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DDArtS: Towards designing digitally enhanced street art tools

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1. INTRODUCTION

The increasing presence and recognition of urban art work in the cities around the world, the emergence of street artists with world-wide reputation and new artistic codes as well as the connection of urban/street art with design and technology, compose an interesting and multifaceted area of study and research.

This paper presents the design and early implementation of a digitally enhanced street art system able to support the creation of large scale outdoor murals using aerosol spray cans on vertical surfaces. The purpose of this design is twofold:

- to offer great assistance in the production of street art under legal assignment, particularly in situations where economic, territorial and environmental conditions are restrictive towards, or prohibiting the use of auxiliary means for the artist and the employer, such as lifting equipment and machinery or construction installation.
- to investigate how far the boundaries that connect art, design and technology can be pushed while exploring the unique characteristics and capabilities of such a multidisciplinary approach.

The implemented system aims to evolve the artist's creativity and expressiveness by enriching tools' variety. Future system modifications will bring about interactions of different scientific and artistic environments.

2. STREET ART – MURALS

Street art, also called Public or Urban art, is a global movement and it is not only a technique or an artistic style; it is a diverse genre with many different professionals, techniques and styles (McKinney 2015) of its aspects is the creation of murals, large drawings painted or affixed directly on walls.

In the preamble of the book Trespass, Sarah & Marc Schiller mention that for the first time in history, public art touches such large sizes as the ones street art does. Furthermore, for the first time art and technology play such interdependent roles, shaping multidimensional artists: people who deal with photography or use the Internet *en masse*, to learn about street art, share stories and experiences, methods and techniques, view comments, come in direct contact with admirers or critics of their work or the work of other artists (McCormick, Schiller, &, Schiller 2010).

Street artworks in general, and murals in particular, convey many different messages and can be performed in a number of different techniques. These techniques vary according to the **tools** (spray, brushes, stencils, markers, etc.), the **media**, which is a combination of tools and techniques to achieve the purpose (drawing, painting, sculpture, collage, knitting, etc.) and finally, the **urban space** or object on which they will be displayed (walls, pavement, columns, windows, cars, etc.) (Catz 2014).

Large scale murals can be produced illegally or legally, with the latter being the most common, due to the demanding nature of the practice in space, time and equipment. There are many different types of murals and mural applications, and each type presents its own set of challenges. In general, the muralist needs to ensure the mural's success by taking into account a set of factors like colour quality or satisfactory large scale transfer.

Street art, as a new form of art, has developed with limited theoretical thinking and scientific foundations. It has evolved into an artistic expression in a fragmented way, with disparate efforts, which aim to develop and sophisticate its

practice, but the discourse has not reached a critical mass in order to allow the convergence towards a robust body of scientific literature.

Work of pioneers in this overlapping context of technology and urban art, such as the "Graffiti Research Lab", inspires research related to this particularly interesting amalgam of art and science. Research done in the Department of Product and Systems Design Engineering at the University of the Aegean in Syros, revolves around this context by creating tools and applications, such as the DDArtS system.

3. DDARTS: DIGITALLY DRAWN STREET ART SYSTEM

DDArtS is a technical system that uses aerosol cans and simple components and arrangement to create large scale murals on exterior surfaces by spraying. The possibilities are many, but the system has been originally designed having in mind artists interested in creating murals in a more expressive but also faster, safer and less expensive manner. DDArtS eliminates the need for construction equipment (scaffolding, lifts etc.), which is very often used in the production of large scale murals. Furthermore, the system is not costly, since the installation and operation can be done easily, in contrast to the installation of the abovementioned construction equipment.

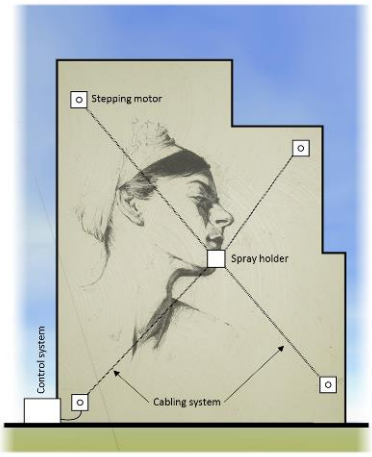

Figure 1: *Concept sketch of the DDArt system.*

The most crucial feature of DDArtS is that it unshackles the artist from physical and technical constraints, allowing them a better and continuous interaction with their project from a certain distance on the ground. In other words, the interesting feature provided by DDArtS enables the artist to observe their large scale painting from the necessary distant vantage point (user role) and at the same time to spray (artist role). Essentially, this dynamic user and artist role interchange provides a new type of creative experience and a revolutionized practice for painting murals.

Furthermore, including the use of DDArtS in art projects results in the expansion of the communication channels between the public, the artist and the employer, a triptych that is difficult to balance in joint decisions on the beautification of cities and public spaces.

The key components of the system are: four stepping motors, a controller, a spray holder, the cabling system that connects them physically and electronically, a computer and the controlling software. The motors are mounted on four outermost points of the vertical surface where the drawing will be created. They are connected via cables which hold the spray holder and they communicate with the controller and the computer system via developed open source software.

The street artist operates the computer, issuing commands to the spraying system to apply the predesigned and stored image on the wall. Thus, the spraying mechanism functions as a valuable interactive art tool for the artist. Additional useful features of DDArtS include the possibility of measuring the surface's height and width, especially in trapezoid walls, the possibility of creating a pre-evaluation draft sketch, and finally allowing edits or required modifications at any stage of the artistic production.

DDArtS has been designed as a hardware and software modular system. Future modifications will allow the interactive creation of mural projects in real time, or through the internet, using additional software modules and various peripheral devices such as pen tablets, gyroscopic joysticks or mice and smartphones. Moreover, the system is designed to include new module in order to be able to produce different image qualities by using multiple colored spray paints, various caps and spraying speeds.

The most important and most desirable aspect of this endeavor is to create an open, totally accessible platform that connects professionals from different disciplines such as architecture, design, technology, informatics to artists.

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