

Process simulation of digital embroidery design module

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ABSTRACT : The 'DED (digital embroidery design) module was developed keeping in mind the principles of mass customization and personalization to derive competitive advantage in respond to consumers demand for customized products. Adobe Photoshop and PE design software were used for developing colourways and digital embroidery design from Rajasthani miniature paintings in systematic manner in the form of digital embroidery design module. In order to judge the efficacy of developed 'digital embroidery design module' (DED), of simulated textile designs for mass customization, the usefulness of developed "DED" module was assessed by a panel of 10 judges (previously selected) and 10 entrepreneurs. The developed digital embroidery designs were highly liked and well appreciated by the judges. Results showed that developed "DED" module was found acceptable by 91.09 per cent and 92.36 per cent by the judges and entrepreneur respondents.

KEY WORDS : Embroidery, Digital, Process, Simulation

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Embroidery digitizing is the process of converting artwork into a stitch file that can be read by an embroidery machine and then sewn into fabric. The researchers first analyzed and edited the miniature art work for embroidery as all logos and designs can not work for embroidery. There are those that need to be simplified and correctly sized up. There may also be elements in the artwork that needs to be eliminated and those will be altered, like enlarging small text and eliminating outlining.

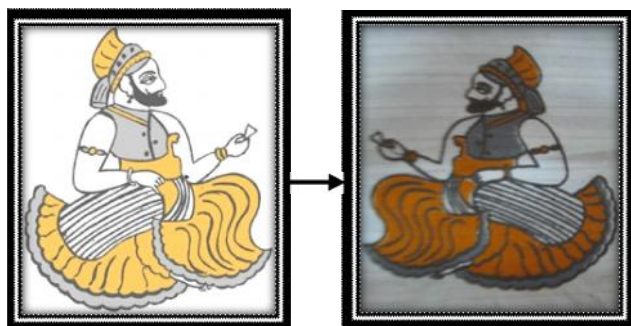
The concept of mass customization is gaining popularity day by day through the innovation of designer's ideas. A large

number of boutiques owners, fashion houses, export houses, entrepreneurs etc. are found to be involved in customization of digital embroidery designs on fashion apparels, with the emergence of fashion houses and boutiques, there is a need to develop a product catalogue to visualize the customized designs on fashion apparels and module on 'Digital Embroidery Design' to enhance the knowledge of untrained and semi skilled technical personnel involved in the process of design development and manufacturing of fashion in apparels industry.

Hence looking in to the above facts, present research work was formulated with the objective to simulate textile designs from traditional miniature paintings for fashion apparels in different colorways using textile designs software.

RESEARCH METHODS

The present exploratory study was carried out in Rajasthan as the origin of miniature paintings is rooted in the history of Rajasthan, a land known for its artistry. miniature paintings have very essence of Rajasthan. Traditional designs of miniature paintings of Rajasthan were



identified and selected to develop DED module in terms of process simulation of digital embroidery designs. Textile designing software was used to simulate selected seventy designs from Rajasthani miniature painting. Out of the selected seventy designs, 50 most appropriate designs with suitable colorways, chosen by the judges for converting into digital embroidery form. The researchers developed 'Digital embroidery design module' to depict the simulation process which was evaluated for its efficacy by both judges and entrepreneurs. The researchers used computerized embroidery machine to digitize the Rajasthani miniature motifs. The motifs of different sizes were embroidered with the colourful threads. In order to assess the efficacy of the developed 'Digital embroidery design module', The usefulness of developed module in terms of 'process simulation' was assessed by the respondents using developed rating scale on various parameters proposed.

