PosturIA

"We help you build good posture habits"

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PosturIA is an AI-based solution that detects and alerts users of bad postures in real-time, suggests exercises to prevent postural damage, and guides users through correct exercise techniques in a user-friendly mobile/desktop application.

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Our Solution

Our AI-based solution, PosturIA, aims to control and reduce the damage caused by bad postures. We provide an innovative solution to prevent musculoskeletal issues and protect users from long-term complications.

By allowing it to run in the background of your device, PosturIA does the following:
- **Bad Postures Detection:** it real-time postures done by users when using their devices,
- **Instant notifications:** it notifies users to change and correct their bad postures instantly.
- **Exercises Recommendation:** it also uses the history of bad postures done by the user daily to suggest and recommend a series of exercises that help in fixing and preventing postures' effects.
- **Smart Assistant:** not only that, PosturIA also assists the users to do their exercises correctly and exactly with the right moves as if they are doing them with an expert.

All of that is done in a creative environment which is a user-friendly mobile/desktop application that motivates the user to have healthy posture habits.

Key Problem

With smartphones and computers being used more consistently in everyday life people are becoming more likely to hunch their shoulders as they stare down toward their laps, habitually creating a poor posture that can lead to arthritis, nerve pain, headaches, and many other diseases. The American Chiropractic Association estimates that 80% of people especially workers will experience back pain at some point in their lifetime. Bad postures become something habitual and having a good healthy posture is something mandatory as it allows an individual to maintain the musculoskeletal balance of their anatomical structure with maximum stability, minimal stress, and minimal energy consumption. However, everyone now is highly prone to incorrect postures. Studies have shown that more than 60 % of the population in the world is affected by bad posture syndromes which led to destroy the body shape and cause many diseases.

Facts about Bad Postures

One more effective example concluded from a study made by the American Chiropractic Association shows the average human head weighs about 10-12 pounds. However, for every 15 degrees forward that we lean our head, the more weight is distributed that our neck to sustain. The weight distribution is as follows:

- 15 degrees forward feels like 27 pounds
- 30 degrees forward feels like 40 pounds
- 60 degrees forward feels like 60 pounds.

By sitting with our heads leaned over at such a high angle, we put our necks and spine at risk of being pulled out of alignment. An increased strain on our necks can be dangerous and lead to muscle spasms, pinched nerves, and herniated discs. Over time and in many cases, persistent symptoms may require additional treatment, including epidural injections and spine surgery.
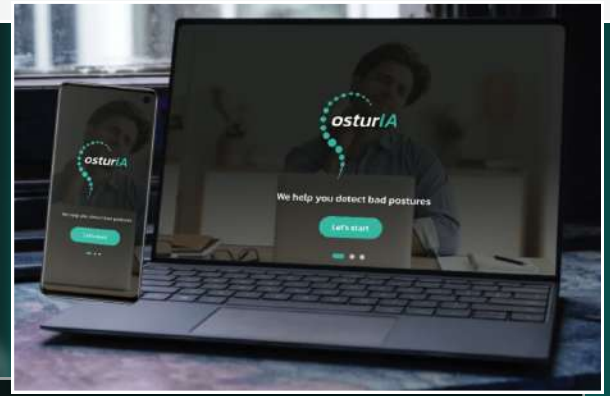
How the System Works?
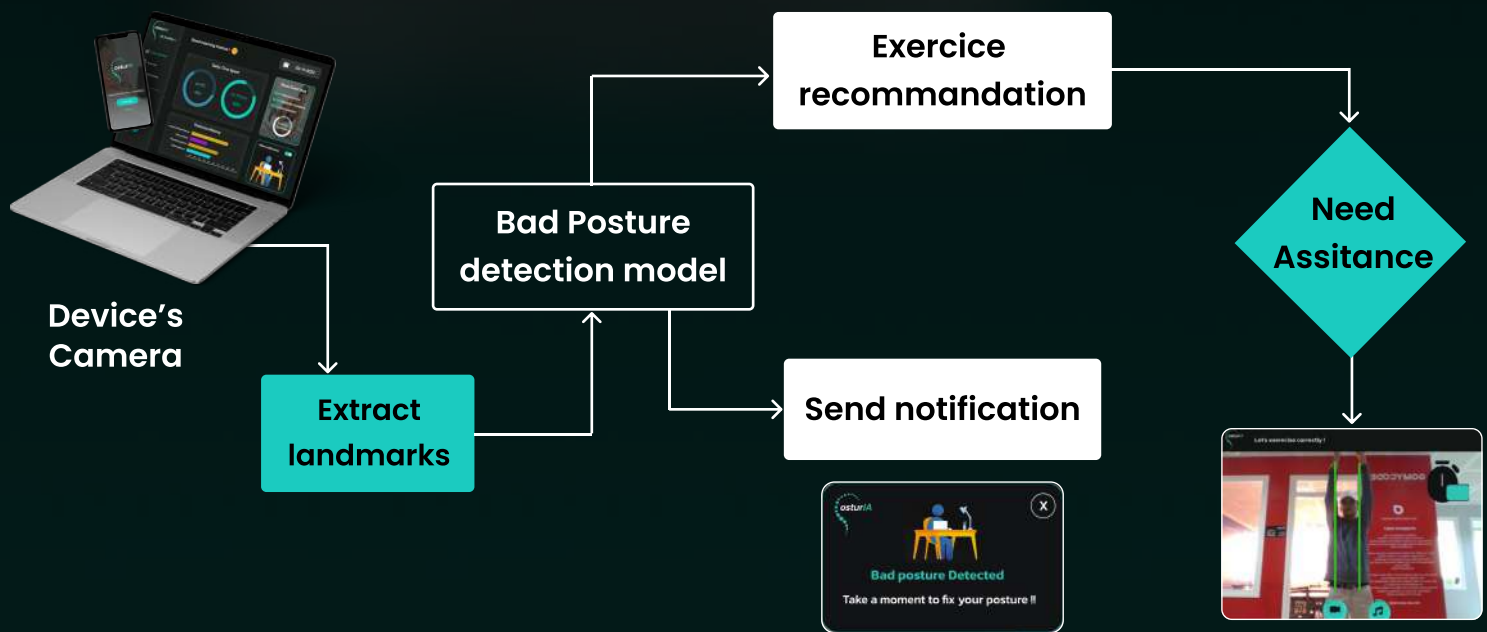
Data and Detection

