Chapter 4
Digitizing the Physical: Physicalizing the Digital

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ABSTRACT
Intertwined with the digital realm is a parallel sphere of digital material objects. The physicality of these things play an important role as they are embedded with memories as well as personal, social, and cultural meanings and references. The pervasiveness of digitizing information, images, spaces, and objects into digital data creates an expanding virtual presence. Simultaneously, virtual objects are now being transformed into material, tactile forms. Sensors are harvesting physical information and providing important feedback. Using digital devices involves an array of electronic rituals that have evolved. These ritualistic behaviors function in a similar manner to the performance of ritual and ceremony in indigenous cultures. This chapter examines the function of these digital rituals, with the physical residue deposited by these rituals and ceremonies. Material objects created by digital processes are powerful and play an important role socially, culturally, and spiritually.

INTRODUCTION
Digital technologies mediate the between the physical and the virtual. Spaces in between the virtual and the material are populated by new phenomena not clearly sited in either one or the other. Sensory perceptions of these phenomena, thought to be clearly delineated as virtual or material experiences, are no longer unequivocal. Exhibited is a tangiality, with characteristics of both the physical realm and the virtual world. Tangiality indicates a radical shift in our sensory perception as they evolve to absorb, incorporate, interact with and adapt to the paradoxical materiality of the virtual. Our perception of interaction in the digital realm is our ability to sense, recognize and represent within ourselves, physical presence—even in its absence.

DOI: 10.4018/978-1-4666-8205-4.ch004
DIGITIZING THE PHYSICAL

Digital experiences vacillate between flat screens and material objects, between simulated three-dimensionality and the physical world. Digital images are inseparable from the electronic page or the screen; the substrate is inherent in the image – paper, computer screen, television screen, monitor, movie screen, and personal devices. Early computer images resided on oscilloscopes or on paper created with pen plotters. Using the Cartesian system of X, Y, Z coordinates the author created a series of drawings beginning in 1975. The computer graphics programs were written in FORTRAN, incorporated mathematical formulas that described invisible physical phenomena such as light waves reflected off of irregular surfaces. The program used CalComp drawing subroutines for the CalComp Pen Plotter. These drawings were envisioned in the imagination as there were no display screens for graphic images. The program was punched on punch cards and communicated to the large mainframe computer through a card reader. The program was processed and the resulting data describing the drawing was transferred to a 1600 BPI tape that was read by the pen plotter. The available plotter used only black ink in the pens to create drawings. The author used color xerography on transparencies to create the color drawing in Figure 1. Individual drawings were Xeroxed onto transparencies in yellow, red and blue, overlapped to create the final artwork.

These drawings created a physical presence for an invisible phenomena in the physical world, described by mathematics. Through the artist’s programs two-dimensional abstract representations were created.

Contemporary culture embraces the material world in collaboration with the digital. Digitization creates parallel universes of simulated constructs, that exist on flat screens - personal computers, tablets, and smart phones. These digital images are transforming into physical space through continually evolving materials and technologies.

Figure 1. Fourier Transform, computer drawings and color xerox

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