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RESEARCH PAPER

Re-exploring the bird heritage carvings of Pattadakallu for computer aided embroidery

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Abstract: The conventional method of designing was tiresome and time consuming. Computer aided designing is a device that cannot replace the designer but can make the effort of designing a more accurate and gratifying. The Computer Aided Embroidery (CAE) design software that has been developed fulfils the needs of the home, commercial and the industrial embroidery. In the present study an attempt has been made to utilise and document the bird heritage motifs of Pattadakallu carvings through computer aided embroidery. Ten motifs were developed on computer using Wilcom software to develop embroidery motifs. These motifs were evaluated by panel of fifty home scientists to select the best designs. The findings of the study depicted that the motifs were appreciated by the respondents and willing to accept these motifs for textile designing.

Key words: Computer aided design, Digitization, Embroidery, Motifs

Introduction

CAD (Computer aided design) is industry specific textile design system using computer as a tool. CAD is used to design anything from an aircraft to knitwear (https:// www.textileapex.blogspot.com). The CAD system was originally developed to aid draftsman, but now has upgraded to powerful man machine interface for designing. Computer in the hands of designer can prove to be a tool of ultimate creativity with the system working as simple as an artist sketch work.

The degree of accuracy in Computer Aided Designing (CAD) is more than manual drawing. Whereas, design errors are few, modification of design can be quickly done. Both two and three dimensional drawings can be designed, repeated and saved as a part of a 'drawing library'. CAD systems can be linked with Computer Aided Manufacturing machines to produce objects from drawings. CAD is a cheaper and quicker method of producing the final product (Holmes, 2013). Computer Aided Embroidery design is a multitasking computer graphics system for the design of embroidery patterns and production of embroidery types and jacquard cards for electronic data media. A minimum number of points can be used to define any shape, which can be regular or irregular. By nominating stitch type, stitch length, spacing and other parameters, the defined shape may be outlined or filled with stitches automatically (Arun, 2000). Ethnic designs woven or embroidered with brilliant coloured fabrics allow a divergent seal of magnificent, magical and traditional artistry of Indian weavers and bear their own regional identity (Naik and Vastrad, 2008).

Pattadakallu has a group of monuments that represents heterogeneous art which was built in the 7th and 8th centuries under the Chalukya dynasty. The temples are built in northern and southern styles of architecture. Pattadakallu is also called as Raktapura (Red town) and Pattadakal Kisuvolal. Pattadakallu had been listed as the UNESCO World Heritage sites in the year 1987 (http://www.indianmirror.com/wildlife/birds/ birds.html). Pattadakallu was a very small place which was used by the Kings for any celebration of royal festival or sovereign's consort. The exterior walls of the temple are sculptured with the pictures of gods and goddesses. The pillars and the inner walls are beautifully decorated and the panels depict the episodes from mythology. The temples also show depiction of episodes from Ramayana, Mahabharata, Bhagavata, Panchatantra and Kiratarjuneya (Sundara, 2008). So this research is intended to keep these carvings alive through Computer Aided Embroidery with the following objective to digitize selected bird heritage carvings into motifs for textile ornamentation through Computer Aided Embroidery.

Material and methods

The Research was conducted during the year 2015-17. Collection of motifs was done from Pattadakallu carvings, drawing and digitizing was done in Dharwad and machine embroidery was done in Belgaum.

Extraction of selected carved images into motifs

Photographs of selected motifs were further categorized into animal, bird and floral designs. Ten bird motifs were selected and drawn manually on white paper to visualise the resemblance and suitability of the designs for embroidery. The designs were finished using a rotring pen.

Digitization, simulation of the extracted heritage motifs

The process of converting Pattadakallu carvings to embroidery was done digitally using the 'Wilcom ES' software. The step wise procedure of inputs, the designing process and simulation were recorded. Ten hand sketched heritage motifs were digitized into motifs with mere outline and with filling stitches separately making them twenty motifs. Based on the design simulations, minor modifications in the size, shape and the quality of the embroidery motifs were made.

Computer aided embroidery of the heritage motifs

Finally the heritage motifs were embroidered on a CAE machine with a computer interface. The fabric used was casement which contained pure cotton yarns. The colour of fabric was black with thickness of 0.363 ± 0.020 GSM. The embroidery thread used was of 2 ply polyester and the colour was Beige.

