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# Cybergenetics : control of gene expression and biological circuits

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## Abstract

Gene expression plays a central role in the orchestration of cellular processes. We recently developed an experimental platform for real-time, closed-loop control of gene expression that integrates microscopy for monitoring gene expression in live cells, microfluidics to manipulate the cells environment, and dedicated software for automated imaging, quantification and model predictive control strategy. This method implements a dynamic interaction between cells and a computer, making it possible to control precisely the level of expression of a gene for both time-constant and time-varying target profiles, at the population level, and even at the single-cell level. I will discuss recent developments of this method and its relevance for systems and synthetic biology.

**Keywords:** Cybergenetics, Microfluidics, Microscopy, Automation

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