

Proof Of Concept Football App

Goal:

1. Proof that we can make the app.
2. Provide an impression of the user experience.

Requirements:

1. Working app, including the most difficult technical parts of the final product: CV/AI.
2. Pre-recorded exercises that can be copied by the app user – providing feedback.
3. In-app real-time analytics of the mirrored exercise.
4. In-app real-time feedback to the user
5. Ability to detect the football jersey of a specific team.
6. Able to save user input for analysis and model training.
7. Full source code and its ownership will be transferred to us (client) on completion of the project.

Decisions:

1. Build on the Android Platform using the Flutter SDK / development platform.
2. The device is in a vertical position when it receives input.
3. Start with 3 simple exercises.
4. Input of 30 seconds.
5. Minimum 80% accuracy of the feedback.

General Detection required:

- The practitioner needs to be completely in the frame continuously. Failure should result in an invalid result with a specified error code.
- The ball should always be completely in the frame and in front of the practitioner. Failure should result in an invalid result with a specified error code.
- No other person or object should be in front of the practitioner, nor should anyone pass in front of the practitioner or the ball at any time. Failure should result in an invalid result with a specified error code.
- The practitioner cannot switch to a different ball during the exercise. Failure should result in an invalid result with a specified error code.
- Multiple practitioners cannot exercise. Failure should result in an invalid result with a specified error code.
- PSV 2024/2025 Jersey detection. 4 sample images will be included. The expected output will be the confidence level (percentage 0-100) that shirt is detected. (see page 5)

Exercise 1: Keep-ups also known as Ball Juggling (feet only version)

Example: https://youtu.be/_Yc2fYf9WBc?t=17&feature=shared

Example: https://youtu.be/_Yc2fYf9WBc?t=94&feature=shared

Example: https://youtu.be/_Yc2fYf9WBc?t=202&feature=shared

Required feedback:

- PSV Jersey Detected: Confidence level (high/avg/low)
- Successful Completion: Code for Success or Error Code(s).
- Number of Correct Up Kicks
- Number of Incorrect Up Kicks
- Longest Streak of Correct Up Kicks

Required detection:

- The practitioner can touch the ball with any part of the foot or shoe.
- The practitioner does not need to switch between the right and left foot. Repeated use of the same foot is allowed.
- The practitioner cannot use other body parts to bounce the ball. For example, using knees, head, shoulders, or chest is incorrect.
- The practitioner does not have to stay in the same spot and is allowed to move around. He/she cannot move out of the picture and he/she cannot turn his/her back towards the camera.
- The ball cannot bounce off the ground or touch any physical object. If it does, the last attempt is incorrect and any streak will restart.
- On each kick attempt, the ball should at least reach the height of the knees. If the ball does not reach the knees, it is incorrect.

Exercise 2: Toe Taps

Example: <https://www.youtube.com/watch?v=ODlw8K66Qil>

Required feedback:

- PSV Jersey Detected: Confidence level (high/avg/low)
- Successful Completion: Code for Success or Error Code(s).
- Number of Correct Toe Taps
- Number of Incorrect Toe Taps

Required detection:

- The practitioner should touch the top of the ball with the bottom of the front part of the shoe.
- The practitioner should switch between the right and left foot continuously. Repeated use of the same foot would make the second and all following touches with that same foot Incorrect.
- The ball should be in front of the player, not underneath or behind.
- The ball should stay in place and not move around. The ball can move a little, but if it moves more than 20 cm due to the touch, it is Incorrect.
- The shoe should touch the ball on the top part of the ball. This means above the halfway line. If the ball is touched below the halfway line, it is Incorrect.
- The front bottom part of the shoe should touch the ball, not the back side (heel) part. If the ball touches near the heel, it is Incorrect.

Exercise 3: Inside Foot Touches

Example: <https://youtu.be/T7iOji3xexM?t=40&feature=shared>

Required feedback:

- PSV Jersey Detected: Confidence level
- Successful Completion: Code for Success or Error Code(s).
- Number of Correct Touches
- Number of Incorrect Touches

Required detection:

- The ball should be underneath the player, not to the side. The ball can move a little in front or behind the player, but if it moves more than 30 cm in front or behind, it is Incorrect.
- The ball cannot stay in place, it should move from left to right and back.
- The practitioner should keep his stance and feet at shoulder width. It can be wider, but it should not be less / narrower.
- The practitioner should switch between the right and left foot continuously. The practitioner should touch the ball with the inside of the shoe. The ball should not touch higher than the ankles.

PSV Jersey Detection

