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**Title:** Internal Feedback: From Optimal Control to the Sensorimotor System

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**Abstract:** Internal feedback (e.g. V2-V1 connectivity) is an ubiquitous yet somewhat unexplained phenomenon in the visual system. Motivated by recent observations on motor-related signals in the visual system, we approach this problem from a sensorimotor standpoint and argue that internal feedback in the visual system is part of necessary information flow from motor to visual areas. We analyze internal feedback in the optimal control context and draw parallels between optimal controller structure and sensorimotor structure. In particular, a new distributed controller (SLS) displays internal feedback patterns that are consistent with predictive coding theory. This controller easily accommodates signaling restrictions (e.g. delay) typical to neurons and is a potential candidate for use in sensorimotor modelling.