

## ***SIMPLE DRAWING METHOD FOR OBTAINING VISUAL AND NEAR INFRARED IMAGE WITH DIFFERENT BALL POINT PENS SPECTRAL PROPERTIES***

### **METODA JEDNOSTAVNOG CRTEŽA ZA POSTIZANJE VIZUALNE I BLISKO-INFRACRVENE SLIKE POMOĆU KEMIJSKIH OLOVKA RAZLIČITIH SPEKTRALNIH ZNAČAJKI**

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#### **ABSTRACT**

Drawing is a simple method of obtaining pictures. Its feature is two stages image, usually high reflection rate from substrate and low reflection from deposited ink. A pair of soft ball pens with similar visual but different NIR spectral properties are chosen. In visual part they obtain very close reflective properties, meaning color experience, but in NIR they differ. At quality pen products the line width is mainly constant as well as the ink coverage. This facilitates to introduced to NIR technology and InfrareDesign to manage the system of twin pairs and to display a visual image, and a secondary image instrumentally visualized in NIR domain. Selected double stage images and dual drawings are customized and prepared for graphic reproduction reproduction in edition supporting dual images implementation.

**Keywords:** *Infrared technology, twin pairs, spectral VZ properties, visual and NIR domain*

#### **SAŽETAK**

Crtanje je jednostavan način dobivanja slika. Njegova značajka je dvostupanjska slika, obično visoka stopa refleksije od podloge i niska refleksija korištene tinte. Odabire se par softball kemijskih olovaka sa sličnim vizualnim, ali različitim NIR spektralnim svojstvima. U vizualnom dijelu dobivaju vrlo bliska svojstva refleksije, što znači doživljaj boje, ali u NIR-u

se razlikuju. Za kvalitetne olovke širina linije uglavnom je konstantna, kao i pokrivenost tintom. Ovo olakšava uvod u NIR tehnologiju i InfrareDesign za upravljanje sustavom parova blizanaca i prikaz vizualne slike, te sekundarne slike instrumentalno vizualizirane u NIR domeni. Odabrane dvostruke slike i dvostruki crteži prilagođeni su i pripremljeni za grafičku reprodukciju u izdanju koje podržava implementaciju dvostrukih slika.

**Ključne riječi:** *Infrared tehnologija, blizanci bojila, spektralne značajke, vizualna i NIR domena*

#### **1. INTRODUCTION: DUAL ART IMAGES FEATURES**

There are several principles meaningful for dual image being carried out [1, 2, 3]. They involve extended vision interconnecting various domains. In regarded situation visual part and not visible near infrared part are connected. The extended part should be visualized instrumentally [4, 5, 6, 7]. Both images are performed in visual part in form of “twin dyes”, meaning two inks different composition but the same visual response. One of them representing the secondary image in NIR domain renders high absorption rate that can be instrumentally visualized. Figure 1: various wavelength domains.