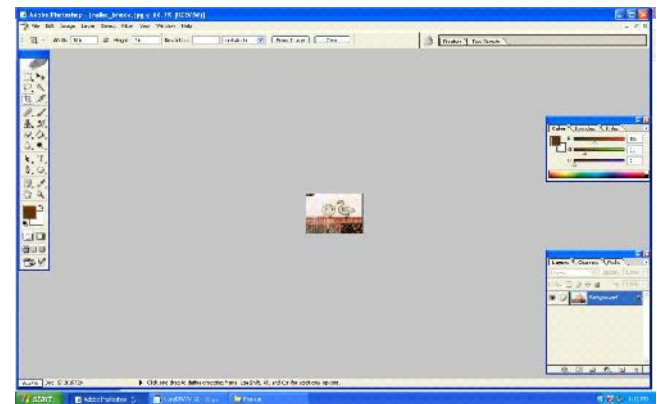
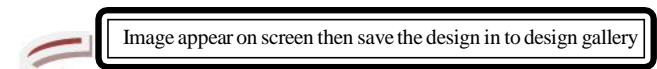
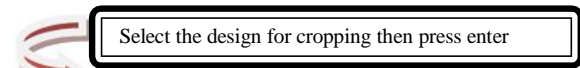
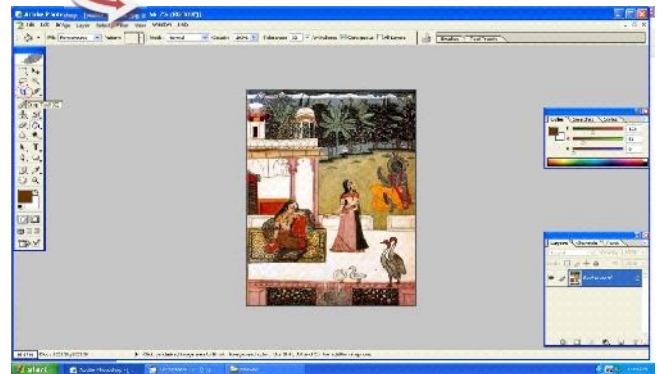
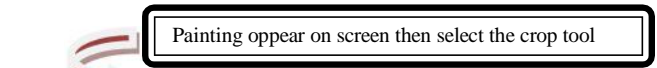
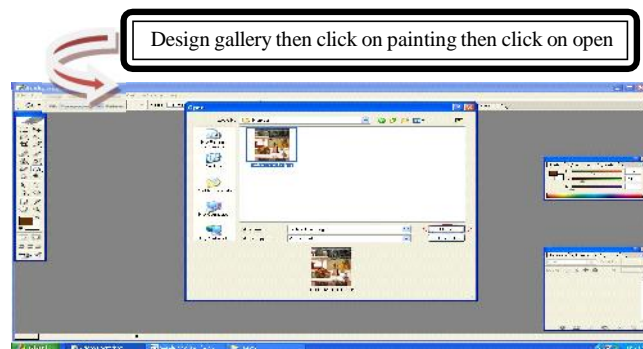
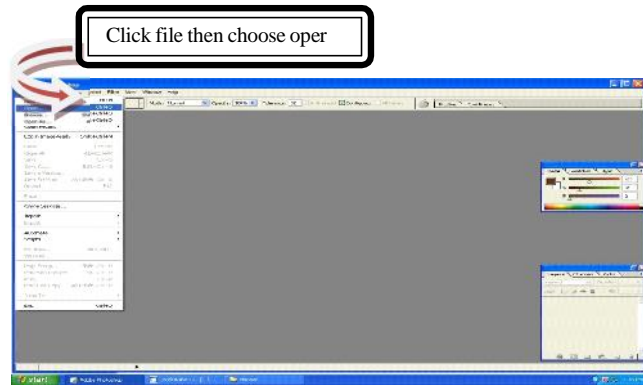
RESEARCH FINDINGS AND DISCUSSION

The various steps involved in developing the Digital design module has been shown below :

Crop the suitable motif for digital embroidery :

Adobe Photoshop software , most powerful image editors on the market today to create and manipulate high quality digital images was used by the researchers in following steps to select design from the selected miniature painting.

Open Photoshop software :



Colour reduction and cleaning :

All CAD/CAM artists know that one of the most time consuming process in the digital design work is the colour separation, reduction and cleaning process. In colour reduction and cleaning process the researchers sketched the basic design on tracing paper followed by scanning in black and white form using JPEG format.

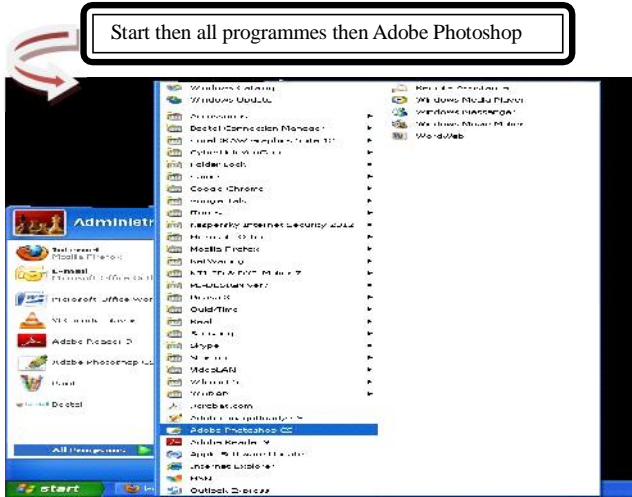
The design was opened in Adobe- Photoshop to developing colourways.