The fabric colour and the thread colour were constant for all the sixty motifs to avoid confusions created in preference.

Fifty respondents were randomly selected from College of Rural Home Science, University of Agricultural Sciences, Dharwad to assemble the information about the preference of embroidered motifs for further use in textiles. Five point rating scale was used for the preference of heritage motifs. The scoring was given in the following order (Vishnoi and Singh, 2014) of Excellent - 5, Very good - 4, Good – 3, Fair – 2, Poor – 1.

Weighted Mean Score was applied to assess the acceptance of the developed motifs (Rashmi, 2016). Scoring was done in the following pattern

$$\text{Weighted mean score} = \frac{\text{Total obtained score}}{\text{Maximum weighted score}}$$

$$\frac{d\sqrt{n}}{s}$$

Paired-t test was applied to assess the acceptance of embroidered bird heritage motifs for textiles. Paired-t test was calculated using the formula.

with n-1 d. f.

Where,

$S = \sqrt{\frac{1}{n}\left[\sum d^2 - \frac{n(\bar{d})}{n-1}\right]}$

s = Standard deviation of difference

n = Number of respondents

$\bar{d}$ = *Mean of difference*

Results and discussion

Table 1 and Plate 1 depicts the bird carvings and their respective converted motifs. Bird 1 (B_1) is the peacock with rider has dimension of 4"x 4" when converted into drawing. Bird 2 (B_2) is the side faced peacock that measures 3"x 4.2" after making outline on the sheet and Bird 3 (B_3) is the side faced peacock with opened wings measuring 3" x 4.5" after transformation into sketch. Bird 4 (B_4) is the back faced peacock with dimension of 4" x 4" after silhouetting, whereas Bird 5 (B_5) is the back faced standing peacock that measures 4"x 4" when drawn on paper. Bird 6 (B_6) is the peacock sitting with side face with a measure of 3.5" x 3.5" when illustrated. Similarly, Bird 7 (B_7) is the open winged swan which measures 3"x 3.5" when

Table 1. Description of selected converted bird motifs from heritage carvings

Sl. No.	Code	Description	Size on conversion (inches)
1	B_1	Bird 1 is the peacock with rider	4"x 4"
2	B_2	Bird 2 is the side faced peacock	3"x 4.2"
3	B_3	Bird 3 is the side faced peacock with opened wings	3" x 4.5"
4	B_4	Bird 4 is the back faced peacock	4" x 4"
5	B_5	Bird 5 is the back faced standing peacock	4"x 4"
6	B_6	Bird 6 is the peacock sitting with side face	3.5" x 3.5"
7	B_7	Bird 7 is the open winged swan	3"x 3.5"
8	B_8	Bird 8 is the peacock with opened wing	3"x 3.5"
9	B_9	Bird 9 is the twin peacocks facing each other	3.5"x 3.5"
10	B_{10}	Bird 10 is the twin peacocks sitting on pot	4"x 2.5"

Table 2. Opinion of the respondents for resemblance of the Computer Aided Embroidery bird heritage motifs with Pattadakallu carvings

N= 50

Sl.No	Bird motifs	Resemblance					
		Outline stitches			Filling stitches		
		Partially	Completely	WMS	Partially	Completely	WMS
1.	B_1	14(28.00)	36(72.00)	1.72	6(12.00)	44(88.00)	1.88
2.	B_2	16(32.00)	34(68.00)	1.68	15(30.00)	35(70.00)	1.70
3.	B_3	7(14.00)	43(86.00)	1.86	4(8.00)	43(86.00)	1.92
4.	B_4	17(34.00)	33(66.00)	1.66	7(14.00)	43(86.00)	1.86
5.	B_5	25(50.00)	25(50.00)	1.5	11(22.00)	39(78.00)	1.78
6.	B_6	4(14.00)	46(92.00)	1.92	7(14.00)	46(92.00)	1.86
7.	B_7	20(40.00)	30(60.00)	1.6	13(26.00)	37(74.00)	1.74
8.	B_8	16(32.00)	34(68.00)	1.68	13(26.00)	37(74.00)	1.74
9.	B_9	10(20.00)	40(80.00)	1.8	4(8.00)	46(92.00)	1.92
10.	B_{10}	9(18.00)	41(82.00)	1.82	11(22.00)	39(78.00)	1.78