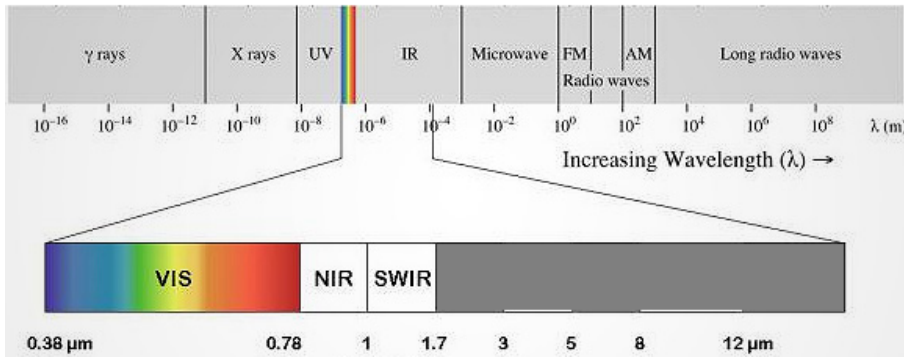


Figure 1 Various wavelength domains

## 2. DRAWING ART

Original pictures can be accomplished in a variety of possibilities, in various techniques, various dyes, substrates, and in our case interesting multicolor, with various hues and tones, mono or/ and single line, drawings. Drawings are known from ancient times till today, and were well known in woodcut and copper plate artists. They have basically two stages, the stage of properties or reflection from the base or substrate, and places where ink or some other material is placed. Practically, in basic work, there are no in-between stages or shades. The sensation of “lighter” or “darker” can be simulated with different line density. The main line is mainly the same width and ink coverage is constant. An example is depicted in Figure 2 Old master sketch and Figure 3 woodcut symbol.



Figure 2 Old master sketch



Figure 3 Woodcut letter example

Drawing was traced. From variety of various assortments two quality pens were chosen. According to visual optical properties they visually were identical. The author was highly informed to VIS NIR Infrared technology procedures so inks used in pen rendered different absorption rated in NIR domain. Visually it is only one sketch on the drawing, depicted in Figure 4.



Figure 4 Drawing in visual domain (courtesy of N. Žiljak)



Figure 5 Enlarged section of Figure 4.

Figure 5 depicts enlarged section of the original image, where difference between two different inks can not be perceived.

### 3. BARRIER SCANNING

Barrier scanning shows the transition from visual domain (showing primary image) to ZNIR domain (showing secondary image) in spectral increments. The steps are performed instrumentally appliance of optical filters, prism or other technical means. It is not just a transition from first to secondary image, bus also showing stages of images separating, what also indicates the quality of images separation [8, 9]. Figure 6 display some barrier steps (in nm barrier value) from visual to NIR image.

