SEMINAR

文獻題目：EXPLORING COMPUTATIONAL MATERIALS FOR FASHION: RECOMMENDATIONS FOR DESIGNING FASHIONABLE WEARABLES

文獻作者：ÇAğLAR GENç , OğUZ TURAN BURUK , SEJDA İNAL YıLMAZ , KEMAL CAN , OğUZHAN ÖZCAN

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報告者： 孟 昕　　指導教授：許素朱　　報告時間：2020.05.26　　國立清華大學 跨院藝術與科技組

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論文摘要

摘要

時尚正在成為可穿戴設備的必然組成部分。但是目前尚不清楚計算材料和時裝設計之間的交叉碰撞如何為不熟悉該概念的時裝設計師提供指導，探索這個領域對於為這類人群提供可行的指導很重要。

因此，我們通過設計方法進行了三項研究：

（1）一個由14名服裝設計和6名工程專業學生組成的設計工作坊，他們在其中通過探索計算和時尚材料創作了7件作品；

（2）對工作坊的成果進行分析以提取有關計算材料的主題，將主題轉化為初步的設計主題；

（3）對來自不同國家/地區的10位可穿戴設計專家進行訪談，將主題進一步完善，形成建議。

最終為設計師制定了五項設計建議以及他們應遵循的應用策略。具體建議如下：

（1）通過增加織物來提供資訊；（2）定義環境和服裝之間的雙向交互；（3）控制服裝的形式；

（4）裝飾表面（5）用計算材料支持服裝的三維形狀。

論文探討之主旨

（1）為希望將技術與科技等多媒體組件納入其設計中的時裝設計師提供啟發和指導;

(2）對於有經驗的可穿戴設計師評估其過往作品及現有的作品，能有更新更高的升級空間和替代途徑。

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方法：

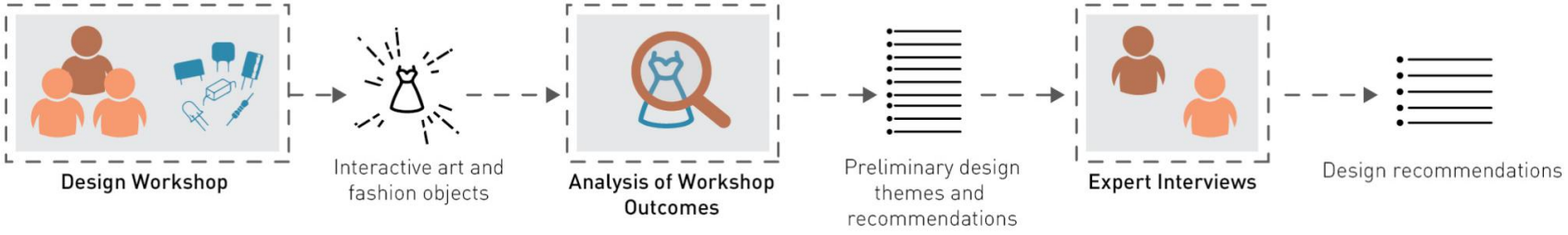


Figure 1. Steps of our methodology.

