

Cervical Relax

A neck-exercise Android application

Abstract: ‘Cervical Relax’ is a neck-exercise application on Android, designed for relaxing user’s cervical spine, especially after a period time of using cell phone or computer with an unchanged head-neck position. This report firstly indicates the motivation of designing such application; then introduces how to use this application and thoughts of designing behind it. Finally, potential future work which could improve the application is discussed.

I. Introduction

Cervical spondylosis is a common condition which does harm to the joints and discs in people’s neck. It develops from wear-and-tear of the cartilage and bones in cervical spine. Although it is mainly due to age, it can be caused by other factors as well, for example, ligament stiffness and cervical spine overuse [1]. Ligaments connect spine bones to each other tightly, and they can become even stiffer over time, accelerated by cervical spine overuse, which affects the neck movement and makes the neck feel tight. When people use cell phone or computer for a period time without changing head-neck position, the cervical spine is overused and ligament stiffness could occur. This application is designed for that moment to help user relieve the fatigue of neck and prevent cervical spondylosis.

II. Use of Application

Fig. 1. shows the start screen and the ready screen. Once the application is started, the user will be brought to the start screen, click the button on the middle of the screen to go to the ready screen. On the ready screen, the user can see the real-time image taken by the front camera. With the help of it, the user can adjust the head to a proper position for taking the exercise later, i.e. inside the circle on the screen. Once the user moves the head into the range of circle, the color of the circle turns green from white.

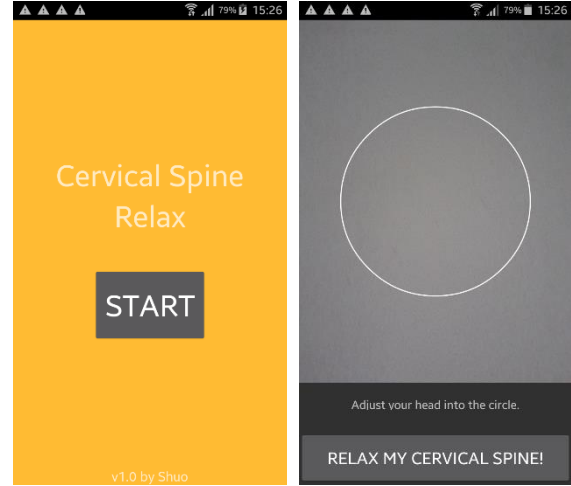


Fig. 1. Start screen and ready (pause) screen

Fig. 2. presents the screen of four steps of the exercise:

- Turn head to the left five times;
- Turn head to the right five times;
- Turn head up five times;
- Turn head down, tuck chin in, and keep for three seconds

During the exercise, the application captures the movement of user’s head by tracking user’s eyes. The user can see the feedback of the capturing via the white cursor on the screen, indicating the middle point between two eyes. The user is expected to achieve required head movement by moving the cursor into the range of the colored circle. In addition, there are audio instructions played during the exercise, giving the user freedom to choose not to stare at the screen all the time. The background music is played automatically once the exercise is started, user can turn it off and on manually by clicking the speaker icon at the top-left corner on the screen.

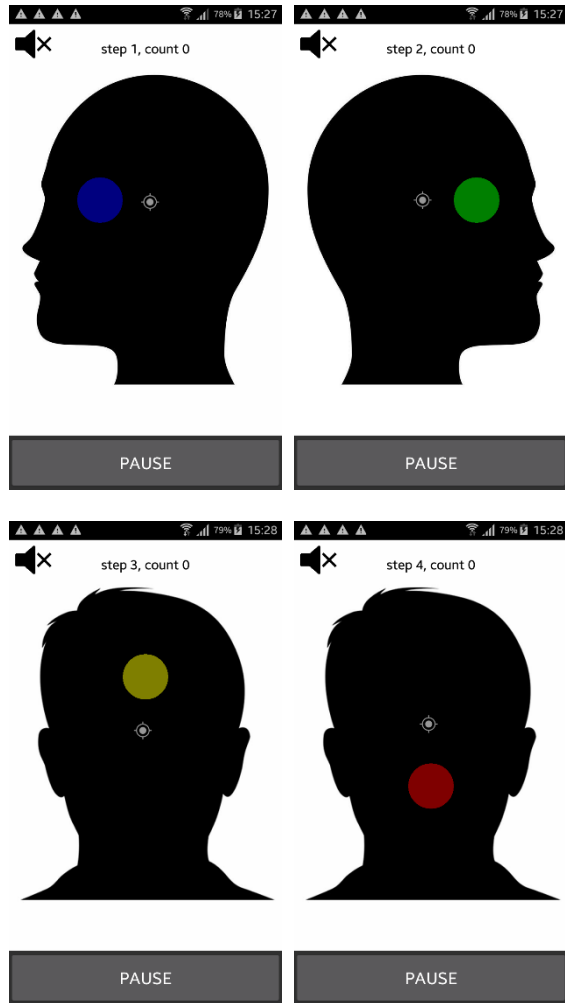


Fig. 2. Screens for four steps of the exercise

After finishing all four steps of the exercise, the user comes to the end screen, where the user can choose whether to redo the exercise.



Fig. 3. End screen

III. Thought of Design

These four steps in the exercise are designed based on professional medical research. To achieve a safe and effective design, it is necessary to understand fundamentals of neck positioning. The bodies of the vertebrae are separated by the discs, and where each two vertebrae overlap, there is a small facet joint on each side at the back. Problems arise when the discs go narrow and dry out, the little facet joints develop wear-and-tear arthritis, and the intervertebral foramen become smaller. With these changes, in certain neck positions, the foramen become even smaller and can compress or pinch the nerve, causing pain, numbness, and weakness wherever that nerve travels to in the arm [2].

One risky neck position is ‘neck hyperextension’, which is hanging head back, opening the throat but compresses the back of the neck. Another is twisting or rotating the neck, in other word, neck rolls. These positions also compress the little facet joints on the back of the cervical vertebra, which can cause further damage to already degenerated cartilage surfaces [2] [3] [4]. Therefore, the design of this application avoids risky neck positions and movements, and is beneficial to relax the neck. Particularly, the forth step “turning head down, tucking chin in” decreases the press on the back of the cervical vertebra.

IV. Discussion and Future Work

Currently, two ways to improve the application are figured out. First, there are only four steps in the exercise now, simply turning head left, right, up and down. More steps could be designed in the future, and the new movements must be designed based on professional medical research. Second, for now, the way to do the exercise is to start the application manually. In the future, this application could be designed to run in the background on the device, meanwhile other applications could run as usual. There would be a time constant set in this application, used to timely trigger it on. The scenario would be: user starts this application and runs it in the background; after period time of using the device continuously, this application jumps out and start the exercise to relax user’s neck.

V. Conclusion

‘Cervical Relax’ is an effective neck-relaxing application, which relaxes user’s neck by instructed exercise. The steps in the exercise are all well designed aiming to relieve the fatigue of neck. This application is easy to use, because for user, the only thing to do is to follow the audio instructions and turn the head. In the future, there are two ways came up with to improve this application. One is to increase the number of steps in the exercise, based on professional medical research. The other is to make this application able to run in background on the device, timely triggered to lead the user to do the exercise.

VI. References

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