Developing colourways :

Photoshop software was used for developing colourways of selected designs from Rajasthani miniature painting. Developing colourways is a powerful function in Photoshop that has the options to separate for hue, saturation and value selection along with tolerance setting. Unlimited

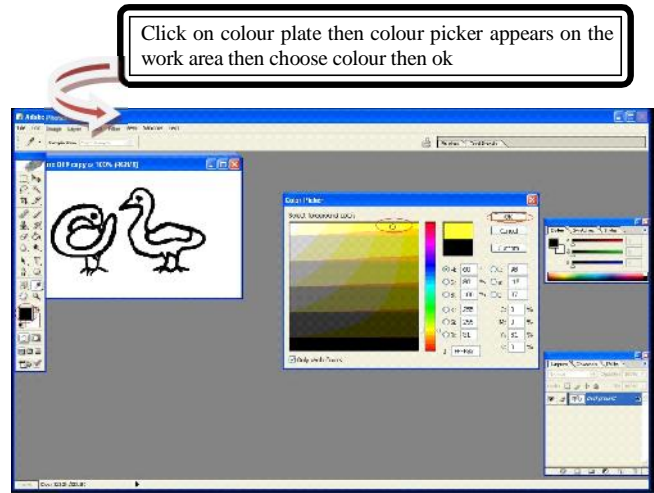
swap and random colourways can be automatically generated using this function. This software was used to develop interesting colourways of selected fifty designs. The steps used in colouring are shown below:

Open Photoshop software :



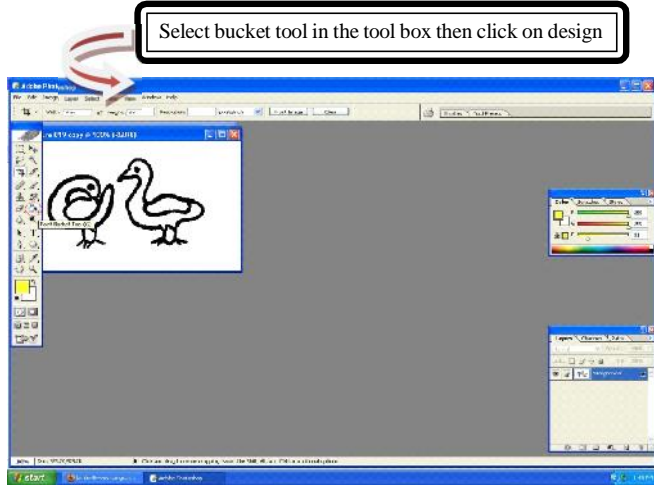
Start then all programmes then Adobe Photoshop

Creating colourways :



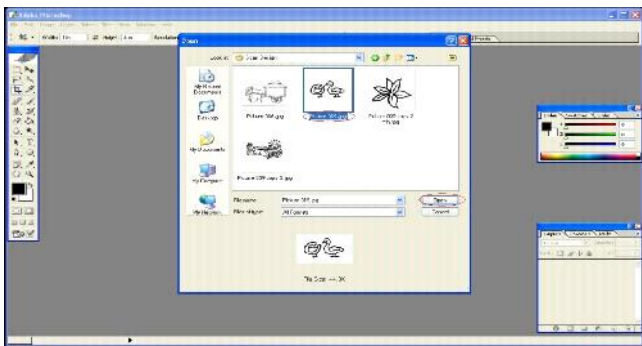
Click on colour plate then colour picker appears on the work area then choose colour then ok

Select the design for creating colourways :

