HOW THE SYSTEM CALCULATES OFFSIDE

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1. General Structure

The system resolves the offside in 4 steps:

1. Sets the parallel lines of the field through the vanishing point.
2. Corrects the position of players on the ground using vertical projection on the ground.
3. Draw the attacker and defender position lines.
4. Compare who is more advanced.

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2. Definition of the Direction of the Field

The user marks two lines that represent the same direction (width) of the field.

These lines, in real space, are parallel.

The system extends these two lines until they meet.

The point where they meet is the **Vanishing Point (P)** as shown in the image below. This point defines the parallel lines of the field to make it possible to check the offside correctly.

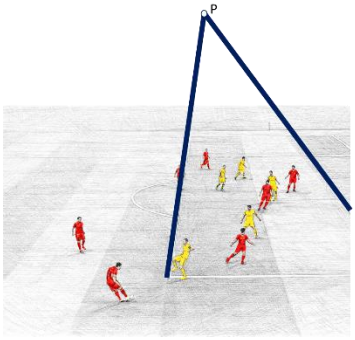

Image 1: Representation of the vanishing point formed by the lines of the penalty area and goal area.

3. Player Position Correction

Each player is marked with two points:

- Foot (contact with the ground)
- More advanced body part

The problem:

- The most advanced part may be above the floor (knee, shoulder, head).
- Using this point directly would cause an error in the analysis.
- Then the system performs a **vertical projection on the ground plane.**

Procedure (done automatically by the system when marking the points referring to the players' most advanced point):

1. Draws a line in the vertical direction (Z-axis) from the advanced part.
2. Draw a line towards the ground (Y-axis) from the foot.
3. Find the point where these two lines intersect.

This cross is the **player's corrected position on the field**. This new point represents the valid position for the offside.

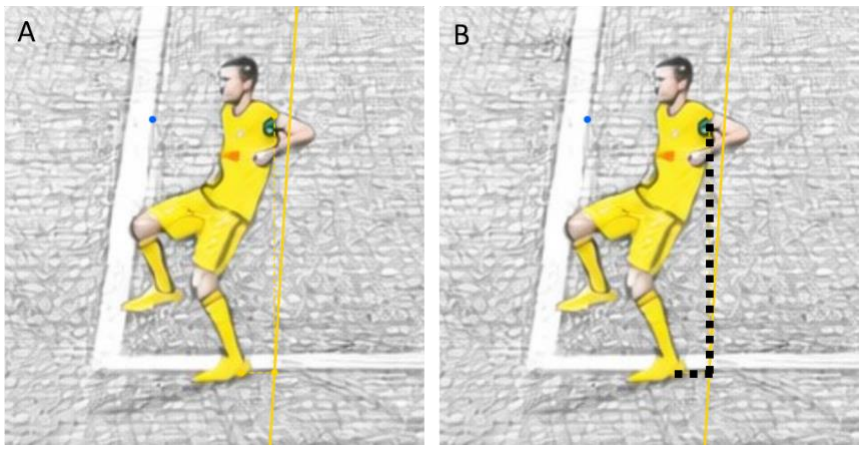

Image 2: (A) Correction of the player's position on the field. (B) Correction of the player's position on the field with black highlighting for the projection lines.

4. Offside Line

After the correction the system draws a line that leaves the player's projected point and goes in the direction of the **X-axis vanishing point**.

This line represents the **prospectively correct offside line**.

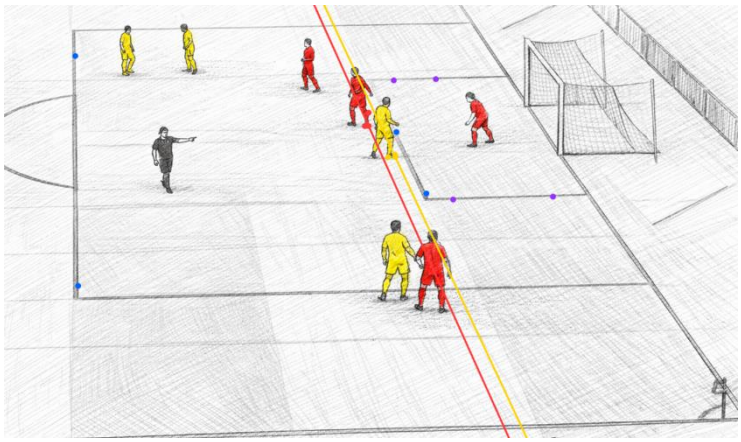

Image 3: Representation of the offside line formed.

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5. Final Comparison

Now the system just checks:

- Which projected point is more advanced in the direction of the attack?
- The comparison is made along the direction of the X-axis vanishing point.
- If the attacker is beyond the defender → OFFSIDE
- If the defender is beyond the attacker → LEGAL

No actual field measurement is used. Just the relative position along the direction of depth.