Design Workshop 參與者：

服裝設計專業的學生中有12人是三年級和四年級的學生，其餘2人是研究生；

6名工科學生是三年級和四年級的本科生。

在整個研討會中，工程專業的學生被視為技術顧問和執行者，而設計專業的學生則負責創意的產生。

Design Workshop 任務：

1.設計“**藝術品**”； 2.轉移至設計“**時尚物品**”。

論文論述 作品 1

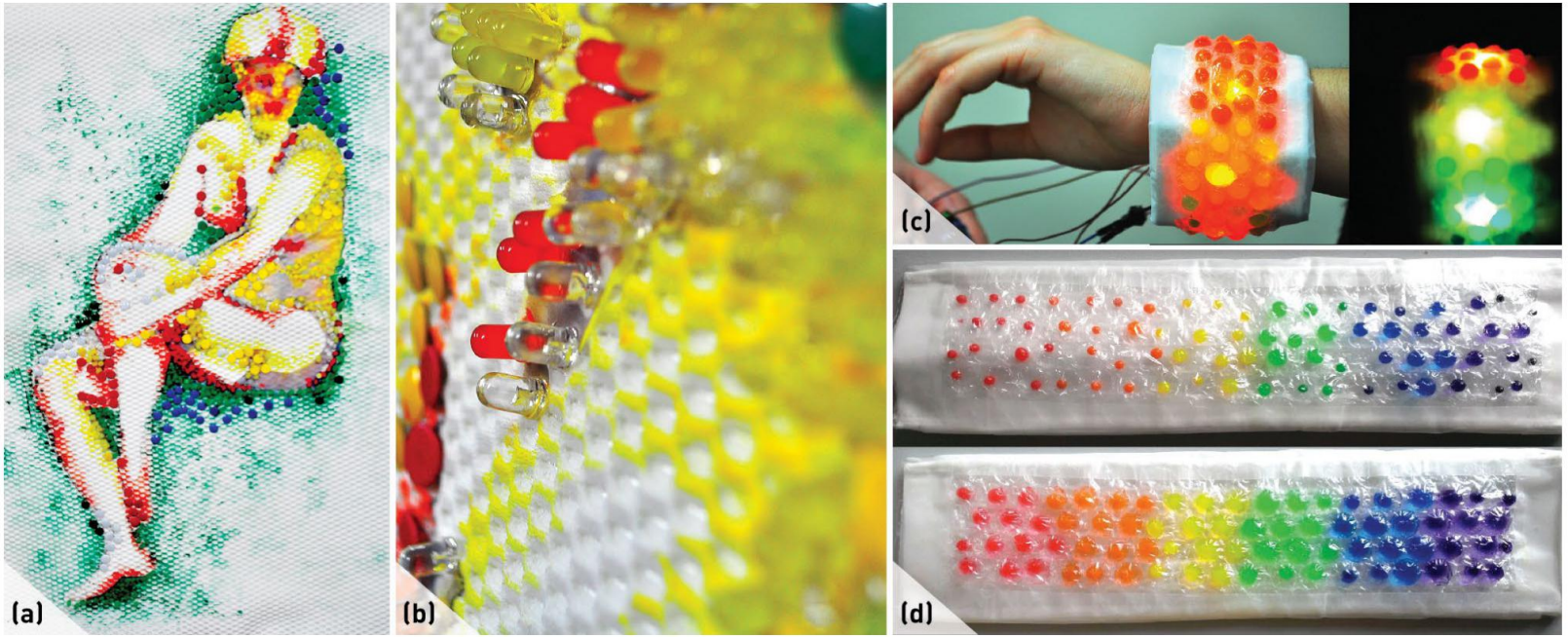


Figure 2. Water Drop Bracelet (designed by Tansu Akın) (a) Art Object, (b) Detail of the Art Object, (c) Water Drop Bracelet and Interaction with Music, (d) Water Interaction with Superabsorbent Polymers.

水滴手鐲（圖2）是一種配件，其樣式設計為在雨天會改變，具體取決於雨滴與手鐲接觸的位置。它還可以回應聲音，並通過LED來創建不同的圖案。設計師通過將與水接觸後會膨脹的**超吸收性聚合物**放入氣泡包裝紙中，從而創建了一種新的複合材料（儘管不是計算性的）。然後，設計專業的學生將水注入氣泡包裝的每個單元內，並在這些氣泡後面放置一個LED條，以創建所需的折射光外觀。
這件作品的設計師創作了Henri Edmond Cross的作品Seated Nude的複製品，該作品與點彩派相關，啟發了其LED的形式。

論文論述


亨利·埃德蒙·克罗斯
Henri-Edmond Cross
(1856-1910)
后印象派艺术家亨利·埃德蒙·克罗斯(Henri-Edmond Cross)专题网站
国籍
Nationality
法国
流派
Art Movement
后印象派
领域
Art field
油画
版画

論文論述 作品 2

Figure 3. Reflect the Night (designed by Muhammed İloğlu & Yağmur Gevrek) (a) Art object, (b) Sketches of Reflect the Night showing open and closed poncho states, (c) Reflect the Night under normal and intense light.

