# Loose Neural Nets in Architecture

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The human brain is a massive net of neurons, and consciousness may be emergent behavior in that net. Intelligence in buildings can be approximated by putting a much smaller number of simple processors into a net of physical influence and signal propagation.

The recently constructed projects in this paper construe loose networks of analog integrated circuits as neural networks, and make the case that emergent behavior in these neural nets forms a low level intelligence. Systems of sensors, emitters, and processors embedded into building components like ceilings and skins, function in a way that is similar to primitive neurons in an organism, propagating signals through adjacency, ultimately affecting the characteristics of interior space and the performance of exterior building systems.

In the design of these systems, it is useful to ascribe some autonomy to the components of the net, and also to the humans in the building they describe. In these projects, no one overtly controls the state of the net and its impact on inhabitants. The net is tuned to "watch" for certain behaviors and then to respond, but not as a directly reply or result to that behavior. Instead, the net's response and the subsequent realizations and responses of the inhabitants can be understood as symbiosis and emergent behavior.

Flocking and schooling behavior provides useful examples of emergent behavior. Birds and fish navigate with two levels of goal, in a subsumption architecture: a high level, seeking of polarized light or water without big shadows, and a low level, seeking to avoid collisions with neighbors. If a neural net cycles through such assessments fast enough, both goals are achieved, and the overall behavior gives the impression of an even greater intelligence.

A number of independent mobile lights in a ceiling are designed to move about, scanning for a subject to illuminate, and scanning to avoid collision. Simple comparators and phototransistors end up functioning in a way similar to the destabilized oscillations of a flip-flop - the precursor to a stable bit of computer memory - and they produce apparent goal orientation and the avoidance of collisions.

A number of independent photovoltaic collectors in a wall are designed to collect energy whenever they can, and release that energy in specific ways. Two types of simple analog "cells" are co-exist in the skin. One type responds to typical hourly variations in illumination, and provides timed pulses of electricity that adjust "scales" in the skin as a sun screen, opened wide when facing away from the sun, and angled for carefully metered in-solation when facing the sun. The other "cells" respond to slower gross variations in diurnal illumination, releasing all of their stored electricity in pulses that closes the skin's shading and insulation scales tighter in the evening.

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