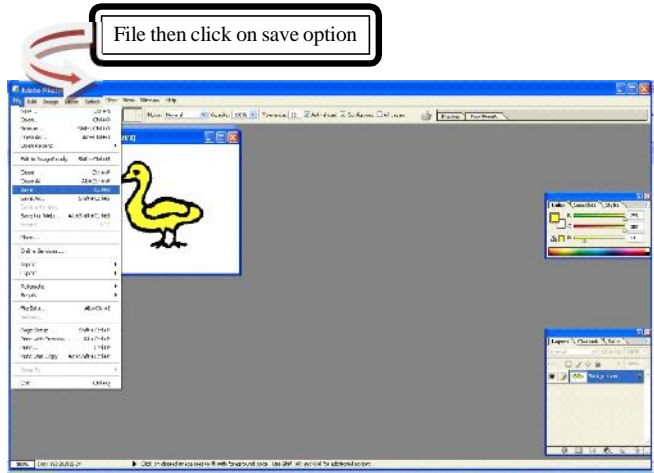


Select bucket tool in the tool box then click on design

Select design then double click on design/click on open

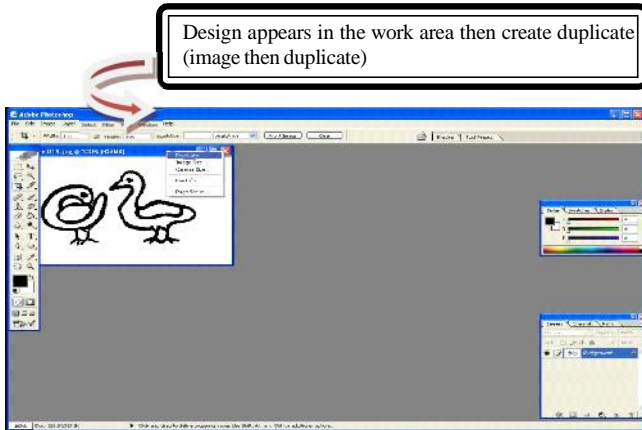


Save design :



File then click on save option

Create duplicate :



Design appears in the work area then create duplicate (image then duplicate)

Thus, with the help of CAD technology, the selected motifs were simulated for further experimentation.

Development of e-module on digital embroidery design:

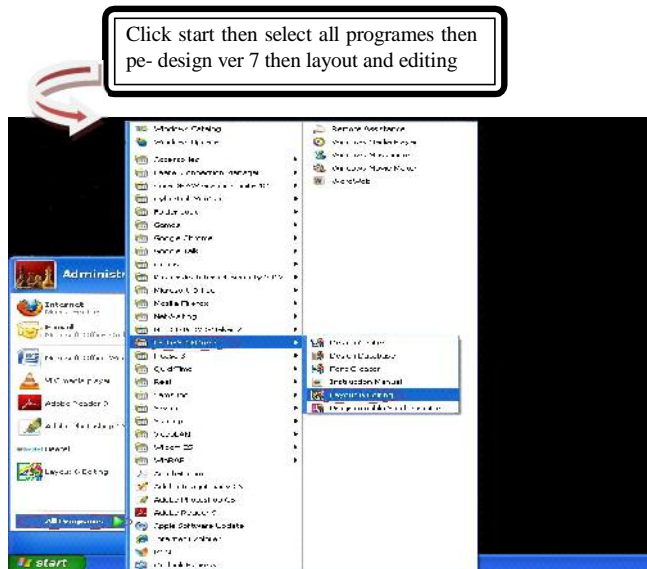
The embroidery digitizing takes place when the original artwork- a drawing, design, graphic or picture is scanned in digitizing software to turn it into a digital file that can be used by the computerized embroidery machines. Embroidery digitizing is basically putting in digital data into a computer with a digital file or scanned image that is now processed through the digitizing software to the many stitches necessary to embroidery the image *i.e.* creating stitch, direction, density setting and adjustments to make perfect embroidery. e-module was developed on ‘Digital embroidery design’ using embroidery design software, clearly depicting the different steps involved in digitization of embroidery designs.

Converting the design into digital embroidery design :