Figure in parentheses indicate percentage, WMS= Weighted Mean Score

Paired t- test

Bird	Outline stitches (Mean ± SD)	Filling stitches (Mean ± SD)	t value
	1.72 ± 0.12	1.81 ± 0.07	2.78**

** Significant at 0.01 level of significance

Plate 1. Computer aided embroidery of heritage motifs

Sl. No	Carvings	Extracted motifs	Digitized outline motifs	Digitized filling motifs	Digitized outline stitches	Digitized filling stitches
B_1						
B_2						
B_3						
B_4						
B_5						
B_6						
B_7						
B_8						
B_9						
B_{10}						

represented on sheet. Bird 8 (B_8) is the peacock with opened wing measuring 3"x 3.5" after sketching. Bird 9 (B_9), twin peacocks facing each other that measures 3.5"x 3.5" when half repeat was sketched and Bird 10 (B_{10}) is the twin peacocks sitting on pot with measurement of 4"x 2.5" while half repeat was illustrated on paper. Plate 1 depicts the bird carvings and their respective converted motifs. Bird 1 (B_1) is the peacock with rider has dimension of 4"x 4" when converted into drawing. Bird 2 (B_2) is the side faced peacock that measures 3"x 4.2" after making outline on the sheet and Bird 3 (B_3) is the side faced peacock with opened wings measuring 3" x 4.5" after transformation into sketch. Bird 4 (B_4) is the back faced peacock with dimension of 4" x 4" after silhouetting, whereas Bird 5 (B_5) is the back faced standing peacock that measures 4"x 4" when drawn on paper. Bird 6 (B_6) is the peacock sitting with side face with a measure of 3.5" x 3.5" when illustrated. Similarly, Bird 7 (B_7) is the open winged swan which measures 3"x 3.5" when represented on sheet. Bird 8 (B_8) is the peacock with opened wing measuring 3"x 3.5" after sketching. Bird 9 (B_9), twin peacocks facing each other that measures 3.5"x 3.5" when half repeat was sketched and Bird 10 (B_{10}) is the twin peacocks sitting on pot with measurement of 4"x 2.5" while half repeat was illustrated on paper.

Opinion of the respondents for resemblance of the computer aided embroidery bird heritage motifs with Pattadakallu carvings

Table 2 shows that the heritage bird motifs with outline stitches and with filling stitches exhibited complete resemblance. Majority of the respondents (92.00 %) opined that the heritage motif B_6 with outline highly resembled the carved image followed by B_3 (86.00 %), B_{10} (82.00 %) and B_9 (80.00 %) in the outline motifs. While heritage motifs B_6 and B_9 (92.00 %, each) with filling stitch had high resemblance with the carved images, followed by B_1 (88.00 %), B_3 and B_4 (86.00 %, each). Correspondingly in a study conducted by Kuamari and Jacob (2004), it was seen that the occupational toy motifs printed on sarees were accepted as they resembled the miniature form of human figures. However, there was a significant difference for the opinion of the respondents for resemblance of the heritage motifs with outline and with filling stitches. Majority of the respondents opined that the bird heritage motifs with the outline and with filling stitches completely resembled with the Pattadakallu carvings. The motifs were found to be realistic, accurate and proportionate with the original heritage carvings and hence resemblance was accepted.

Similarly it was found in a study by Vastrad (2003) that the consumers preferred all the computerized buttas since they resembled hand embroidered motifs. And it was also stated that the $\div^2$ values for the opinion for the resemblance of computerized motifs to be highly significant. Byadgi (2009) in her study revealed that most of the working women and housewives agreed that the digitized patterns of Gujarat embroidery wholly resembled the hand embroidered motifs and later it was also found to be significant for the chi-square values indicating better resemblance with the hand embroidery.

