CLASSIC COMMON FASTENERS FOR TEXTILES AS CONNECTIONS IN ELECTRONICS ON TEXTILES

Review scientific paper
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ABSTRACT: *Classic common fasteners in textiles can be good as connections in electronics on textiles. They are mostly made of electrical conductors or covered with an electrical conductor. They can also be insulators in the form of some clips or magnets. They have in common that they are not specially made for electronics, but are common textile accessories.*

Keywords: *Electronics on textiles, classic common fasteners in textiles, snap on button, conductive hook and loop, zip, magnets, clips.*

KLASIČNI UOBIČAJENI ELEMENTI ZA KOPČANJE KOD TEKSTILA KAO KONEKCIJE U ELEKTRONICI NA TEKSTILU

APSTRAKT: *Klasični uobičajeni elementi za kopčanje kod tekstila mogu da budu dobri kao konekcije u elektronici na tekstilu. Uglavnom su od električnih provodnika ili prekrivene električnim provodnikom. Mogu biti i izolatori u obliku nekih štipaljki ili magneta. Zajedničko im je da nisu posebno pravljene za elektroniku nego su uobičajeni tekstilni dodaci.*

Ključne reči: *Elektronika na tekstilu, klasični uobičajeni elementi za kopčanje kod tekstila, drikeri, provodna čičak traka, rajsferšlus, magneti, štipaljke.*

1. INTRODUCTION

Electronics on textiles is becoming more and more interesting and applicable. Connectors are one of the most important components [1-4]. Clip-on connectors for electronics, from DC to microwave, are sometimes unwieldy for clothing and require modification or special fabrication. For this reason, classic fasteners in textiles are also used. They are easy to obtain and go well with textiles, both functionally and in appearance. One example is

shown in Fig. 1 [3] showing the application of embroidered vias, folded strips of metalized fabric, eyelets, and snap-on buttons.
Classic fasteners in textiles that are easy to put on and easy to take off will be dealt with here. This ensures changeability and modularity (interchangeable parts) which is often important in clothing. In doing so, we insist on the least possible damage to textiles and thus sustainability, which is so important today.

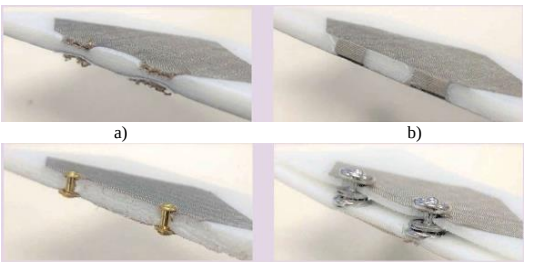


Figure 1: Realization of antennas with metalized fabric in [3]. The four considered shorting strategies: (a) embroidered vias, (b) folded strips of metalized fabric, (c) eyelets, and (d) snap-on buttons

Some specific classic common fasteners in textiles will be considered here: snap on button [3,5-11], conductive hook and loop (Velcro) [12-19], zip [15,20-23], magnets [24-28] and clips [14].

2. SNAP ON BUTTON

Snap on button enables easy putting on and taking off of textile parts and other modules. One striking example is shown in Fig. 2 [5].

Figure 2: Putting the module on the prepared piece of clothing using snap on button [5]

One drawback may be the need to drill the textile when installing both the male and female parts. However, there is a way to fix the parts with self-adhesive conductive tape without drilling. Such a case is shown in Fig. 3 [6]. It is shown that the snap on button can be used down to lower microwave frequencies.

Figure 3: Fixed snap on button with self-adhesive conductive tape without drilling [6]

3. CONDUCTIVE HOOK AND LOOP

Conductive Hook and Loop, or "Velcro" according to the company that produces them, is also good for easy putting on and taking off of textile parts and other modules. One set of hook and loop is shown in Fig. 4.

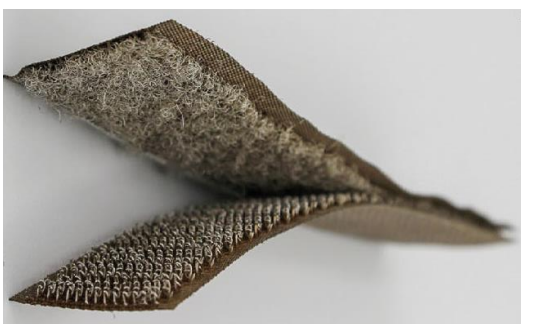


Figure 4: Silver-plated conductive hook and loop [2]

They must also be fixed to the textile, glued or sewn, at least one half of the structure. One application where only one side is fixed is given in Fig. 5 [15] and Fig 6 [17].
Hook and loop systems can be used as a connector at low microwave frequencies. Reusable connector allows the electronics to be removed from a textile for security or other reasons, such as washing [12].