Reflect the Night（圖3）既是晚禮服又是日禮服，通過計算禮服的狀態與變化來演繹不同的視覺風格。

衣服的領口附近有一個包裹的部分，當通過觸摸啟動時，該包裹的部分面料會在伺服馬達的幫助下掉落，變成平坦的雨披。

面料下方有反光織物，可以在有強光並黑暗的時候顯現閃亮的圖案，適合跳舞的場合營造特殊效果。

另外，服裝上安裝有LED，通過舞蹈和音樂可以啟動LED，並在黑暗中有閃亮的服裝外觀效果。

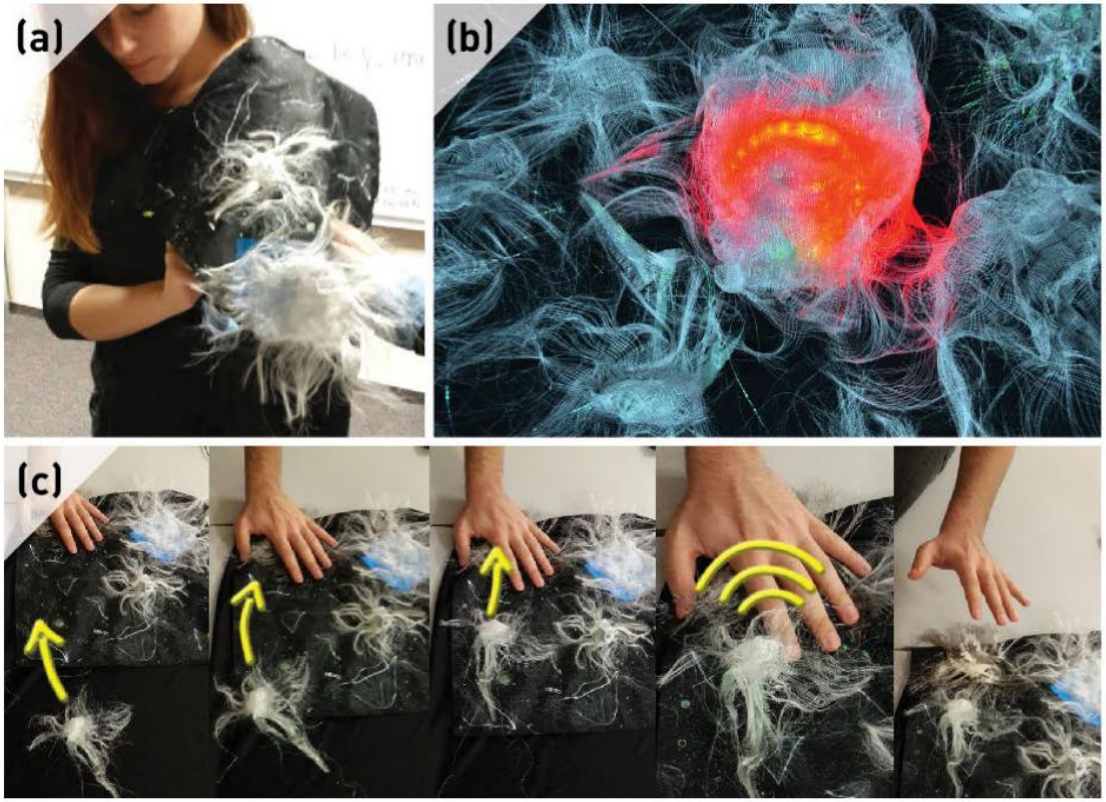
在藝術品的設計過程中，設計師發現將反光織物和幾層紡織品與光結合使用，可以產生所需的波浪狀和閃亮外觀。如圖3-a所示藝術品的設計，也因此最終在時尚項目設計中使用了相同的材料組合（圖3-c）。

論文論述 作品 3

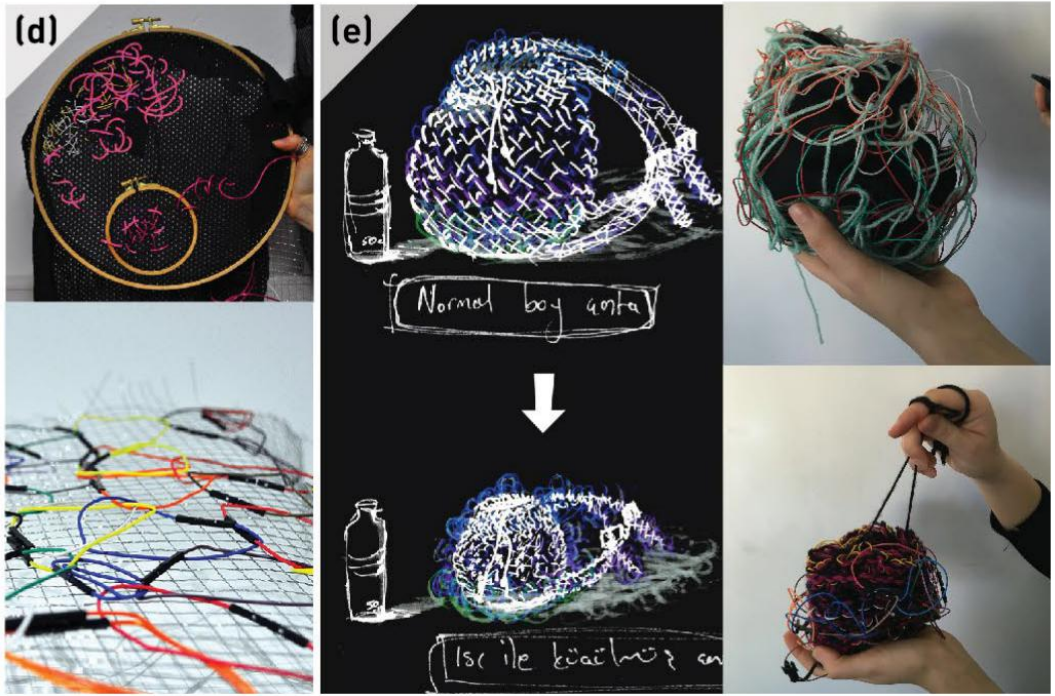
水母 是一種具有觸摸sensor的服裝，對外部觸摸產生反應，從而阻止觸摸者，來增強自我表達：“請勿觸摸我！”。

