**Application of a genetic algorithm**

A genetic algorithm has been used in the control scheme for autonomous navigation of intelligent mobile robots in an unstructured environment. Based on environmental information obtained from external sensors or transmitted from an upper level, the control circuit performs autonomous navigation consisting of sensor-based path planning and real-time tracking control. First, using a simple genetic algorithm, the path planning module generates an obstacle-free path as a sequence of directional control vectors given the kinematic constraints in the steering control of wheeled mobile robots. The tracking control module then calculates landmarks to control the motion of the mobile robot using a neural network with sensor fusion. Straight-line and circular motions over black-band markers were used to train the network, where internal sensors are combined with external sensors. Simulated path planning experiments in an unstructured environment will have several obstacles.

Sensor-based robot path planning used the capabilities of a genetic algorithm to find a path for the robot in a real-time environment. The genetic algorithm is used to find a short, safe and obstacle-free path. The robot uses its sensors to feed data to the genetic algorithm. The path must be of minimum length. The path length is used as a fitness function. A one-point crossover was used for reproduction. The author used a roulette wheel to select parental chromosomes during the selection process. The genetic algorithm uses sequence vectors to discover the best pathway. These control sequence vectors are combined to find the final pathway. The genetic algorithm also optimizes the length of the final path. The feasibility of the proposed control scheme is shown by experimentally training the sensor fusion network, and measuring the main characteristics of the internal and external sensors during straight-line and circular movement on the floor with black-striped markers using experimental small robot.