This is a dummy that is the exact reproduction of a patient, and what you see superimposed is the reconstruction of a virtual skeleton , of his arterial and venous vessels and, for example, in this case of the parotid gland and a nodule inside the gland which could be a tumor.

The dummy was reproduced on the anatomy of a real patient. Therefore, the skeleton was printed in 3d based on Tac data, while the soft tissues, the ones you see in the video in pink, are printed in silicone material. This is the experimental environment in which we tested the device at the beginning before moving on to the experimentation on the human being.

Let's take a step back to understand why the surgeon wants augmented reality. The reason is that the surgeon has always wanted to see through the patient, or at least to see on the surface of the patient a map of what he would encounter during surgery. So, as you can see in these photographs, we used to draw. Here we draw the malformed jaw; here a nodules of tumors; in this case the map of a reconstruction of a superior maxillary using thigh tissue.

These are all examples of maxillofacial surgery. Over time there have been many technologies that have been proposed to make more accurate these maps. In the last twenty years, the technology that has been established for this purpose has been that of surgical navigators that works just like the navigators in the car. They have a map that is given by the Tac, and this map is related to the patient's reality.

I think it is everyone's experience that when using a navigator in car is necessary some time to look from the dashboard into the street. With a glance but also with the head and with the mind in order to relate the virtual information of the navigator with the real environment of the road. This mismatch makes that you waste time but also accuracy, and sometimes you miss turning to a crossroads and you're wrong despite the navigator

This also happens with surgical navigators because the screen on which it is shown the map is outside the operating field while the patient's on the table. This may result in a slowdown or, even worse, in the accuracy of the surgery. The goal of augmented reality is exactly to reduce as much as possible this discrepancy between the virtual and the real, merging them into a single glance.
Therefore what the surgeon was looking for in the drawing, is actually shown to the surgeon's eyes through a visor wearable, and that has a lot of advantages over design.

First because it's three-dimensional, just like the patient's actual anatomy. Second because it is real, i.e. it is derived from the real data of the Tac scan of the patient so there is no generic estimate of the location of the size of a tumor.
In this video, that is actually shot in the operating room on a real patient, the device shows me a dotted line that the saw must follow to cut the bone exactly where we planned.