



SMART INFOTAINMENT

FULL 3D RECONSTRUCTION OF HUMAN MOTION BY COMBINING VIDEO STREAMS

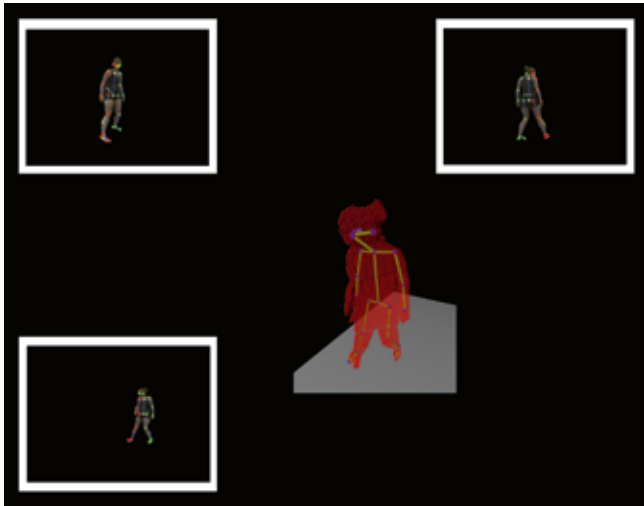
Understanding how sportsmen move is a prerequisite to improve their technique. For this reason, coaches have turned to modern technology to collect detailed data on athletes' movements. Current solutions to create a 3D reconstruction of human motion are not very user-friendly, as they require athletes to wear transmitters or markers on their body. Researchers from IPI – an imec research group at Ghent University — now developed a markerless method to enable a full 3D reconstruction, by combining data from multiple video streams.

AN UNOBTRUSIVE METHOD TO CAPTURE HUMAN MOTION

Although existing methods — such as IR body marker systems or radio-based transmitters — can track movement very accurately (millimeter-precision), they are restricted in their use. IR body marker systems, for instance, can only be used reliably in indoor conditions and radio-based transmitters have a varying reliability depending on the surroundings. But more importantly, both the markers and transmitters need to be attached to the person's body, which is not very practical as it might hinder movement and thus affect performance. Sometimes the markers or transmitters even fall off during a recording session. In addition, wearables are often not

allowed during a game. Especially in times of increasingly data-driven decision-making and increased fan engagement, this is a significant drawback.

That's why researchers from IPI — an imec research group at Ghent University — developed a new technique for performance analysis by fusing the video feeds from multiple cameras. Unlike existing solutions, we are able to create a full 3D reconstruction (visual hull) and detect joints in near-real time (15-20 frames-per-second) with a 2-4 cm precision. Although our method makes a trade-off in accuracy, it is much more user-friendly and completely unobtrusive. In addition, by combining multiple video streams, we can ensure a clear 3D reconstruction with minimal occlusion problems.



By combining 2D-camera input, a full 3D-reconstruction (middle) including joint recognition is created.

BEYOND SPORTS: FROM CUSTOMER BEHAVIOR TO TRAFFIC SAFETY

Because the technique requires zero effort from the person being tracked, it can easily be applied in other contexts. For instance, shops could use it to find out where customers are in the shop and what products they pick up from the shelf to study customer behavior. In security, it could be used to track suspect individuals' movements. And it could even be applied in traffic: by merging images from different cameras, blind spot accidents could be avoided.

LOOKING FOR PARTNERS IN THE FIELD OF SPORTS PERFORMANCE TRACKING

We would like to put our technology to the test by collaborating with commercial players in the field of sports performance tracking. At the same time, we would like to fine-tune our solution through feedback from sportsmen, so we are also interested in working with sport clubs or individual athletes.

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