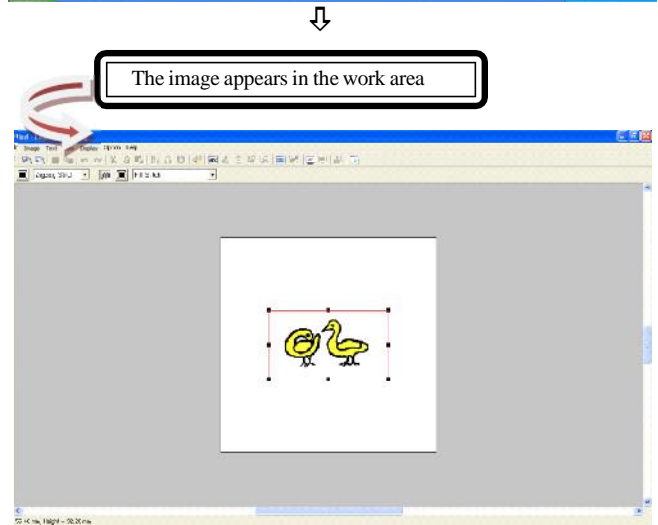
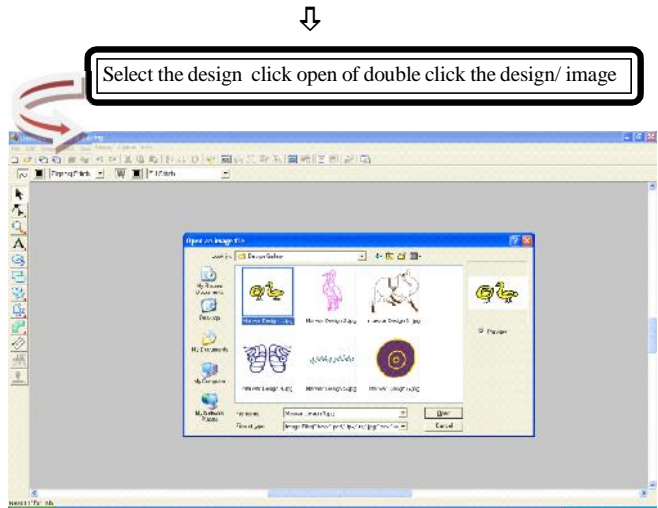
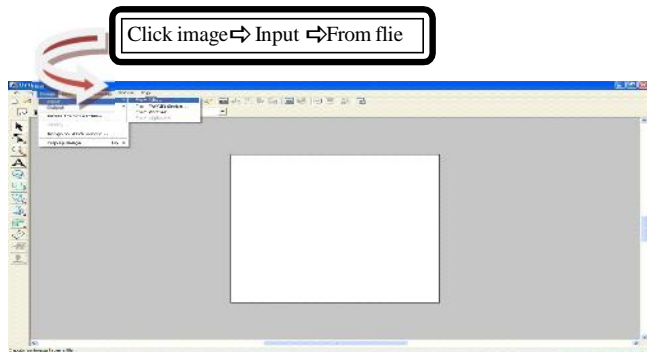
Step 1: Importing design into layout and editing :

First used import option was used for the design converted into an embroidery pattern. For example:

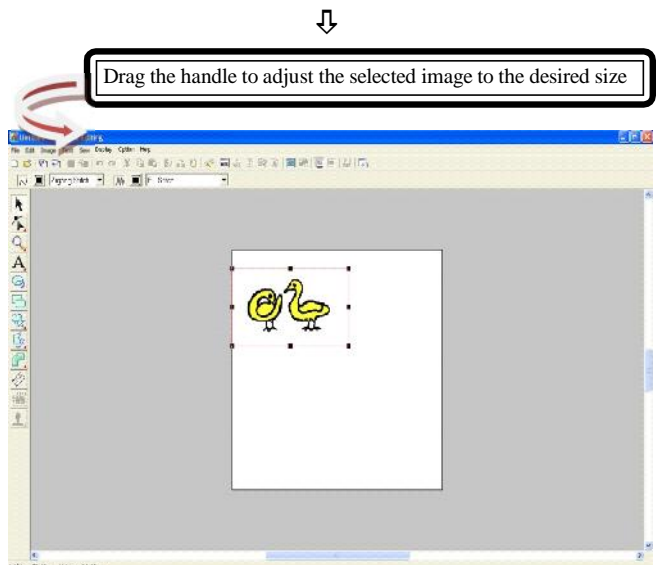
Start up layout and editing :



Import the image :