We developed a new detection model that uses a unique dataset created by us with thousands of pictures of good and bad postures to identify bad postures in real-time. Our first objective is to detect if the user has a bad posture that could cause pain and irreversible deformations. We capture regular landmarks using the user's device camera, and MediaPipe's real-time detection models classify the images to recommend preventive and corrective exercises. The model detects key points on the body and compares them to the expected position to provide an accurate analysis of the user's posture. Our objective is to provide an accessible solution to help people improve their posture and prevent musculoskeletal issues, while also ensuring user privacy.
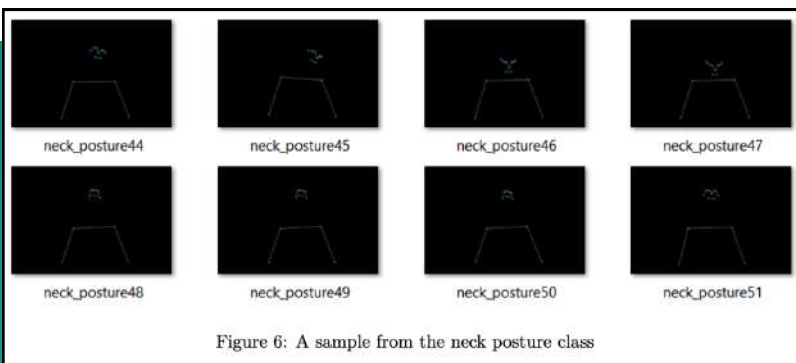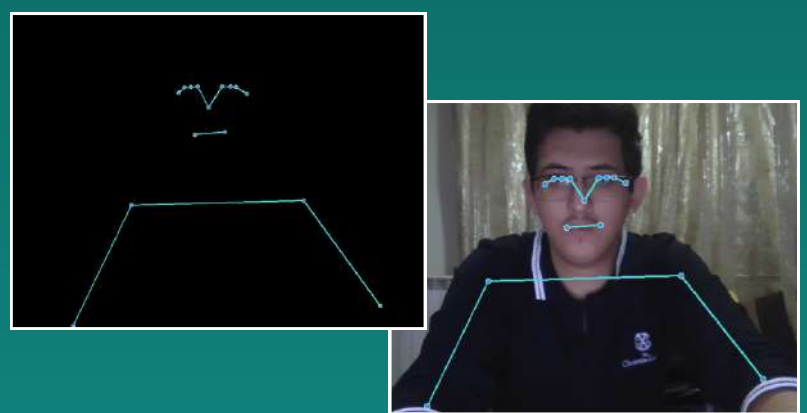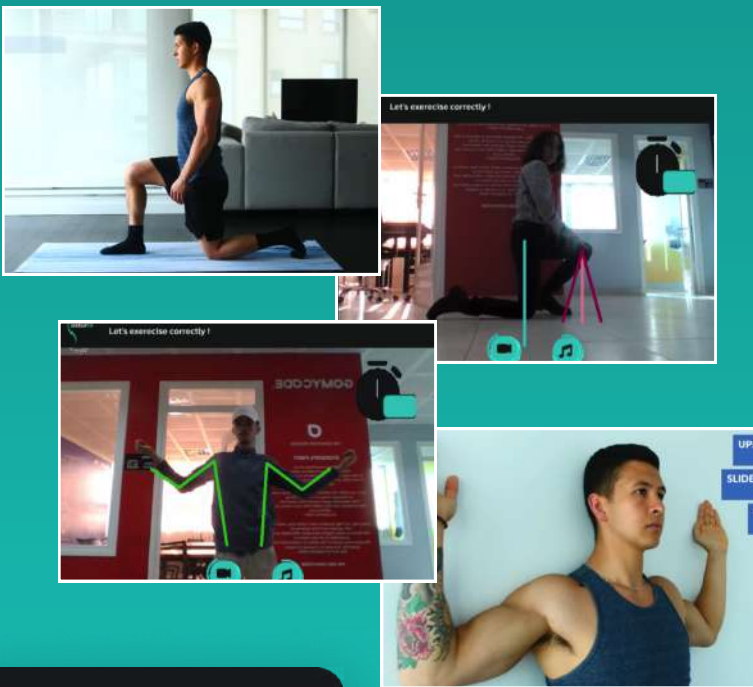