Table 3. Opinion of the respondents for preference of computer aided embroidery (CAE) bird heritage motifs for textiles

N= 50

Sl. No.	Motifs	Ratings										
		Outline stitches						Filling stitches				
		E	VG	G	F	A	WMS	E	VG	G	F	A	WMS
1	B_1	27(54.00)	12(24)	10(20.00)	1(2.00)	-	4.30	34(68.00)	13(26.00)	3(6.00)	-	-	4.62
2	B_2	15(30.00)	23(46)	7(14.00)	4(8.00)	1(2.00)	3.94	14(28.00)	21(42.00)	13(26.00)	2(4.00)	-	3.94
3	B_3	10(20.00)	17(34.00)	20(40.00)	3(6.00)	-	3.68	14(28.00)	17(34.00)	18(36.00)	1(2.00)	-	3.88
4	B_4	11(22.00)	14(28)	15(30.00)	10(20.00)	-	3.52	13(26.00)	12(24.00)	15(30.00)	10(20.00)	-	3.56
5	B_5	14(28.00)	17(34)	13(26.00)	6(12.00)	-	3.78	18(36.00)	14(28.00)	14(28.00)	4(8.00)	-	3.92
6	B_6	32(64.00)	14(28)	3(6.00)	1(2.00)	-	4.54	32(64.00)	15(30.00)	3(6.00)	-	-	4.58
7	B_7	5(10.00)	17(34)	16(32.00)	8(16.00)	4(8.00)	3.22	8(16.00)	9(18.00)	24(48.00)	7(14.00)	2(4.00)	3.28
8	B_8	9(18.00)	16(32.00)	18(36.00)	7(14.00)	-	3.54	16(32.00)	22(44.00)	7(14.00)	5(10.00)	-	3.98
9	B_9	16(32.00)	25(50.00)	6(12.00)	3(6.00)	-	4.08	25(50.00)	16(32.00)	8(16.00)	-	1(2.00)	4.28
10	B_{10}	13(26.00)	24(48.00)	11(22.00)	2(4.00)	-	3.96	12(24.00)	26(52.00)	9(18.00)	3(6.00)	-	3.94

Figure in the parenthesis indicate percentage

E- Excellent, VG- Very Good, G- Good, F- Fair, A- Average

WMS= Weighted Mean Score

Paired t- test

Bird	Outline (Mean±SD)	Filling (Mean±SD)	t value
	3.85± 0.39	3.99±0.41	3.00**

** Significant at 0.01 level of significance

Opinion of the respondents for preference of computer aided embroidery (CAE) bird heritage motifs for textiles

The results presented in Table 3 exhibits the preferences of the digital embroidered bird motifs on textiles. The embroidered heritage motif B_6 (WMS = 4.54) was highly scored followed by B_1 (WMS = 4.30), B_9 (WMS = 4.08) and B_{10} (WMS = 3.96) for outline due to sharpness, clarity and proportion of motifs. Heritage motif B_1 (WMS = 4.62) received high score for filling stitches followed by B_6 (WMS = 4.58), B_9 (WMS = 4.28) and B_8 (WMS = 3.98). The statistical analysis showed significant difference among the outline and filling stitches group. Respondents preferred filling stitches more than outline for the textural effect produced that made motifs more similar to the carvings. The bird heritage motif B_1 with outline and filling stitches followed by B_6 with filling were preferred by a majority of respondents. The motifs were more preferred as they gave traditional and aesthetic appeal.

Birds have appeared in mythology and religion from time to time. Peacock is the national bird, symbol of immortality, courtship and fertility. It signifies the completeness of being women. It is believed to carry a sense of energy that comes from its renewal of feathers every year (Kapila, 2017). Peacock represents war and immortality through its association with the god Kumara and is also connected with the fertility and love. With the exotic colouring and elaborate tail features of the male peacock, it was popular motif for saree end pieces. Therefore, among the many form of birds especially peacocks, the peacock with the rider (B_1) and the stylized peacock (B_6) were preferred by majority of the respondents.

Conclusion

It was concluded from the study that Pattadakallu heritage carvings are great source of inspiration for the textile designers. The developed computer aided embroidered motifs resembled the heritage carvings and were appreciated by the respondents and willing to accept these motifs for textile designing that could be applied successfully for the development of new products to fulfil the changing demands of consumers.

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