

# Demonstration of Human-Humanoid Collaboration

Miguel Xochicale and Chris Baber

School of Engineering

University of Birmingham

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## Abstract

Technical report for the demonstration of a human-humanoid collaboration activity at the Open Day at The University of Birmingham.

## 1 Introduction

For the demo, NAO, a humanoid robot [Gouaillier et al., 2008] has been programmed to move their arms from left to right in a continues way (Fig 1).

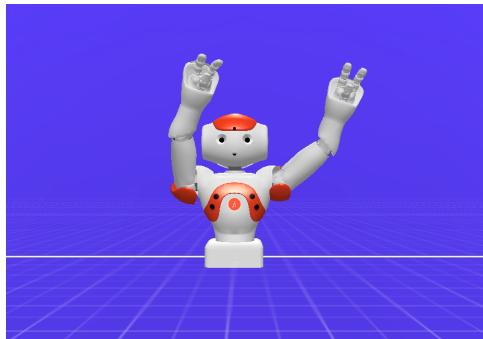


Figure 1: **Nao.** Upper arm movements of NAO.

## 2 Setting up

## 3 Effects of Lights with Colours

Adquiring pictures with different light conditions make changes of the filtered images. It requires more investigation to tackle light dependencies to tackle better such problem. It can also be raised a question regarding the consideration of different skin colours of users when interaction with NAO.

Particularly, the reflection of light in the bricks which make detecting less of the surface area, as well as the use of certain colour. Green colour is hardly detected when using only artificial light, but using blue brick is a bit better, however there is some problems with the light reflectance that show a bit of white colour. Fig. 3.

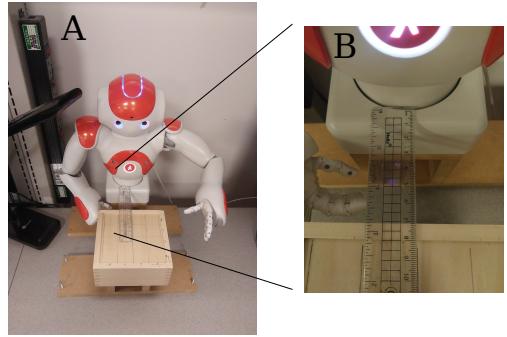


Figure 2: **Setting up of experiment.** (A) A rectangular box is put in front of NAO, (B) the distance is approximately 8 cm considering the both the box and the base of NAO are at the same height.

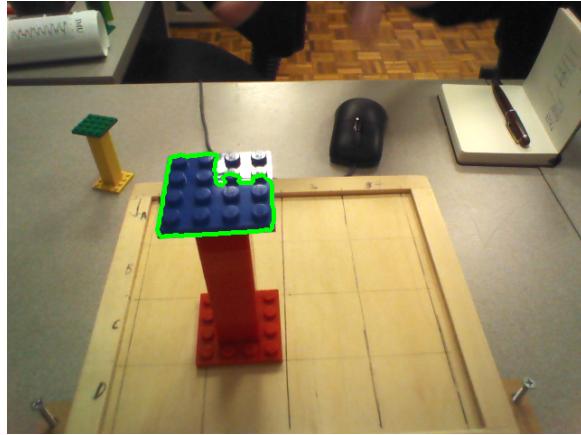


Figure 3: **Blue colour detection with OpenCV.** Problem with detection of colours with OpenCV [Bradski, 2000] for reflection of light in the bricks.

## References

- [Bradski, 2000] Bradski, G. (2000). The OpenCV Library. *Dr. Dobb's Journal of Software Tools*.
- [Gouaillier et al., 2008] Gouaillier, D., Hugel, V., Blazevic, P., Kilner, C., Monceaux, J., Lafourcade, P., Marnier, B., Serre, J., and Maisonnier, B. (2008). The NAO humanoid: a combination of performance and affordability. Technical Report arXiv:0807.3223. Comments: 10 pages, 20 figures, paper submitted to IEEE Transactions on Robotics.