AUTONOMOUS (Self-Guided) NAVIGATION TECHNOLOGY

(Navigation Robots that can Think for Themselves)

Steve Krar

Robots are a source of fascination for humans because of the ease at which they carry out work that is too difficult, monotonous, or hazardous for humans. They are used in all types of manufacturing, assembly, medicine, etc. Robots have given thousands hours of service without tiring, complaining, or breaking down in dangerous, or boring environments that were not suitable for humans. Robots are good pickers and placers on automated assembly tasks, excellent welders and painters, and useful for performing many repetitive tasks. Robots have been one of the prime factors in the growth and productivity of manufacturing since the 1980s.

Switzerland – One of the World's Leading Innovators

Switzerland follows Japan among the world's most innovative nations according to a new report from the Economist Intelligence Unit, sponsored by Cisco. The aims of the study were to analyze the importance of innovation, then determine which countries innovate the best and why.

The **Incubator Programs** at the Swiss Federal Institutes of Technology, known as ETH, (www.ethz.ch) in Zurich and Lausanne are devoted to assisting companies and scientists with new ideas the business space, technical expertise, and general knowledge at these institutions to develop and bring their products to market.

- The ETH has three primary missions:
  - To teach and develop new generations of scientists and entrepreneurs.
  - To generate discoveries, innovations, and new scientific fields.
  - To apply this new knowledge to improving the quality of life.

The purpose of these types of institutes is to offer facilities to transform scientific excellence into **economic competitiveness**, **jobs** and **quality of life**. A start-up incubator, coaching services, study programs in entrepreneurship, and innovation programs all serve to stimulate the links between lab and business.

Autonomous Navigation Technology for Robots

Many robots and autonomous guided vehicles (AGVs) that are used for pallet positioning, stacking, transferring materials and other applications use inductive lines in the floor, reflectors, teleoperation or teaching defined routes. These keep the robot on the defined

path but obstructions in its path can result in collisions resulting in human injury or operational damage. Autonomous Navigation Technology (ANT®), developed by BlueBotics SA, can avoid collisions through the use of sensors, vision and guidance systems.

Allowing full autonomous navigation, BlueBotics' ANT system gathers data from many sensors such as wheel encoders, laser scanners and physical sensors. The result is a robot that move freely around obstacles while moving from point A to point B or its destination. It uses natural or positioned features in the work area rather than reflectors to choose the fastest and easiest path to perform its duty. This allows the vehicle to move freely within a certain area to reach its goal instead of simply following a predefined line.

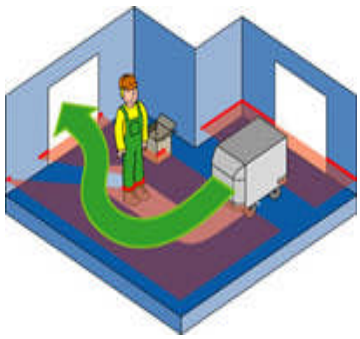
How ANT Works

The BlueBotics' AGVs, ANT guidance system is an integrated contour measurement and safety scanner system. Depending on the type and shape of vehicle and the operating area, the AGVs use either a 180° , two 180 ° or a single 270° scanner to locate features or landmarks. The system allows positioning a vehicle using references as far away as 500 ft. Ultrasound sensors are used for motion control in areas where glass walls could defeat the lasers.

The ANT Navigation System Components

The BlueBotics-developed navigation system contains a map of the working area showing positions the AGV has to reach to perform its job. It contains information about the features in the area the robot uses to calculate where it is and where it must go. Path-planning on different levels of concept take readings to guarantee that operators choose a speed that permits the robot to stop before hitting obstacles.

As an option, BlueBotics has a navigation function that takes sensor readings within a grid around the robot. Should it realize that objects will not permit the AGV minimum clearance along the path for clearance, the navigation function is called upon to choose another path.



Supporting the AGV's ability to move in unmodified environments is its global feature-based multi-assumptions to achieve high localization accuracy with an added benefit. In case the robot loses track of its position it can generate suggestions about its current position and relocate itself.

The AGV has a security system to protect the safety of humans, objects and the robot itself. A wireless communication system connects the AGV with either a traffic coordinator who handles requests from enterprise resource planning (ERP) system depending on customers' requirements.

ANT System Uses

ANT systems are compatible with equipment of almost any size, capacity and application. In addition to transport, ANT is applied to cleaning, inspection, research, healthcare and surveillance systems. The **Shrimp,** a specialized unit, has six motorized wheels and is applicable for space exploration, rescue and firefighting.

Robots of the Future

Expect big changes in robotics in the future:

- Robotic companions are becoming popular in the far east for the blind or elderly with a robot dog on a tether sensing things, telling a person when it is safe to cross the street.
- On the factory floor, industrial robots will become more versatile and affordable which helps small and midsize manufacturers to afford factory automation.
- With the developments in cyber vision, cameras, lighting and software a robot should be able to see what it's doing.