A robot to beat humans at foosball

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At first glance, the foosball table located in the middle of the Automatic Control Laboratory looks perfectly normal. Looks can be deceiving. In defense, one of the levers has a mechanical arm capable of propelling the ball into the opposing goal at a speed of 6 meters per second. "This is already enough to beat the average player," said the researcher Christophe Salzmann, who heads the project. And this is only the beginning. The robot should eventually prove to be more accurate, faster, and more strategic than any player.

A high-speed camera to detect the ball

Made from start to finish by several student groups, the robotic arm depends on two computers: one to control the mechanical movement of the arm and the other to provide information about the position of the ball. In order to position itself correctly, the robot must have a clear idea of the location of the ball in real time.

So students replaced the bottom of the foosball table with a transparent material. They then placed a high-speed camera on the ground to film the game board. "Through image processing algorithms, we can analyze the movement of the ball in real time. This information is transmitted to the computer that controls the movement and positioning of the arm," says masters student Martin Savary, who participated in the project.

The video above is in French.

"We still have some problems coordinating the two processes, but we are going to work on it," added Cyril Picard, another student working on the robot. "It will eventually condense into a single computer."

Challenges of an industrial project

For now, the robot cannot perform complex moves, but its kicking power is already formidable. Christophe Salzmann welcomes the results. "This is a very good exercise for the students. They controlled the materials, assembled the robot, programmed it and developed the algorithms. The work is comparable to any industrial project. It must be accomplished by working in a group, and sometimes," he smiles, "they end up banging their heads against the wall."

The goal: Robots playing against each other

The robot will continue to be developed by other groups of students until

it works perfectly. "Potentially, the computer can simultaneously analyze many more parameters than a human and process information faster. It could simultaneously analyze the location of all players and the exact trajectory of the ball after it ricocheted off the edges. All that remains is to develop a strategy," explains Christophe Salzmann. The researcher allows himself to dream: "Ultimately, we could imagine organizing games between opposing robots."

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