在第一階段，設計師通過撕裂導電衣服來瞭解其纖維結構，這他們想到了水母的外形和防禦效果。

在第二部分中，他們確定了這種水母模式的防禦功能。他們希望可以使用裝飾有微型機器人的衣服可以在服裝周圍像導電纖維這樣移動。



論文論述 作品 4



電纜袋 是一個袋子，它可以根據容納在裡面東西的多少而變大或變小。袋子由羊毛，電纜和EL線編織而成。

設計師還推測在編織結構中使用形狀記憶合金可以直接控制袋子的尺寸。

在第一階段，電纜袋的設計師發現電纜可以像鏈子一樣交織在一起，並且還可以使用正確的工具將它們更好地編織在一起。

論文論述 作品 5

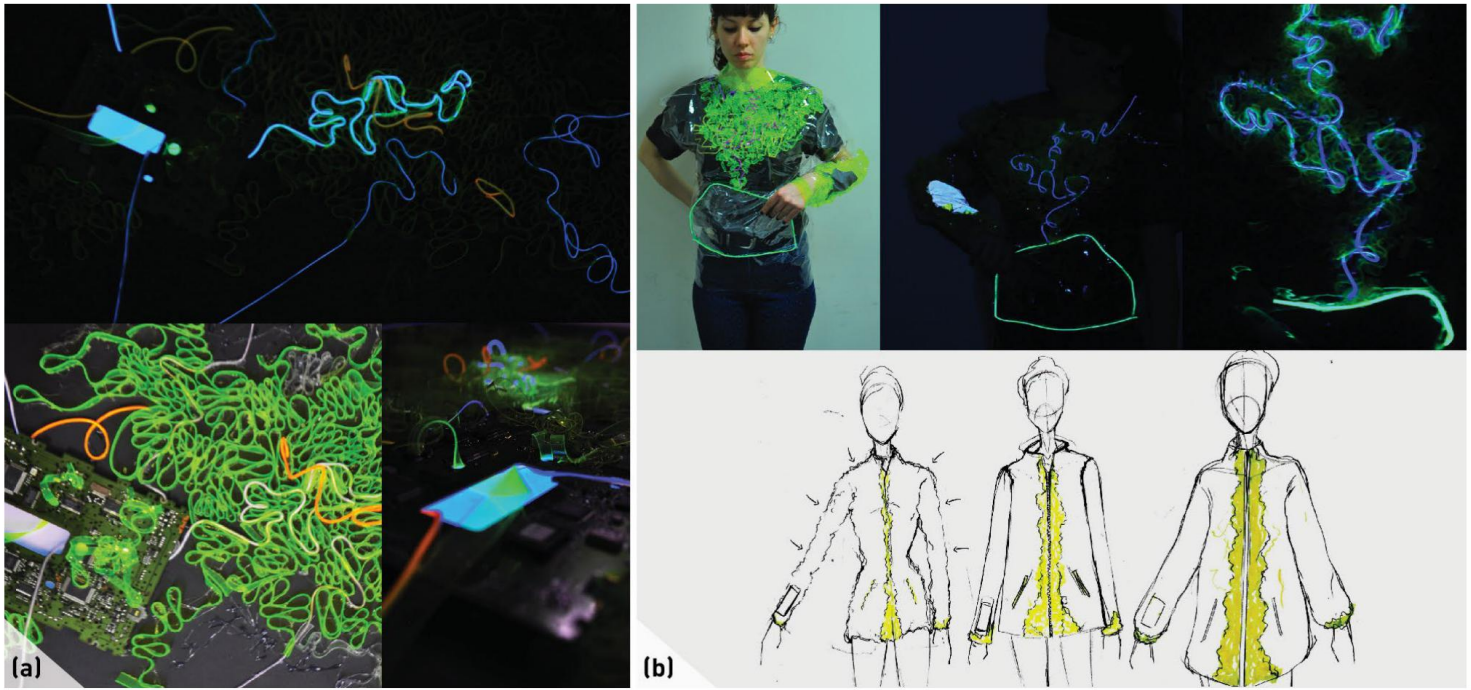


Figure 5. Panic Run (designed by Cemre Eren, İrem Öğütçü & Cansın Gürler) (a) Art object, (b) Prototype and sketches of Panic Run.

Panic Run（圖5）是一種慢跑雨衣，可根據穿著者的速度進行收緊和放鬆。外套的口袋與脖子周圍有光線裝飾。Panic Run的黃色曲折部分旨在反射和散射從EL導線發出的光。

在第一階段的藝術品是圍繞EL線的不規則形狀、波浪形狀以及晶片、機械零件的結構形式進行裝飾構造，這種線的混亂和城市化（如設計師形容）激發了他們設計一件在城市慢跑的雨衣。此外，在最終設計的某些部分中使用了第一階段的這種曲折圖案。

