

Microbial Cell Driven Website Design Using Genetic Algorithms and Optical Disc Computing

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Innovation in contemporary website design includes the use of scripts and style sheets to streamline and coordinate the display, interaction with, and retrieval of electronic information. Last year it was reported by one of us¹, that bacteria could be cultured on the data surface of Compact-Discs pre-written with graphical website elements in S-VCD format. Optical instability during disc rotation is directly caused by the cell specific morphologies interfering with the laser light path. This generates frame-mutations at the data level; and the glitch-type errors have been used to augment the process of website design. In this paper, we expand this approach by developing a software implementation allowing users to simulate components of the photonic process using a small set of bacteria from the Genus *Bacillaceae*, grown under different culture conditions to vary colony morphology and alter the optical transmission properties on disc. This is similar to the related use of diatom exoskeletons for constructing photonic filters. Our new approach goes beyond manipulating just browser mark-up content, and works at the bit level with graphical I/O and exploits web infrastructure with new scripting technologies like PHP in a P2P context for increased speed.

A demonstration computer program illustrating the method allows selected website elements to be mutated according to pre-defined genetic algorithm (GA) rules; but are rule-based on well-localised (~300-700nm) spectroscopic properties of bacteria. A high performance assembly/C/PostgreSQL/cluster-processing Unix backend is capable of real time manipulation of large raw datasets from optical disc computing, and coupled with a JavaScript, CSS, and light Flash based efficient UI maximizes the graphical experience. Finally we conclude by considering the potential of evolutionary computing that directly borrows rule-sets and 3D structures from microbiology, and how this may be of benefit for augmenting practical website design tasks as an alternative aesthetic to human-centric programmable choice-making.