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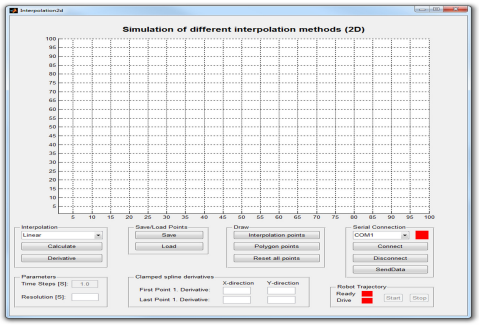
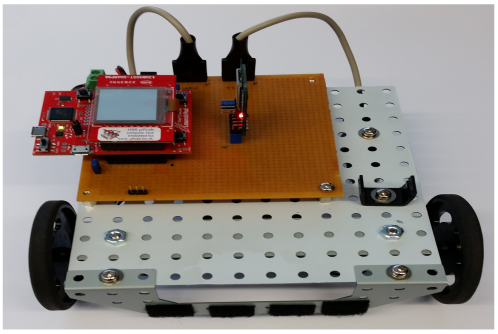
Subject Area	Sensor, Actuator and Communication Systems

Trajectory Planning

Spline based path calculation for autonomous robots



Trajectory Planner GUI.

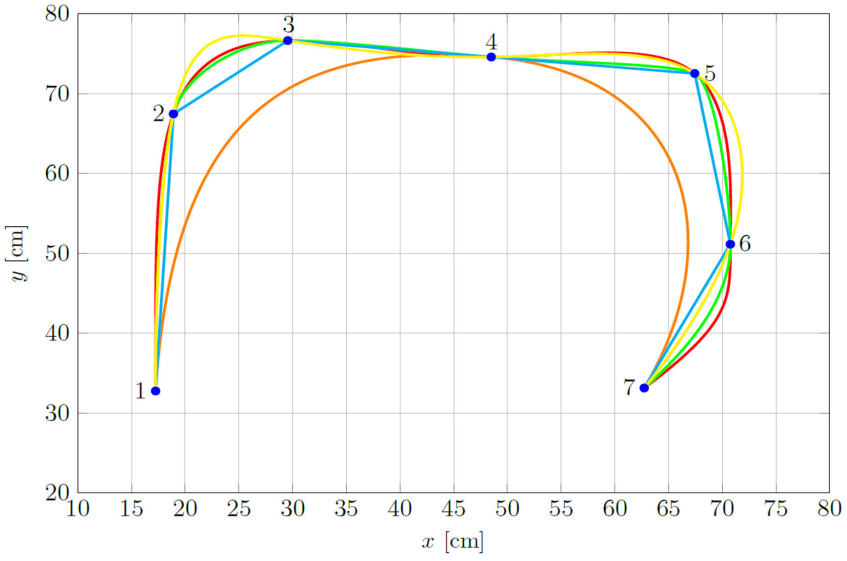


Robot.

Introduction: Each year, teams compete with their autonomous robots at the national and international Eurobot Championships. Thus, that the autonomous robots can exploit their full potential, it is necessary to make the movements as fluently as possible. To achieve this, the robot must calculate so called trajectories and precisely drive them.

Proceeding: First, a simulation of different trajectories is done in MATLAB. After the simulations, the most appropriate method was picked and implemented on a microcontroller. Then, this method was implemented on a microcontroller of the Cortex-M4 family from Texas Instruments. Besides this method, a robot was programmed to generate and drive the calculated trajectories. In addition, the GUI from the simulation was further developed to control the Robot.

Result: With this project a working «Trajectory Planner» was developed. An autonomous robot was built and programmed, which can generate the trajectory properly. Furthermore, a MATLAB GUI was developed which can easily simulate different trajectory methods. The GUI can easily be extended with new trajectory approaches for future projects.



Trajectories generated by a linear interpolation(cyan), clamped spline(red), natural spline(yellow), hermite spline(green) and Bezier spline(orange).