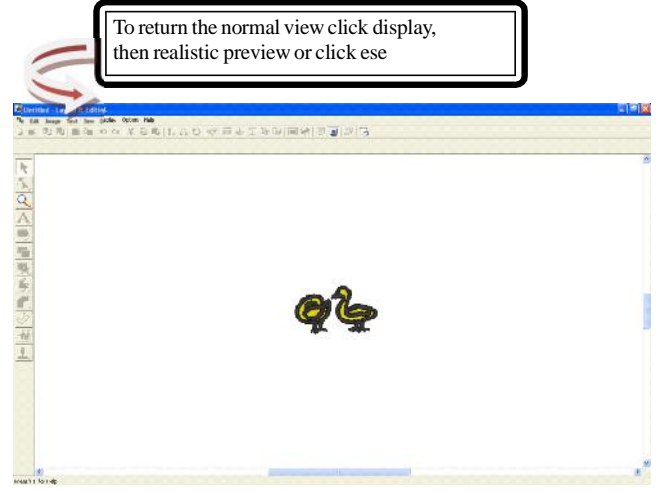
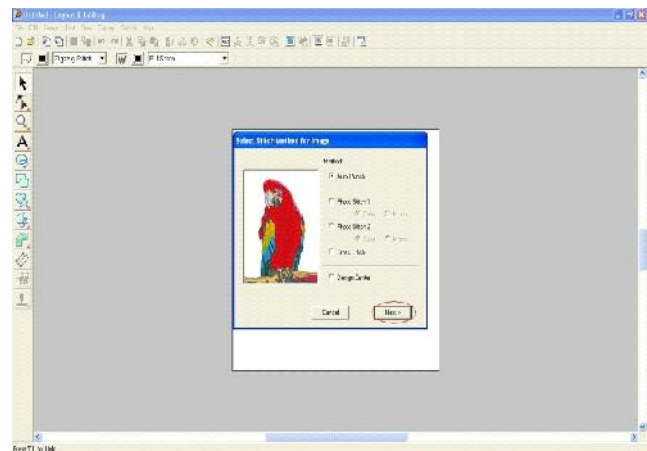
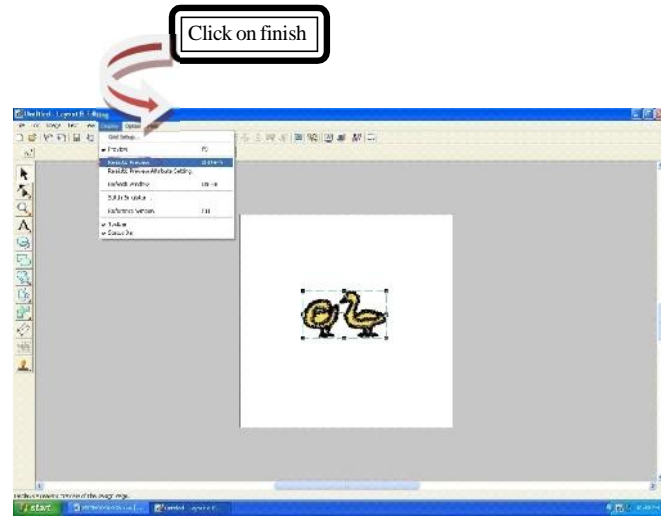
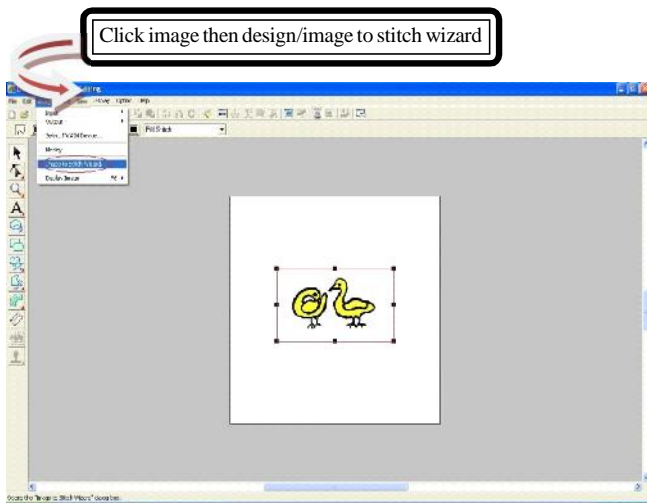


Adjust the image size and position :

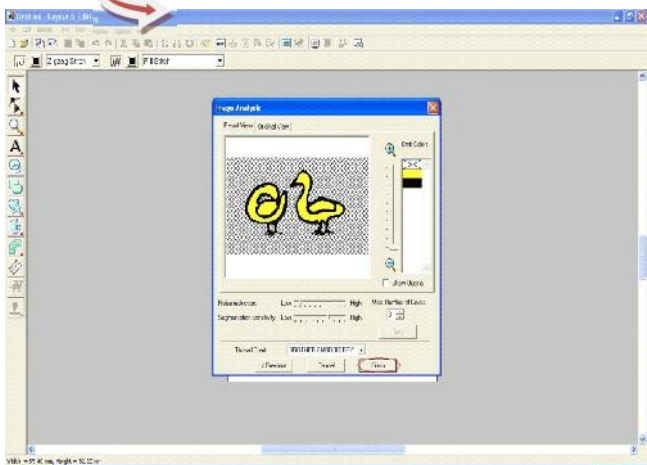


Step 2: Converting the design into digital embroidery pattern through auto punch

Step 3: Displaying preview of the embroidery :

