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Demonstrating Maori Haka with Kinect and Nao Robots

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ABSTRACT

In this video, "Nao Haka", four robots and a haka leader perform a traditional Maori Haka. The Haka leader, who performs the main actions is supported by Aldebaran Nao Robots, which are controlled by an external performer, using a Microsoft Kinect as the input device. This device allows for full-body user tracking. This Video was made as a supportive gesture towards the All Blacks Rugby World Cup Campaign 2011.

Categories and Subject Descriptors: I.2.9 Robotics: Operator Interfaces

General Terms: Performance, Design, Experimentation, Human Factors.

Keywords: Robot Interaction, Robotic Puppeteering..

1. INTRODUCTION

Traditionally, Maori Haka is a war dance performed by Maori warriors before engaging combat with rival tribes or more notoriously known in this age on New Zealand Rugby fields. Haka war dances are also regularly practiced around New Zealand by Kapa Haka groups and in many schoolyards across the country, which helps promote New Zealand heritage and culture. The Particular Haka for this performance was chosen to honor the sensitive cultural aspects of Maori History. The more notorious and controversial Haka, Kamate which was adopted by the All Blacks, was decided to be detrimental to local cultural values if performed.

To support our national team, the mighty All Blacks in the 2011 Rugby World Cup final, a traditional haka was performed by robots, all of which actions are being controlled in a puppeteer style fashion by a solo performer. The Group is also valorously lead by a human performer due to system limitations. It should be noted that the robots are manufactured in France, who's rugby team played against the All Blacks in the 2011 Rugby World Cup. which has raised some controversy. The French lost to the All Blacks 7-6, so we like to think that our performance provided some good spirit and energy (mana) to the All Blacks.

A capable Performer was requisitioned who could correctly perform the war dance as the group leader. A second person who was also capable of performing the dance had control over the four Nao Robots from Aldebaran Robotics where the Microsoft Xbox 360 Kinect Camera system was used for body pose tracking [1].

An open-source library, nao_openni [`http://www.ros.org/wiki/nao_openni`], is used to recognize the humanÕs poses and map them on to Nao, providing gesture control without the need to attach any sensors to the user. The OpenNI [`http://openni.org/`] or Open Natural Interaction software library provides the functionality to estimate the full body poses of the user, with the exception of the hands, feet and the head. The user performs a calibration pose, called the Psi pose, to initiate tracking, and must remain within the KinectÕs field of view throughout the tracking session.

To interface the Nao robot to the Kinect camera, three libraries were used, called stacks, provided by Robot Operating System (ROS) [`http://www.ros.org/wiki/`]. The 'nao' stack, developed at the Humanoid Robots Lab at the Albert-Ludwigs-Unversitaet, provides joystick teleoperation, odometry, joint state, and a basic robot model for Nao devices. The 'openni' stack, integrated into ROS by Wim Meeussen, provides critical functions for processing data from the Kinect camera. Lastly, the 'nao_openni' stack, developed by Halit Bener Suay at Worcester Polytechnic Institute, provides the necessary mapping of body pose between the KinectÕs user pose and Nao.

The power and speed of execution in a Haka is critical to the effect that it has in devastating enemy moral. It can be seen that the Robots performance was quite noticeably poor, which lead them to become the supportive dancers. The update rate of the Nao pose was set to provide adequate performance without putting too much load onto the Nao robots CPU. Unfortunately at this rate there is around a one to two second delay between the user input and Nao's response. We also found that the Haka performance involved a significant amount of hip rotation, which proved difficult to map to the Nao. For future improvements, we want to reduce the Nao's response time and impose a constraint to prevent Nao's arms from hitting itself. Furthermore, allowing Nao to imitate userÕs leg and hip movement, while keeping its balance, is also desirable. We hope to discover a greater range of map-able movements for better control of the Nao Robots.

2. REFERENCES

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