Self-Adapting Machines on Basis of Microcontroller

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As we know, technologies evolve, and making software for every different device gets harder and harder. We wanted to create a system which could help us make machines work, without having to write mathematically complex software for each of them.We decided to use so-called “teaching” method to accomplish this. For example, if we want to make “line following car”, instead of writing algorithms, we can teach it how to follow the line by driving it ourselves with joystick for some time. After teaching process, the car should be able to follow the line itself. We use neural networks written on basis of microcontroller as a core of our system. For every problem we worked on, besides neural network solutions, we were writing mathematical solutions as well. By comparing these two we were able to measure performance of different versions of neural networks we tried. Finally, we got system which does not need to be rewritten for each problem. You just need to attach appropriate sensors, output devices and teach it accordingly. There are some problems which are so dynamic, that it takes reasonable amount of time for humans to learn how to control it. We made “self-learning” system which does not require “teaching” process, instead we set a simple “goal” for a specific task and our system should come up with solution itself. One of the examples is “surface stabilization problem”, where we have servos, attached to a stick, which rotate on different axes. System needs to come up with solution that can satisfy “goal” of keeping surface horizontal in any position of the stick. Our project’s main purpose was to make process of solving any type of problem easier. Self-Learning system allows robots to adapt to new environments and show us solutions we would not be able to come up with.

Awards Won:
Fourth Award of $500