neck_posture44 neck_posture45 neck_posture46 neck_posture47
neck_posture48 neck_posture49 neck_posture50 neck_posture51

Figure 6: A sample from the neck posture class

Recommendation and Smart Assistant

Our recommendation system uses a DNN architecture to suggest exercise combinations and durations based on the daily report of bad postures. Unlike traditional classification models like KNN or SVM, our model uses data collected by the detection model, resulting in more accurate classification and exercise suggestions. We initially implemented three exercises for the beta version, using geometrical methods such as angles and distances to make it easy for the user to complete the exercise. We also customized voice and visual assistance for each exercise, with voice assistance triggering every second to notify the user if a part of their body is incorrectly placed. Our assistance is coded using Python, and our goal is to make it easy for users to correct their posture and prevent musculoskeletal issues.
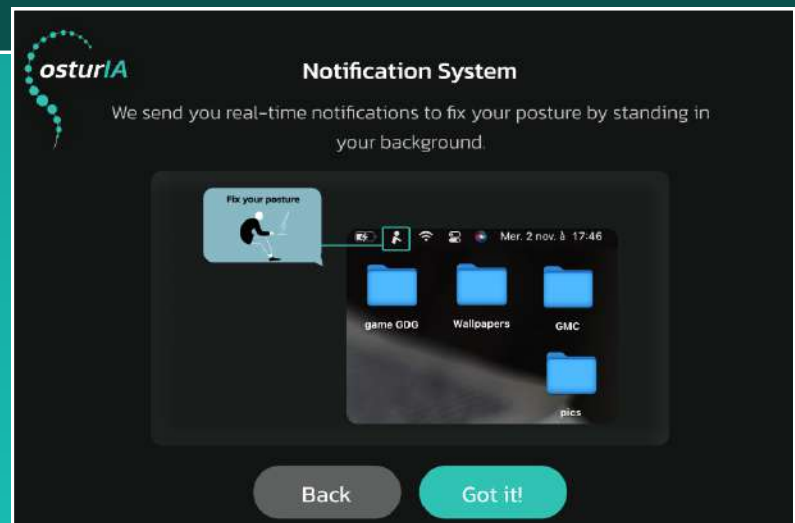
Conclusion

Our AI-based solution detects various types of bad postures without recording visual data to ensure user privacy. We suggest the perfect combination of exercises to fix and prevent further damage caused by bad postures, and our smart assistant helps users perform exercises correctly and efficiently using customized voice and visual assistance. Our goal is to provide an accessible and efficient way for users to improve their posture and prevent long-term musculoskeletal issues.