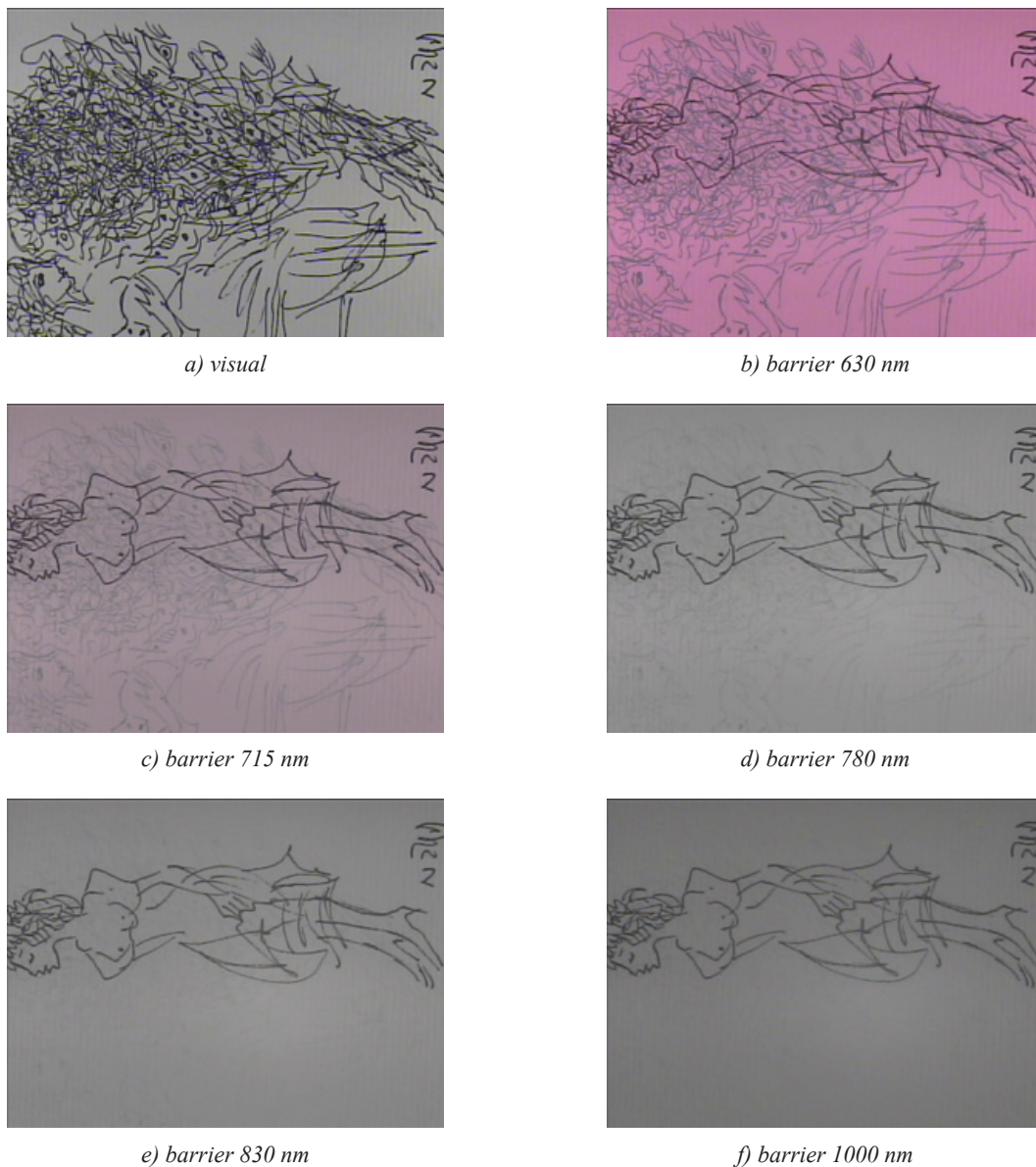


Figure 6 displaying barrier scanning images: a) visual, b) 630 nm, c) 715 nm, d) 780 nm, e) 830 nm and f) 1000 nm Z image

Observing these barrier selections, it is easy to conclude that in visual (where any trace of NIR is excluded) only the first image can be seen. Moving toward NIR secondary image gradually appears while approaching 1000 nm, while the primary image vanishes. At 1000 nm only the secondary image exists. If we use these barrier separations as a principle in visual no traces of secondary can be present, and in an NIR image no primary component can occur. In the author's drawing, this duality can be determined visually (first drawing) and in the secondary drawing instrumentally with a Z infrared camera.

If the drawings are prepared for graphic reproduction according to Z-NIR technology, where visual drawing appears in CMY channels and secondary Z-image in K channel. Figures 7a and 7b depict channel assignment while preserving all original dual image properties.

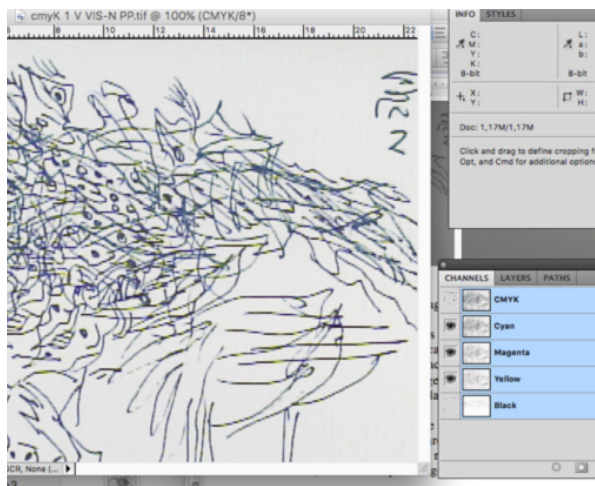


Figure 7a Visual presentation channels

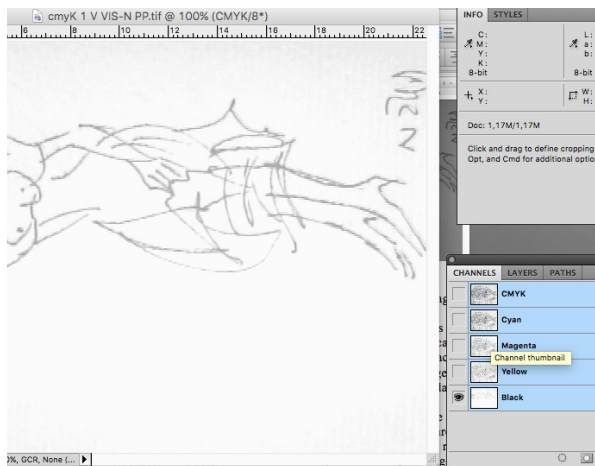


Figure 7b Z-image channel presentation

In more complex drawing the principle must be extended for multicolour version, so visual channels are showing colour combinations, and forth channel secondary image, depicted in Figure 8a and 8b.

