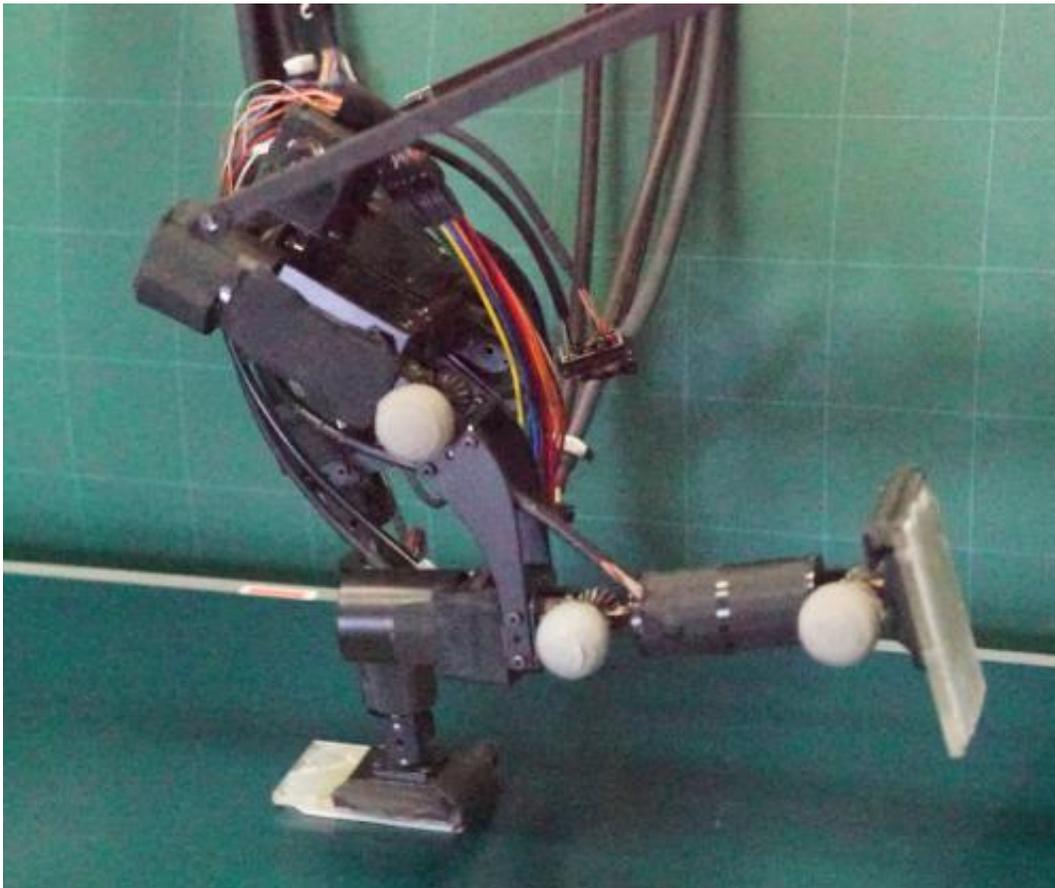


Two-legged robot able to run without ZMP control (w/ Video)

September 3 2014, by Bob Yirka



(Phys.org) —A team of researchers at the University of Tokyo has built a small two-legged robot (named Achiros) capable of running without using Zero Moment Control (ZMP)—instead it relies on high speed

cameras and actuators. The team, led by Masatoshi Ishikawa, is the same one that made news recently by building a robot that could beat any human at rock-paper-scissors.

Because of balance issues, robots with two legs, rather than four, are much harder to program. Up till now, most approaches have centered around ZMP, which requires so much processing that the robots aren't able to run very fast. By eliminating the need for ZMP, the robot built in Ishikawa's laboratory, is able to run faster than any other two-legged robot thus far—4.2km/h. It's small though, with legs just 14cm long. The team notes that if torque were used to build a human-sized version of the robot, it would be able to run at speeds up to 20km/h. That would take a lot of energy of course, the diminutive version is only able to run for approximately ten seconds currently—engineers in the lab are working on increasing that time.

Achires runs by leaning forward, taking advantage of gravity, with its legs taking six steps per second. A [high speed camera](#) takes snapshots (at 600fps) of the robot in motion and feeds that information to a computer which uses what it receives to control the balance of the robot. The high speed actuators allow for a speedy response to commands from the computer. The result is a robot that is able to run with a smooth gait, using far less computational muscle. The team reports that the robot is also able to perform a somersault, a stunt that is meant to show that the team plans to give the [robot](#) multiple capabilities that might be useful in a number of applications.

The goal of the researchers working at Ishikawa's lab is to build speed into robots, making them able to perform tasks faster than human beings, which could translate to lowered costs on production lines or when used in building or engineering projects. The idea is to look at new ways of controlling robots, sometimes using unorthodox methods, to perform tasks that we may not yet have imagined.

Bipedal Robot

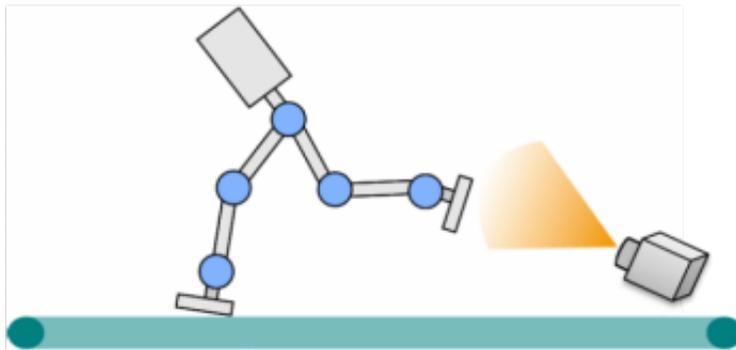
- ❑ High-power actuator
- ❑ Non-ZMP-based control

Leg length : 14 cm
Max speed : 4.2 km/h

High-speed Vision

- ❑ State recognition
- ❑ Aerial posture control

Frame rate : 600 fps
Resolution : 1280 × 700



More information: www.k2.t.u-tokyo.ac.jp/fusion/.../Running/index-e.html

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