論文論述 作品 6

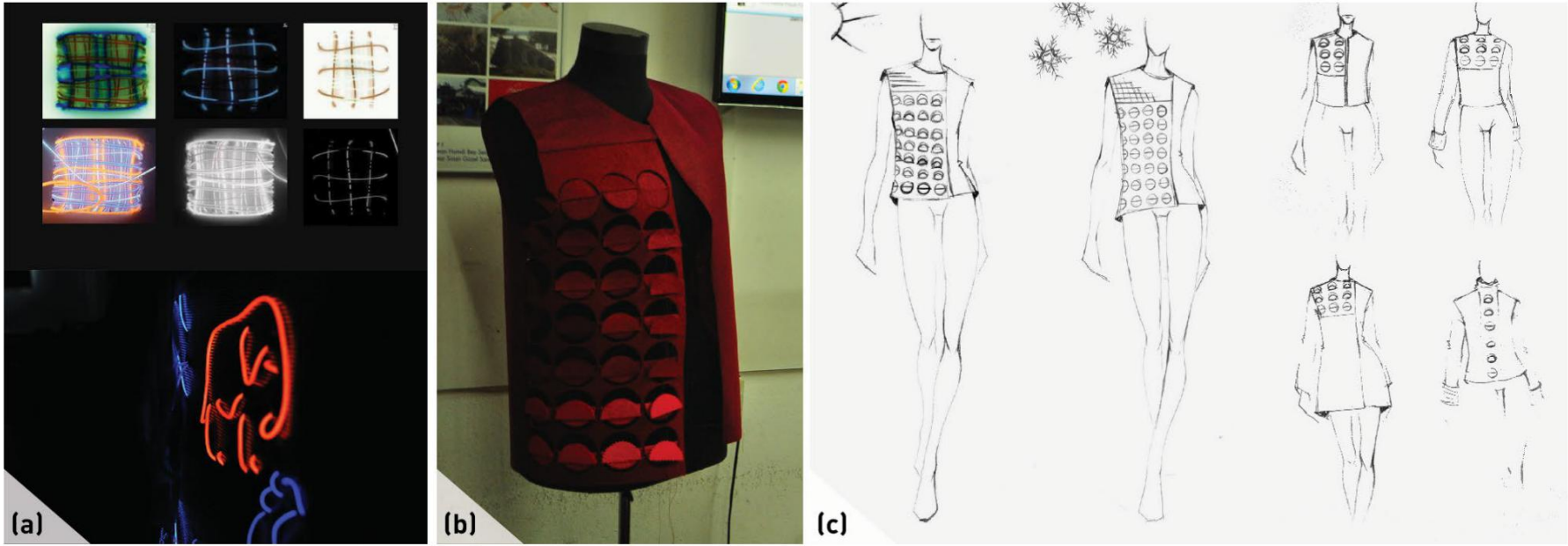


Figure 6. Reform Season (designed by Elif Balta & Selin Topuz)
(a) Art Objects, (b) Prototype of Reform Season, (c) Sketches showing alternatives.

Reform Season（圖6）是一種夾克，可以穿著於不同的溫度條件下，例如室內/室外，溫暖/寒冷的天氣，夾克表面的洞洞會與外界溫度發生反應而形成不同的鏤空效果，或半開，或閉合。

設計師第一階段中探索了光的不同用途，在第二部分中則是沒有承接之前的研究。

論文論述 作品 7

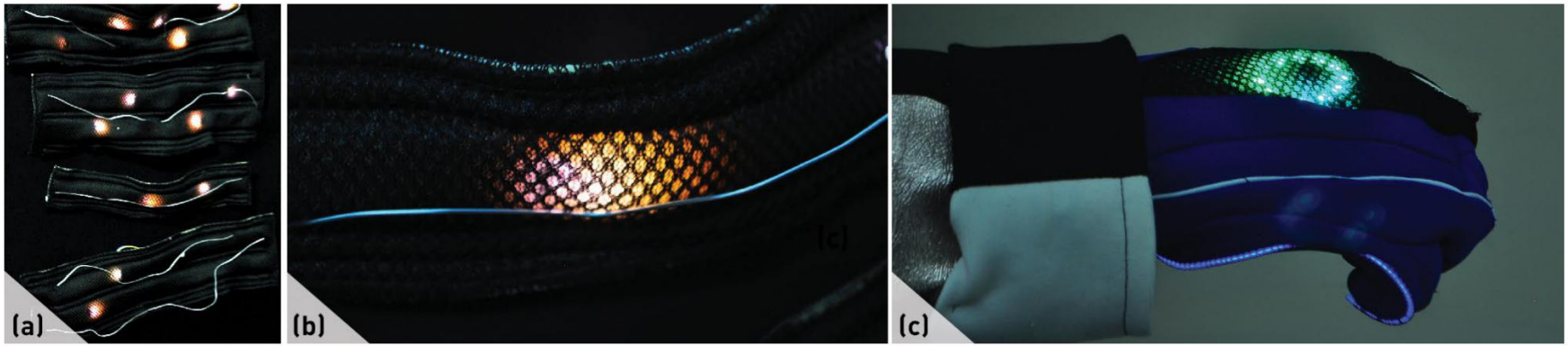


Figure 7. Bicycle Glow (designed by Seydullah Yılmaz, Melis Kabail & Çağla Demirkan)
(a) Art object, (b) Detail of the art object, (c) Prototype of the Bicycle Glow.

