An Autonomous Wheelchair at an Art Gallery

Beurs van Berlage, Amsterdam, 16 December 2009 to 8 March 2010

Our robotic wheelchair has been exhibited at Niet Normaal in Amsterdam from December 2009 to March 2010. See a Youtube video or a local copy (WMV) (thanks to Aram Voermans for filming and editing).

Institute of International Visual Arts (INIVA), London, 2008

The autonomous wheelchair "Psalms" commissioned by the late Donald Rodney in 1997 has been exhibited at the exhibition "Donald Rodney In Retrospect". Curated by Sebastian Lopez and Keith Piper. Produced by Iniva (Institute of International Visual Arts).

South London Gallery 1997

An autonomous wheelchair has become a piece of art named "Psalms" as a part of an exhibition entitled "Nine Night in Eldorado" by Donald Rodney, held at the South London Gallery until the 12th October 1997 (Fig 1,2,3 and wcl.mov).

"...Our fear of automata is again harnessed in Psalms, as the empty wheelchair courses through its various trajectories on a sad and lonely journey of life, a journey to nowhere. Its movements repeat like an ever recurring memory, a memory of another life and another journey, that of Donald Rodney's father..."

(Exhibition brochure, Jane Bilton.)
The wheelchair was modified at the School of Computing of the University of Plymouth to perform a repeated sequence of circles, spirals and figures of eight, as specified by the artist Donald Rodney, himself disabled by sickle cell anaemia.

The wheelchair uses 8 sonar sensors (fig.4), shaft-encoders, a video camera and a rate gyroscope to determine its position. A neural network using normalised RBF nodes encodes the sequence of 25 semi-circular sequences of positions forming the trajectory (fig.5).

The control system comprises a laptop PC 586 running a control program written in CORTEX-PRO, and linked to a Rug Warrior board built around the 68000 microcontroller.
for self-localisation purpose when the wheelchair is oriented parallel to a wall. represent positions in the same form as nodes in layer L1. More details on normalised RBF nets can be found in Althofer and Bugmann (1995), Bugmann (1996), Bugmann et al. (1998).

Contributors:

The control system of the wheelchair was built by:

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- **Dr. Nigel Barlow** (School of Computing, University of Plymouth)

with the help of Steve Hill (SoC) and Prof. Mike Denham (SoC), and the support of Technical Services of the University of Plymouth.

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- **Dr. David Keating** (Dept. Cybernetic, University of Reading)

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Many technical solutions in the control system of the wheelchair are based on sub-systems developped during the projects realised by following students: Vincent Onillon, Priska Shônborn, Antonio Rodriguez Perez, Jose Dorado, Petr Bunus, Derrick Tapscott.

References:

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Research Report CNAS-96-02

http://www.tech.plym.ac.uk/soc/staff/guidbugm/wheelchair/wheelc.htm
"Stable Encoding of Robot Trajectories using Normalised Radial Basis Functions: Application to an Autonomous Wheelchair" (83,209)

"Normalized Radial Basis Function Networks" (Preprint, 179,885)
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"Stable Encoding of Robot Trajectories using Normalised Radial Basis Networks: Application to an Autonomous Wheelchair." (PDF 337KB)

Guido Bugmann, Jan 2010