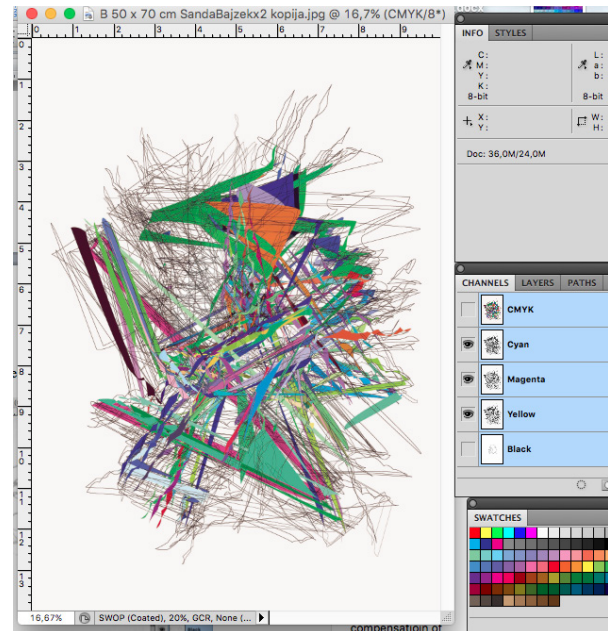


Figure 8a Visual drawing part displaying channels

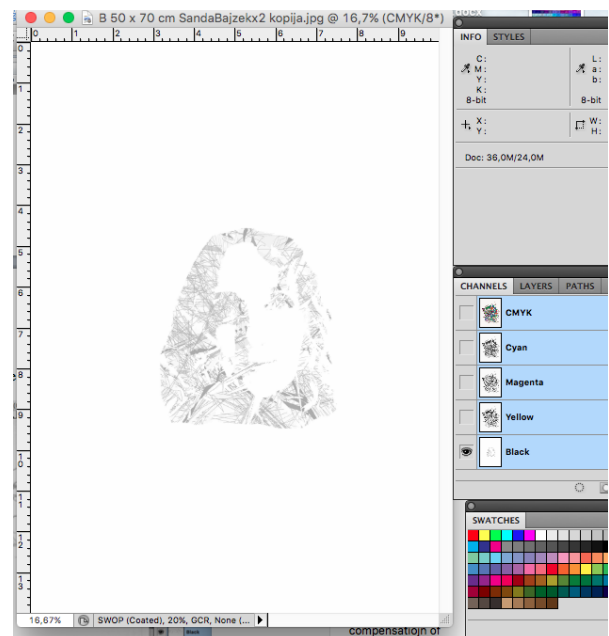


Figure 8b K channel presenting Z image drawing

As a wide range of possibilities here is an example of multicolour paintings achieved in dual ZNIR images technique, exhibited in Gallery Zelina, where next to picture is Z-NIR image monitor, so both images can be observed.



Figure 9a Paintings, visual domain



Figure 9b Paintings, as Z-NIR images (courtesy of Gallery Zelina)

#### 4. CONCLUSION

NIR Z presenting technology has been developing for years. Numerous alternations and improvements have been implemented and carried out till the to day's functionality. NIR technology interconnected with InfrareDesign and Infrared procedures for many fields and it is expanding. Numerous works have been carried out, in dual images usage, paintings, line drawings, open air images, generated images all can be coordinated together, so that way of artistry is broadly recognised and practised. It lead numerous occupations and callings to investigate their skills, expressing, technical knowledge, material specifications and similar.

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