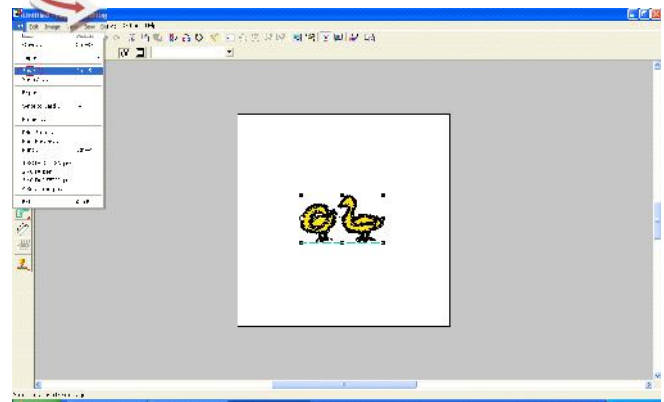


Click display than realistic previes



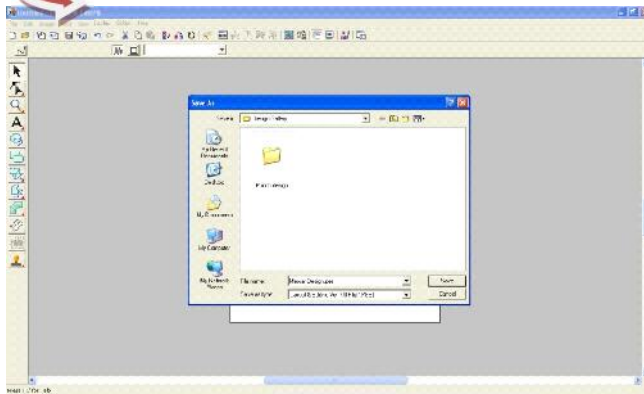
Step 4: Saving the embroidery design

Click file, then save



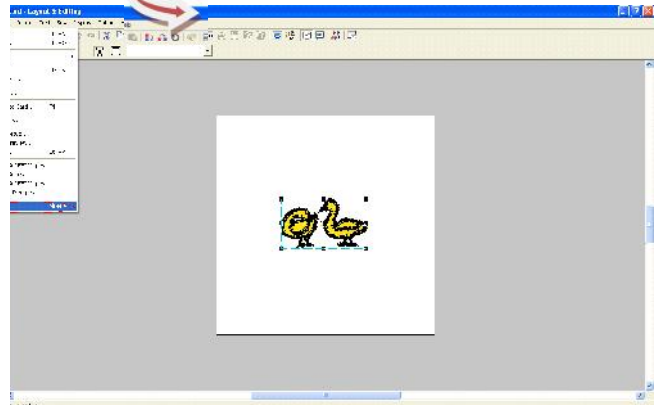


Select the drive and folder and then type in the file name, then click on save



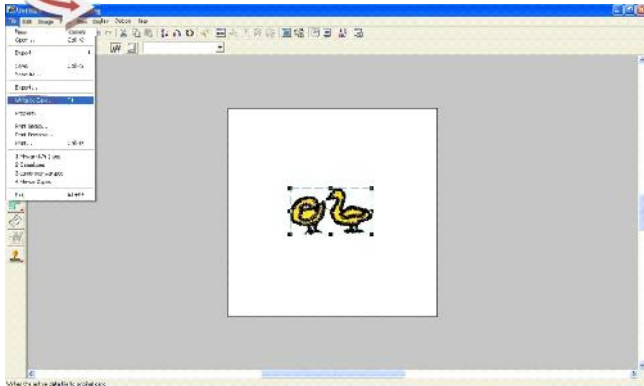
Quit layout and editing :

Click file, then exit

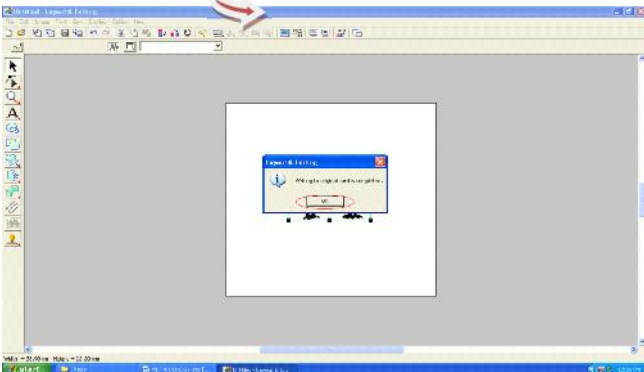


Step 5: Transferring the design to an original card
 Insert an original card into the USB card writer module :
 Transfer the embroidery design in card :

