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Tablet Printer

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Abstract—*The project is all about creating a printer which is look wise similar to an Apple Tablet, i.e. designing a tablet size printer which does printing mechanism without using any kind of ink or color powder. This printer is portable and need no wired connection for operating. The printing surface used is a paper coated with a layer of PHOTOCHROMATIC INK. The processing of the tablet printer involves the editing of the document and then, a single click printing operation directly on the paper through passing a beam of Ultraviolet Light. The tablet printer needs no ink, no wire connection for supply, facilitates USB connection for transferring documents into the device, consist of internal memory, consist of memory card slot and facilitates the adjustment of focal length. Tablet printer is an asset to tackle the urgency of printing at certain time of emergency and can be carried easily like a tablet.*

Keywords*: PHOTOCHROMATIC INK, Ultraviolet Light, USB*

1. INTRODUCTION

Since the evolution of devices used for printing purpose; Printers, there have been many technological advances in the field of printing.

The history of printing goes back to the duplication of images by means of stamps in very early times. The use of round seals for rolling an impression into clay tablets goes back to early Mesopotamian civilization before 3000 BCE, where they are the most common works of art to survive, and feature complex and beautiful images. In both China and Egypt, the use of small stamps for seals preceded the use of larger blocks. In China, India and Europe, the printing of cloth certainly preceded the printing of paper or papyrus. The process is essentially the same - in Europe special presentation impressions of print were often printed on silk until the seventeenth century. The development of printing has made it possible for books, newspapers, magazines, and other reading materials to be produced in great numbers, and it plays an important role in promoting literacy among the masses.

From stencil printing to the latest 3D printing technique technological developments have enhanced the ease of printing through innovative advancements in the structure of printers and the technology used in the working.

This project is a spark towards the creation of a new device in the field of printing and deals with the creation of a printer which eliminates the use of ink or any wired connection for printing mechanism. The basic principle of working of this printer is that when a beam of Ultraviolet light falls on the surface coated with the Photochromic Ink , there occurs a dark patch like formation on that part of the surface which is exposed to the Ultraviolet beam of light. Thus, if the beam of Ultraviolet light could be controlled with the help of a microcontroller based magnifying glass, then, that beam would be able to produce dark patches on the Photochromic coated surface in the desired form. This would lead to the new evolution in the field of printing.

This mechanism of inkless printing is fabricated in the form of a tablet, so that, this device could be carried easily and printing mechanism is done whenever or wherever required. At the time of urgency of printing, Tablet Printers could be of great use. The printing surface used for the printing mechanism is the simple printing paper coated with a layer of Photochromic Ink. When Ultraviolet light rays are controlled through a microcontroller and then are made to fall onto the Photocromic surface then a desirable format is obtained on the Photocromic surface. This device is a new advancement towards a better future of printing and each and every individual would have his own printer with which the printing mechanism could be done anywhere or whenever desired.

2. PHOTOCROMIC INK

Photocromic ink is a type of ink that darkens as the light level increases. Photochromic dye changes it's color when exposed to the source of Ultraviolet light. As the intensity of the applied UV rays increase, the change in the color of the Photochromic dye is proportional to the increment in the intensity of light. Some of the Photochromic inks also change color, in fact, it is Ultraviolet Light which causes the darkening of the Photochromic ink when the UV light falls on it. Photochromic ink changes it's color whenever exposed to the Ultraviolet Light. Thus, the change in Photochromic surface occurs because of change in intensity of light rays. The Fig. below shows that how the Photochromic ink changes it's color on increasing the intensity of the Ultraviolet light falling on it. The Fig. shows the change in color of ink with the increase in the intensity of light.

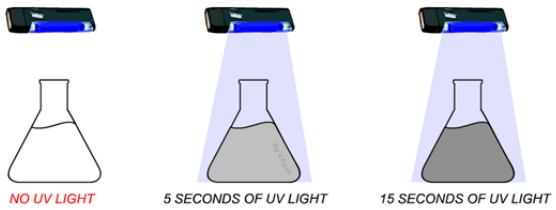

Fig. 1: Change in color of Photochromic Ink with change in intensity of applied UV light

When there is no Ultraviolet light then the Photochromic ink is nearly invisible, and as the intensity of the Ultraviolet Light rays is increased then the color of the Photochromic ink changes.