Bicycle Glow 是一種手套，通過表面提供燈光的方向幫助騎自行車的人在城市中導航。

手套的邊緣處也有燈，以增加可見度，尤其是在轉彎時。該專案的設計師探索了紡織品與輕便之間的關係。

他們在第一階段的研究產生了一種分層的紋理紡織品，當光源置於其後時，其內層就會露出來。

在第二階段的工作中，將相同的模式轉移到最終設計的服飾品中。

論文論述

將workshop項目進行分析後得到的初步結果

Table 1. Sub-categories and design themes emerged as a result of analyzing the projects through fashion construction techniques and computational composites frameworks.

Sub-categories	Design themes	Description of the theme	Examples from the design workshop
Ambient Interaction: Bi-directional interaction among the garment, wearer and its surroundings	Contextual triggers	Using the contextual inputs, such as weather temperature, as activation elements for the interactive garments.	• Pace of the runner changing silhouette of the Panic Run • Activation of lights as the wearer dances in Reflect the Night • Interaction with rain drops in Water Drop Bracelet • Pattern change due to the temperature of the environment in Reform Season
	Extending the expressions of the garments to the environment	Using light as a design element which can create tracks and patterns in the environment to connect the garment's expression to the surroundings physically.	• Projection of light through the netted fabric to the walls and the other surroundings in Reflect the Night and the Bicycle Glow
Surface Alteration: Dynamic modifications of qualities of fabric surface via components of computational materials such light or controllable parts	Dynamic surface treatments with computational materials	Integrating computational materials such as lights or movable parts on the surface of the fabric that can be computed to create dynamic alterations.	• Making fabric patterns visible by placing light behind the netted fabrics in Bicycle Glow and Reflect the Night • Change of patterns with light due to the environmental sound in Water Drop Bracelet • Altering the pleats on the fabric with shape-changing materials in Panic Run and Cable Bag
	Embellishing with Computational Materials	Using computational materials as a part of the visual form as embellishments and/or computing the traditional embellishments with computational materials	• Utilization of retro-reflector pieces for projection in Panic Run similar to applique technique • Micro-robotic attachments moving on Jellyfish • Computable cut-outs in Reform Season
Modifying 3D Form: Formgiving and dynamically altering the form and the shape with the use of computational materials	Conveying information through soft materials such as fabrics, textiles and cloth	Defining temporal behaviors of the features of the clothes, fabrics, textiles such as the pattern, form; for giving information	• "Stay away!" message by the moving robotic jellyfish patterns towards touched area in Jellyfish • Navigation information via temporal behavior of light through netted fabric and the bindings in Bicycle Glow • Temperature information via the cut-outs opening or closing in Reform Season
	Changing silhouettes of the garments by controlling the fabrics with computational materials	With the help of computational materials, altering the volume of garments for changing the silhouettes	• Controlling the form of the fabrics with servo-motors to alter the silhouette of Reflect the Night from poncho to clustered state • Loosening or expanding the predetermined pleats by implementing shape-changing materials in Cable Bag and Panic Run
	Using hard computational materials to create structures for the garment	Benefiting the hard or elastic material qualities of electronic components by incorporating them in the garment or fabric construction techniques to support the three-dimensional shape of the garments.	• Creating a rigid and an elastic structure by weaving cables in Cable Bag • Using the hard structure of EL-wires to create a binding in Bicycle Glow
Material Production: Creating new interactive fabric surfaces or using computational materials as base materials for fabric construction	Weaving computational materials	Using computational materials in the fabric structures for increasing the expressiveness of the object.	• Utilizing shape-changing fibers to gradually change the fittingness of the coat in Panic Run • Aesthetic of the form created by the dangling cables in Cable Bag
	Creating non-woven computational composites	Experimenting with computational materials in a way that can inspire the creation of interactive fabric surfaces with non-computational materials	• From inspiration of the form of single LEDs, creation of a new fashionable and interactive surface material by combining superabsorbent polymers and a bubble wrap in Water Drop Bracelet

4 個子類別：環境交互、表面更改、修改3D形態、材料生產.

9 個主題描述

論文論述 expert interviews

Table 2. Background of the wearable experts. Mean approx. experience of the participants was 7.05 years.

