PaperPrinting: A Machine for Prototyping Paper and Its Applications for Graphic Design

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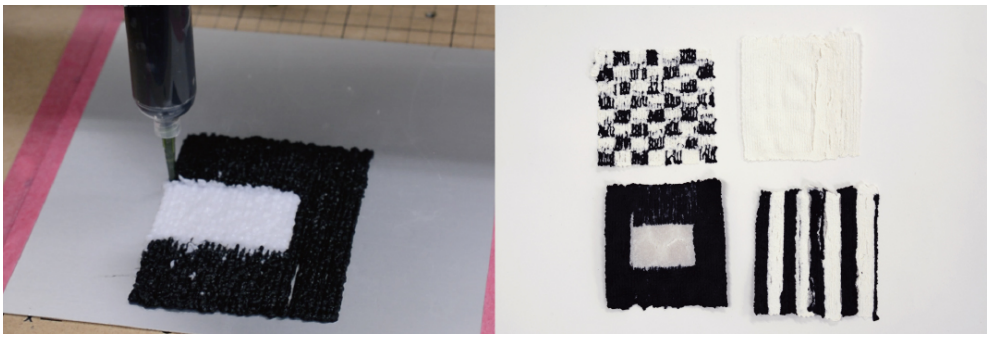

Figure 1: PaperPrinting

ABSTRACT

In this research, we propose a system which makes paper through additive manufacturing process by using a dispenser mounted on XY plotter. By using our system, graphic designers can design and output paper itself which is hard in an existing paper production process. This time, we designed and implemented a machine for fabricating paper and created several output examples. In SIGGRAPH, we will provide a workshop for participants to design their original paper using our machines.

CCS CONCEPTS

• **Applied computing** → **Fine arts**; • **Human-centered computing** → *Interface design prototyping*;

KEYWORDS

Papermaking, Graphic Design, XY plotter

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1 INTRODUCTION

Paper can be said to be one of the most important inventions for mankind. Paper, which is inexpensive and easy to process, is a material and tool indispensable to our lives even in modern times. Along with these papermaking and printing technologies, graphic design on paper has also been advanced. Designers choose the appropriate size and type of paper and print visual information on the paper. Furthermore, it has recently become possible to add further functions such as electronics or robotics onto paper by special printing technologies[Kawahara et al. 2013] [Guberan 2012].

While most of existing graphic design processes use existing paper, in this research, we propose a new process that graphic designers can make the paper itself from scratch. By developing a digital fabrication machine which can print papers, the process of making papers and the process for designing its appearance and functions can be overlapped. More concretely, a position-controlled dispenser outputs gel made by papers, and forms a paper according to digitally designed data. By using this machine, not only the appearance but also the texture and shape can be designed (see Figure 1).

In this paper, we will introduce the hardware and design process of the paper and show some output examples and a workshop plan in SIGGRAPH.

2 PAPERPRINTING

In this section, we describe the process of PaperPrinting for designing and making paper. In our system, we developed an additive manufacturing machine for papermaking.

2.1 Materials

As a material for the additive manufacturing, we utilize a gel, which is made from existing papers. First, a paper is pulverized for about 30 seconds with a pulverizer to make the paper cottony. Then, we create gels with the pulverized paper, CMC (carboxymethyl cellulose) powder and water (see Figure 2). Here, we can use various

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