Description of Photochromic ink:

- Reversible and Nearly Invisible when not exposed to Ultraviolet Light.
- Fast Transition - Intense color in 15 seconds returns to clear after 5 minutes indoors
- Sixteen standard plastisol colors including process colors are available.
- Washable without chlorine.

3. WORKING IDEA

The working idea of the Tablet Printer is that, when the beam of the Ultraviolet light rays from the sun falls on a Photochromic ink coated surface, the area of the surface which is exposed to the UV rays changes it's color. The Fig. below shows the basic idea of the project.

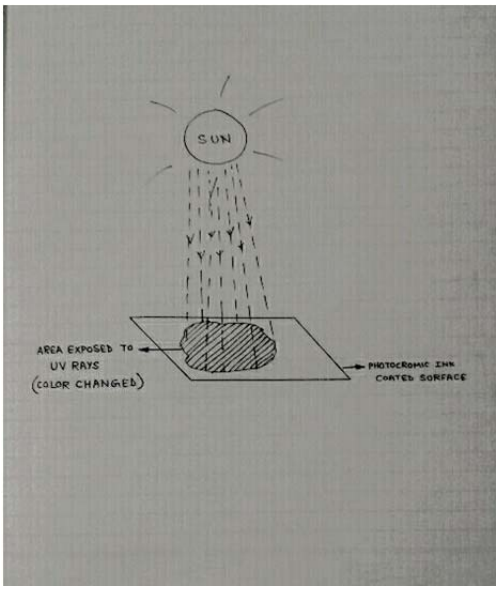

Fig. 2: Working Idea

For implementing the working idea to facilitate the printing mechanism we only have to control the Ultraviolet beam, so as to generate the desirable pattern on the Photochromic ink. According to the working idea of Tablet printer, through controlling the beam of UV rays we can print any kind of pattern on the Photochromic surface. So, for this purpose a microcontroller controlled lens could be used and to obtain UV rays, a halogen source may be used.

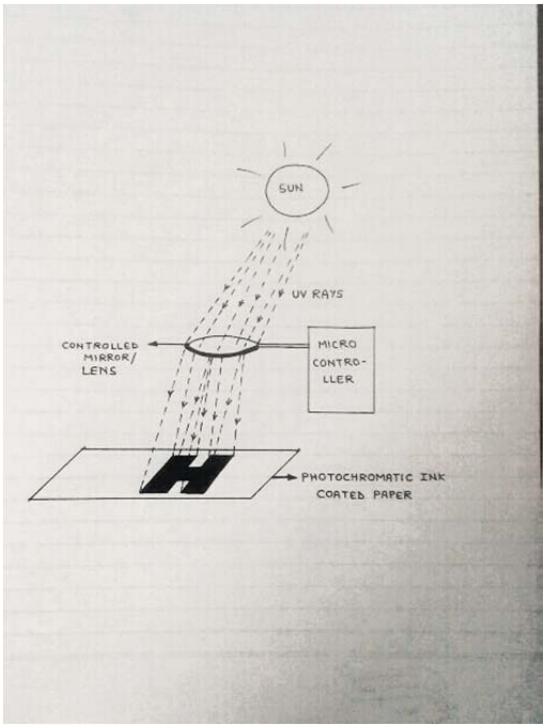

Fig. 3: Application of Working Idea

Thus, applying a light controlling lens between the UV source and the Photochromic surface we can control the path of the light rays from source to the surface for printing. And, thus any pattern could be obtained on the Photochromic ink coated surface.

4. EXPECTED DESIGN

The expected final design of the Tablet Printer is very similar to an ordinary tablet. The only difference would be caused due to the thickness of the tablet due to the extra components like, microcontroller, halogen source (Halogen LED), USB port. Rest of the above part would be similar to a normal tablet. Thus, a tablet size printer is designed. The figures below show the final expected design of the Tablet Printer.