	Title	Exp.	Background
Bruna Goveia da Rocha	Researcher/ Industrial Designer	5 years	Specializes in wearable technology and interaction design. She is currently a doctoral candidate at TU Eindhoven. Also, a freelance wearable designer.
Camille Baker	Artist/Researcher/ Curator/Lecturer	16 years	Reader at the University for Creative Arts, Epsom in Interface and Interaction, and artistic researcher in the School of Communication Design. She has presented, exhibited, and performed internationally, and her wearable research has been awarded by many institutions (incl. The European Commission - Horizon 2020)
Yulia Silina	Researcher/Jewelry Designer/Artist	5 years	PhD candidate at Queen Mary University of London. Specializes in social wearables. Her works have been selected for many international exhibitions.
Marina Toeters	Researcher/ Lecturer/Fashion Tech. Designer	10 years	Working freelance for Philips Research, Holst Centre, and others. Conducts research and educational activities at Utrecht School of Art, Saxion University, Eindhoven University, and others.
Melissa Coleman	Artist/Curator/ Lecturer	13 years	Curator at "Pretty Smart Textiles" in Holland, Denmark, Austria, and Belgium. Coach at Wearable Senses at TU Eindhoven (2010-2012). She is also an artist and co-host of the "e-stitches" meetup in London and (previously) of "the e-textile workspace" in Rotterdam
Afra Sonmez	Wearable Tech. Designer	3.5 years	Has organized and moderated many workshops on E-textiles and working with fashion designers.
Bushra Burge	Founder/Creative Director/Multimedia Artist	7 years	Founder of an award-winning creative technology company. Most recent artistic and commercial projects have focused on immersive experiences, integrating VR and innovative sustainably made fashion-aesthetic wearables. Her work has been exhibited nationally and internationally
Ezra Cetin	Fashion Designer	5 years	Owns her own fashion brand. Co-creator of many wearable devices, including a collaboration with Intel.
Tuba Cetin	Fashion Designer	5 years	Owns her own fashion brand. Co-creator of many wearable devices, including a collaboration with Intel.
Jason Lin	Designer	1 year	Researches and develops wearable products for people with movement disorders.

10位具有可穿戴设备设计经验的該領域国际设计师和学者。

参与者中有五位是研究人员/教育工作者，另外五位是可穿戴设计领域的专业设计师/艺术家。

3

論文結論

論文結論　5點設計建議

1. Give Information through the Computational Augmentation of the Clothing

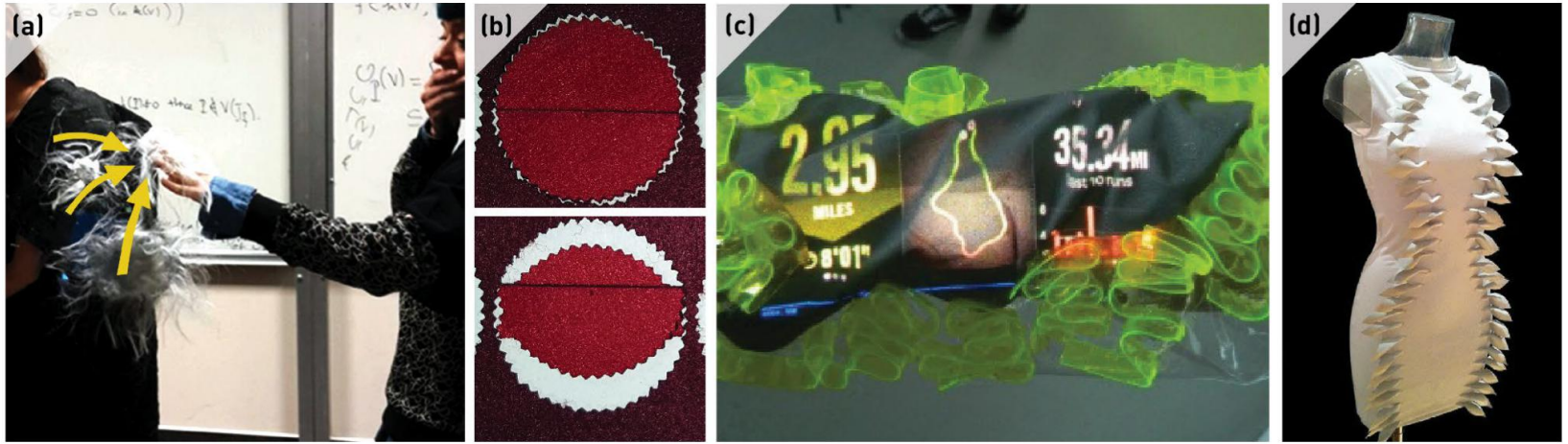


Figure 8. Examples for 1st recommendation

(a) Illustration of moving Jellyfish patterns conveying the information of “Stay Away!”, (b) Reform Season’s open and closed patterns providing information regarding temperature, (c) Direct information Interface of the Panic Run on the wearer’s arm, (d) Flutter (Profita et al., 2015) dress with winglets for displaying information to its wearer by heading towards the noises.

