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In Augmented Reality for Therapy (ART)
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Abstract - A novel approach for the localization of acetabular prosthetist cup placement, using X-ray images, in total hip replacement operation is described. A computational mathematical model is given and simulation results are presented. This information helps the orthopaedic surgeons to know the position of the hip in world coordinate system and direct him to the right position of implant insertion tool, viewing through a capture and display unit. X-ray localization can be used both preoperatively and intraoperatively. Ability to use X-ray intraoperatively is the major advantage of our proposed technique.

Keywords: Total hip replacement, X-ray localization

III. RESULTS AND DISCUSSIONS
The proposed method is applied for finding 3D location of markers (using Optotrak, Northern Digital Inc, Waterloo Canada, or any other device for 3D position and tracking), and their corresponding image coordinates, we develop the transformation. After doing this, the coordinates of the periphery of hip cup is found and hence its 3D location. The simulation result is given in Fig. 1.

Fig 1. 3D location of hip and correct path of tool.

The oval represents 3D location of the hip and the line is showing the right path of the tool (45° of abduction and 15°-20° of anteverversion) for implanting the acetabular component.

IV. CONCLUSIONS
An X-ray localization technique has been developed which gives the position of the hip in 3D, in particular the socket, without making the complete image of cup, and hence the right path of the implant insertion tool.

REFERENCES