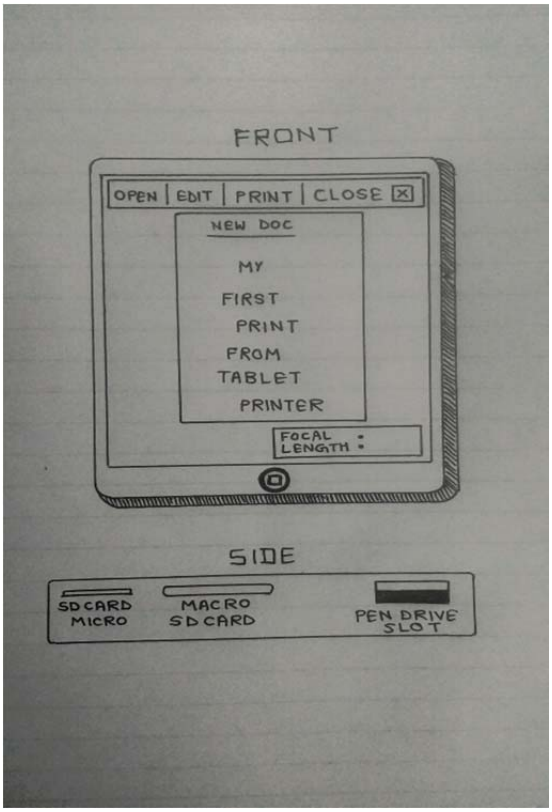

Fig. 4: Front and Side Look

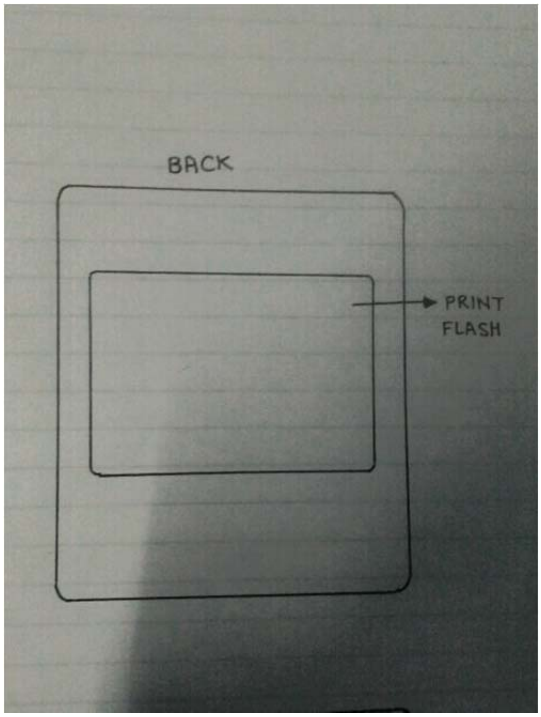

Fig. 5: Back side Look

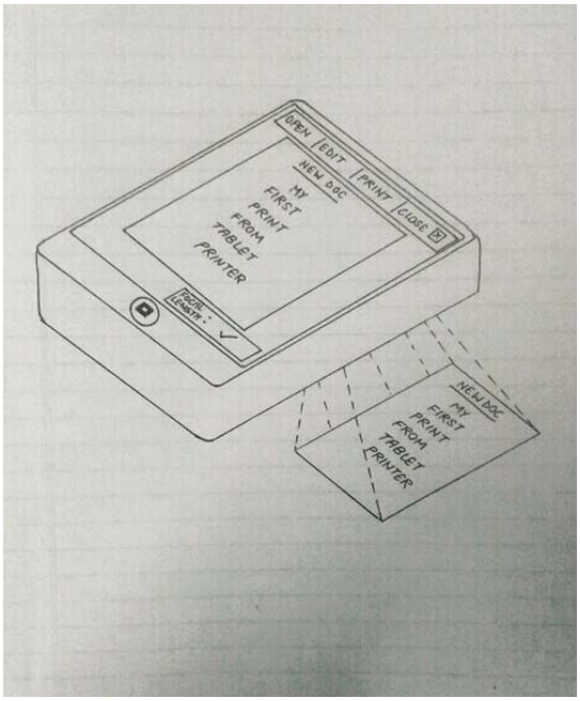

Fig. 6: Final Expected Design

Features of Tablet Printer are as follows:

- Supports editing of document before printing.
- Facilitates storage of documents in the internal memory of device.
- Consist of an USB port, which facilitates sharing of data with the help of mass storages.
- It is inkless and no wired connection for supply, a 3-4 volt battery is enough for it's working.
- Portable and easy to carry.

The Tablet Printer is of great use at the time of urgency of printing and support the inkless printing whenever and wherever in need. The printed matter last for some time, thus the use of Tablet Printer is basically for the emergency of printing, for example, if you are in an urgent need to show a printed layout of any document, at that moment you can easily get that necessary document printed. The only things you will have to keep with you is a Tablet Printer and a set of Photochromic Ink coated papers and whenever or wherever there is an emergency of printing, it would be easily sorted out without any kind of ink or any kind of wired supply to do the mechanism.

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