

“BY MID-21ST CENTURY, a team of fully autonomous humanoid robot soccer players shall win... against the winner of the most recent World Cup.”



Pennalizers

- Mission of the RoboCup Federation

GRASP
LABORATORY

RoMeLa
ROBOTICS & MECHANISMS LABORATORY

Virginia
Tech

A DIFFERENT TYPE OF SOCCER PLAYER



The UPENNALIZERS, the UNIVERSITY OF PENNSYLVANIA's RoboCup team, was one of the first participants in the original Sony Aibo league (renamed the Standard Platform 4-legged league in 2004), and participated in all the international competitions between 1999-2006. The team finished among at least the quarterfinalists in every one of those eight years. After a short hiatus in 2007-2008, we have reformulated the team with a new

group of undergraduates and graduate students from various departments at the Engineering School at the University of Pennsylvania. Finishing second at the US Open in 2009, the team was disappointed with an early elimination at the World Cup. Unfazed, the team came back with a strong showing in the any ball challenge, walking with 3rd place.

LOOKING FORWARD TO 2010

The UPENNALIZERS will be competing in three leagues at the 2010 RoboCup World Cup in Singapore:

- Standard Platform league
- Simulation League
- Humanoid League as part of a collaboration with VIRGINIA TECH

FIELDS OF INTEREST

Vision

The robot's vision system needs to provide it with reliable information in order for it to create a rich world model. We are working towards designing and implementing robust approaches to achieve this task in noisy real-world environments.

Localization

Using the information provided by the camera, the robot must be able to localize itself. We are currently working on improving methods to fuse all the visual information received by the robot into a coherent model of the world.

Locomotion

Humanoid locomotion involves sophisticated techniques to ensure that the robot maintains stability while it is walking. We are developing and implementing ZMP (Zero moment-point) based methods to achieve this task.

CHALLENGES

The aim of RoboCup is to address some of the challenges in robotics in a competitive setting. Some of these include humanoid locomotion, robust computer vision, and localization in noisy environments. To get a feel for the difficulties involved, consider a typical task that a soccer-playing robot must achieve. It must first survey the scene it is looking at and detect the ball. It must then be able to deduce its own position and orientation solely from the information that it receives from its camera. Then, the robot has to walk to the ball, a task that requires it to continuously balance itself using its inertial measurement unit. Finally, it has to balance itself on one leg and use the other leg to kick the ball. And all this must be done in only a few seconds!

WHY ROBOTICS?

The last few decades have seen tremendous leaps in robotic technology. The quest for autonomy has fueled much of the research effort. The possible benefits of autonomous cars and other robotic systems are clear, both for government applications and commercial ones. Much of this recent progress has been made due to research initiatives like Robocup and the DARPA challenges, which provide a test bed for new and innovative ideas.

HOW CAN YOU HELP?

The University of Pennsylvania is one of the leading research institutions in the world. Like all research institutions, funding is critical to maintaining our activities. The UPennalizers require monetary support to buy and maintain robots, purchase laboratory equipment, and cover travel expenses to the annual US Open and World Cup. Any support will receive prominent logo placement on our team website, on our competition banners, and most importantly, on our robots.

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UPennalizers 2009

TEAM BACKGROUND

We are engineers from the University of Pennsylvania, our majors ranging from computer science and robotics to mechanical engineering and electrical engineering. Our 2009 team even included students with majors as diverse as mathematics and finance.

This year, we have recruited more graduate and undergraduate students to continue strengthening our team and building for the future as current team members begin to think about graduation. And now with our collaboration with the Robotics and Mechanisms Laboratories (RoMeLa) at Virginia Tech, the expertise of our team is expanded to include robot design, construction, and embedded control.

TEAM HIGHLIGHTS

- 3rd place finish, Any Ball Challenge, Graz 2009
- 2nd place finish at US Open, 2009
- Quarter-final finish at Osaka, 2005
- 2nd place finish at US Open, 2005
- 4th place at Lisbon, 2004
- 2nd place at Padua, 2003



Trophies at the US Open