Click file, write to card



Click ok

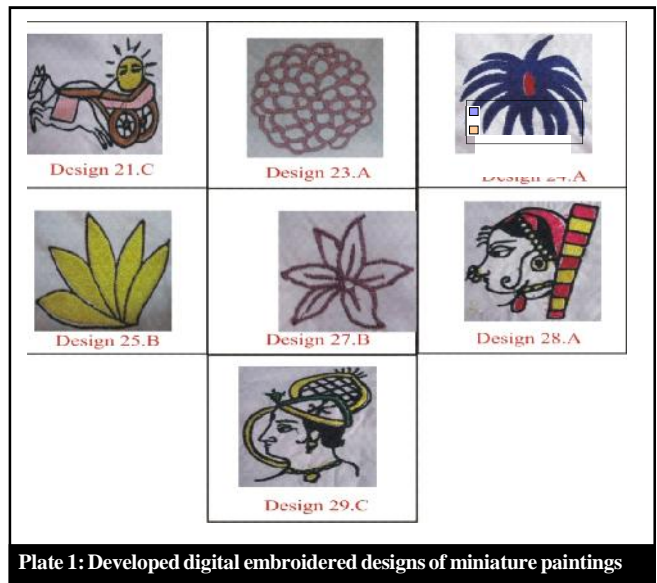


Procedure of computerized embroidery machine :

Digitized embroidery designs were created by embroidery digitizing with the help of PE design software. The design was created in a format, which can be easily reshaped and edited as required and then changes it into a stitch file format. Once the final design was ready, it was loaded into the machine as per the file format acceptable with the machine. The embroidery pattern was transferred through USB interfaces. The fabric was placed on embroidery frame that fits onto the machine.

Development of digital embroidery designs:

The researcher embroidery was digitized from selected motifs using computerized embroidery machine and PE design software and applied on various fashion apparels.



Following plate shows some of the digitized embroidery designs.

The 'DED (digital embroidery design) module was developed keeping in mind the principles of mass customization and personalization to derive competitive advantage in respond to consumers demand for customized products. In order to assess the acceptability of the 'DED module', a rating proforma was developed based on five point ranking and was given to judges and entrepreneurs. The developed DED module was evaluated for different parameters *i.e.* content coverage, presentation style, suitability of audio visual aids used, ease in transmission/difficulty level in understanding and overall.

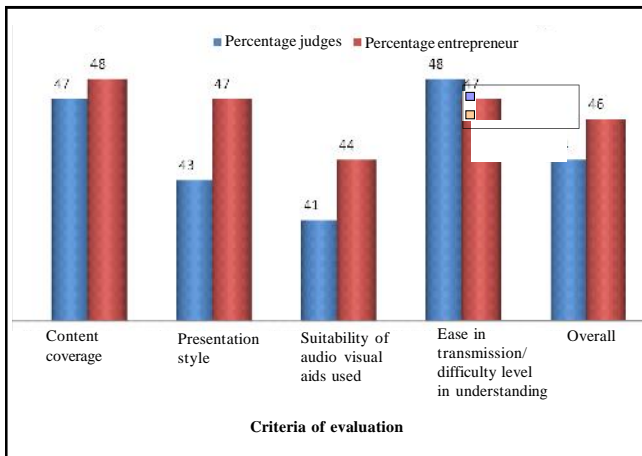


Fig. 1: Mean score of the developed module for relative ranking (n=20)

It was also tried to find out the acceptability of the 'DED' module by the respondents. It was interesting to note that the developed "DED" module was found acceptable by 91.09 per cent and 92.36 per cent by the judges and entrepreneurs, respectively. Jyotsana and padma (2003), Srivastava and Rajvanshi (2008) and Devi and Srivastava (2011) have made some contribution on Madhubani painting phad paintings and traditional disigns of sarees of Manipuri, respectively,

Conclusion :

Embroidery digitizing is the process of converting artwork into a stitch file that can be read by an embroidery machine and then sewn into fabric. The developed digital

embroidery designs module will be very beneficial for customers and entrepreneurs as it will provide complete process of converting design into 'digital embroidery design' which can be applied on the fashion apparels and other textiles according to customer's need. The researchers first analyzed and edited the miniature art work for embroidery as all logos and designs can not work for embroidery. After finishing up on the modification on the artwork in the programme or software, then decided on how the "pathing" of the stitches will run followed by deciding *stitch types* to sections of the design. The underlay stitches were added first correctly because it helps the other remaining stitches to have a smooth surface to embroider on. It also adds density to the design. When not done correctly, the stitches will sink into the fabric or allow the base fabric to show through the design.

It was further decided what variation of the stitch to be used, along with the direction of the stitch, where it should start and where it should stop considering the type of fabric used for embroidery.

Embroidery digitizing is indeed faster and easier. Designs with fine details, small text, and lots of colours obviously need more set-up time for the digitization.

Time and experience are essential to digitizing, since there are a lot of stitches, fabrics and factors need to be considered in the art of embroidery digitizing.

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