VELCRO-ON VELCRO-OFF

Figure 5: The effective way of using conductive hook and loop to interchange a textile slot patch antenna [15]

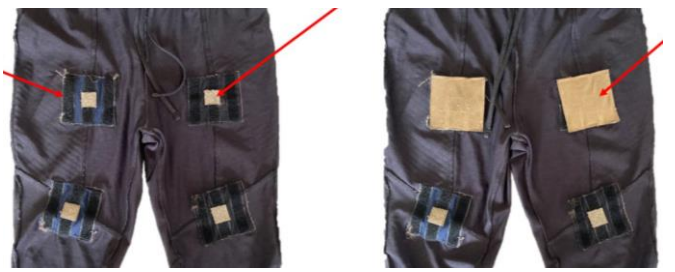


Figure 6: Conductive hook and loop connecting the electrode to the outside of the pants [17]

4. ZIP

The use of zip connectors has already been presented before. They were especially used as switches, Fig. 7, [20,21]. The application for antennas is also interesting, Fig.8 [23] and Fig. 9 [15].

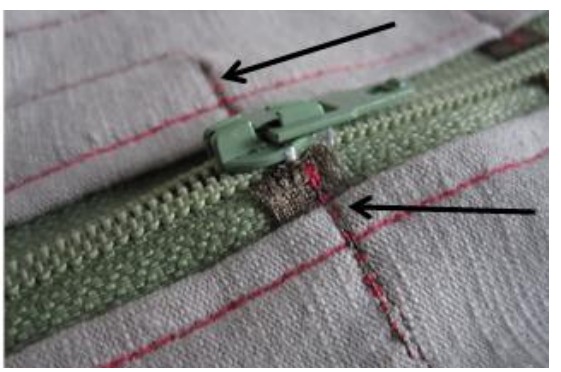
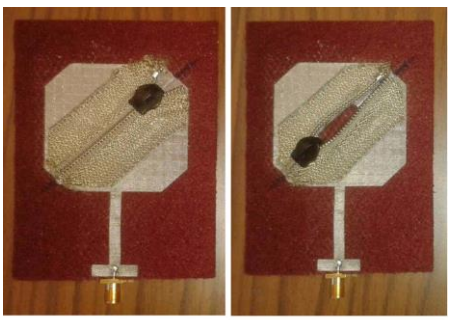


Figure 7: Switching via zip via conductive threads (arrows) [20,21]

Figure 8: Zip as an antenna [23]



ZIP-CLOSE ZIP-OPEN

Figure 9: The effective way of using conductive zip to interchange a textile slot patch antenna [15]

5. MAGNETS

Magnets can generally be used to apply pressure to conductive surfaces to make them adhere better and thus have better contact [24-27]. The problem is that on the other side there must be a magnet or something that the magnet attracts, Fig.10 [26].

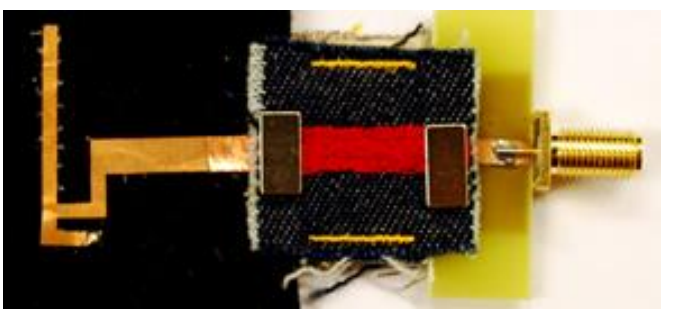


Figure 10: Magnets exert pressure on conductive surfaces

On the other side is also a magnet or something that a magnet attracts [26]

Another logical application is with electrically conductive magnetic snaps [28], Fig. 11.

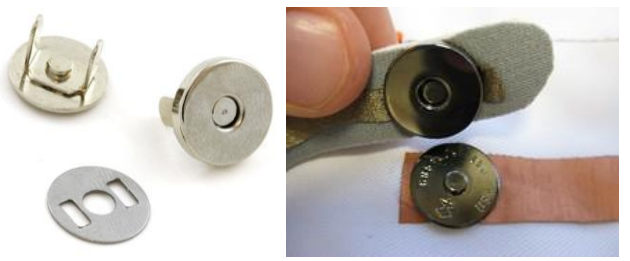


Figure 11: Conductive magnetic snaps to make contact [28]

6. CLIPS

Clips can also be used to apply pressure to conductive surfaces to make them adhere better and thus have better contact [14], Fig. 12.

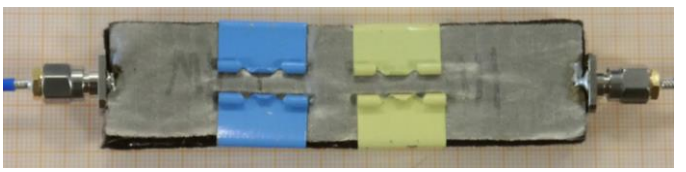


Figure 12: Clips apply pressure to the conductive surfaces to better adhere and thus have better contact [14]

7. CONCLUSION

Classic common fasteners in textiles are briefly presented as connectors in electronics on textiles. Examples in the literature show that this application can be effective even down to lower microwave frequencies. The emphasis was on the least potential damage to the textile and thus on sustainability.

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