagnosis. Having the coordination of one's joints, the system diagnoses the deformities based on medical standards.

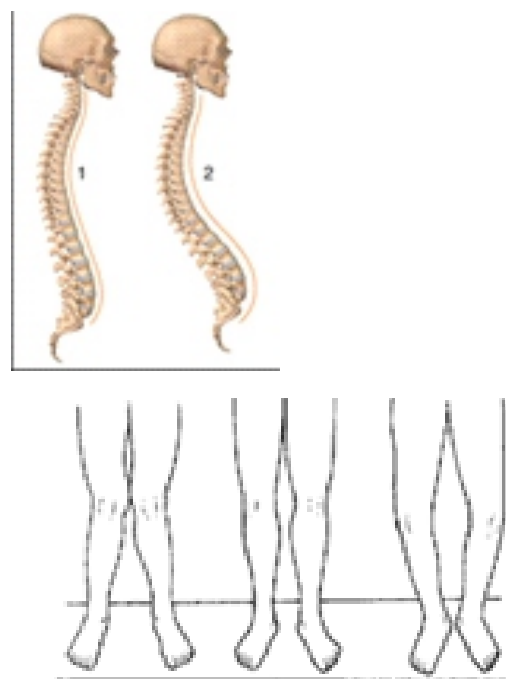


Fig. 1: Lordosis and Bow legs as postural deformity

Conclusion

The implementation of the treatment phase is based on the diagnosis part, which means suggesting a treatment for a postural deformity is related to what we diagnosed in the diagnosis phase. The treatment is usually accomplished by doing some specific exercises for the deformity; these exercises are called therapeutic exercises. According to the fact that Kinect camera is able to monitor the user's movements, we control the

suggested exercises to see whether they're done correctly by the user or not. By these methods every user can do the whole process of the diagnosis and treatment intelligently and without the supervision of any expert.

The expansion of this system can raise the velocity and accuracy of the diagnosis and treatment process, and also can decrease the requirement of an agent as far as possible. This system can be used as a replacement of the doctor in places with the large number of users such as schools which can prevent the waste of time and money.

طراحی سیستم تشخیص ناهنجاری های بدن بدون نیاز به اپراتور

امروزه ابتلا به ناهنجاریهای ارتوپدی شیوع بسیار یافته است. تشخیص و اقدام به درمان این ناهنجاریها در زمان مناسب، میتواند علاوه موثر بر ساختن اقدامات درمانی، هزینه های درمانی را نیز کاهش دهد. هدف از انجام این پروژه، ارائه راهکاری برای تسهیل و ارتقای کیفیت فرایند تشخیص و درمان ناهنجاری های یادشده، بوده است. در فاز اول، تمرکز بر تشخیص ناهنجاری ها قرار گرفت. بدین منظور از طریق ارتباط کامپیوتر با کینکت، اطلاعات مربوط به مختصات مفاصل اصلی بدن کاربر را دریافت کرده و با بررسی آنها، مبادرت به تشخیص ناهنجاری های ارتوپدی کند.