

Nikolai Bernstein's Theories Being Tested With Robots

<http://news.bbc.co.uk/2/hi/technology/6291746.stm>

RunBot is a small, biped robot designed by scientists co-operating across Europe. Instead of using the "brain" RunBot uses "local circuits" to move in a human like manner. The brain was only used in unfamiliar movements such as upward movements.

RunBot walks by using sensors that tell the foot and leg parts what to do. When different settings are introduced only then does the robot change to using more complex technology to figure out the next move.

Poramate Manoonpong, Tao Geng, Tomas Kulvicius and Bernd Porr are among the scientists involved with the project. They have been working on RunBot for the past four years.

Professor Woergoetter, of the University of Gottingen, in Germany, said: "When Runbot first encounters a slope these low level control circuits 'believe' they can continue to walk up the slope without having to change anything.

"But this is misguided and as a consequence the machine falls backwards. This triggers the other sensors and the highest loop we have built into Runbot - the learning circuitry - and from that experience of falling the machine knows that something needs to be changed."

The robot is helping teach the scientists the ways that humans walk. Most other robots walk as kinematic walkers while RunBot walks as a human would.

The first step when creating the robot was to make it able to walk in a passive manner. The biomechanical frame RunBot has supports walking in this manner.

Prof Woergoetter said: "Passive walking looks pretty realistic - but that's level one. On top of this we have local circuits, nested neural loops, which operate between the muscles (the joints of the robot) and the spinal cord (the spinal reflex of Runbot)."

The robot has learned to walk in much the same way as a human child. He learns from his mistakes and the new calculations are automatically added to his data base.

Prof Woergoetter said Runbot was able to learn new walking patterns after only a few trials.

"If walking uphill, the gait becomes shorter, the robot's upper body weight shifts forward," he said.

The key lesson from the study, he said, was that the nested loop design first proposed by Bernstein more than 70 years ago "worked and was efficient".

The next step in for RunBot is a size increase.

Someday you may just be walking beside him yourself!