1.通過服裝計算增強提供的資訊

不受服裝上時尚或計算材料品質的限制，而是通過將計算材料的可控制性質與時尚審美能力相結合，定義提供資訊的多模式方式（為穿著者本人或向觀看者提供）服裝的材料和生產技術。

將計算材料的可控制特性與服裝的製作工藝相結合，可以通過增加服裝的語言來代表實際資訊和表達資訊。因此，該方法不僅指示計算材料的品質或相反地指示其品質，而是**通過分解這兩者的特徵並將它們重新合併來創建新的介質。**

論文結論

2. Define Bi-Directional Interaction between the Contexts and the Garments

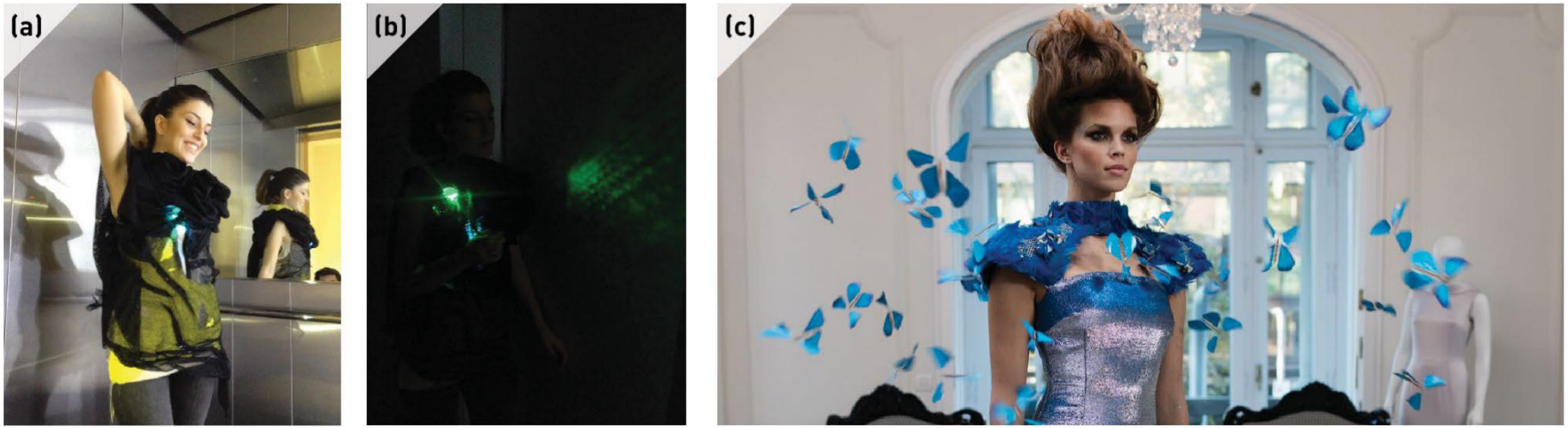


Figure 9. Examples for 2nd recommendation (a) Reflect the Night, activated LEDs via dance and music, (b) Reflect the Night, extended expression, (c) Butterfly Dress (Landau, 2014) with embellishments flying away.

2. 定义（環境）語境和服装之间的双向交互

在**“情境触发因素”**和**“将服装的表现形式扩展到环境中”**的设计主题中提到了指向该建议的证据。
计算材料的可控制和关联性质使服装能够在各种环境（即生理数据，环境数据，手势）中**获得的各种触发因素做出表达性响应，提供了环境影响服装的机会**（即周围的，其他人）。
服装的定义不再是與身体周围的紧密物理空间，与衣服的相互作用仅限于穿着或脱掉，拉开拉链或织物在环境条件下的磨损等。

論文結論

3. Control the Form of the Garments with Computational Materials

Figure 10. Examples for 3rd recommendation (a) Water Drop Bracelet, continuous changes in the patterns and interaction with light, (b) Monarch by Social Body Lab, OCAD University (Hartman, McConnell, Kourtoukov, Predko, & Colpitts-Campbell, 2015), altered the silhouette of the wearer via activated shoulder pads, (c) “Ebb” (Devendorf et al., 2016) textile display with computable patterns.

3. 用计算材料控制服装的形式

衣服不僅可以以靜态的方式設計，更可以以動态方式呈現。將傳統服裝面料與計算材料結合，通过**计算材料来控制传统构造**设计师可以进行一系列控制。可以**进行表面更改或进行完全转换以更改服装的外观。**在织物表面或或内部以及服装的整体轮廓提供一些受控的動態变化，可以獲得服装形式上的各種“表情”。

論文結論

4. Embellish Surfaces with Computational Materials

4. 用计算材料修饰表面

可以**将计算材料作为传统装饰的替代方法应用于织物表面**。
通过点缀来使织物的物理形式多样化。服装上电子元件可用于修饰织物表面，或者可以设计新的计算复合材料以在服装上产生动态修饰效果。

論文結論

5. Support the Three-Dimensional Shapes of the Garment via Computational Materials

5. 通过计算材料支持服装的三维形状

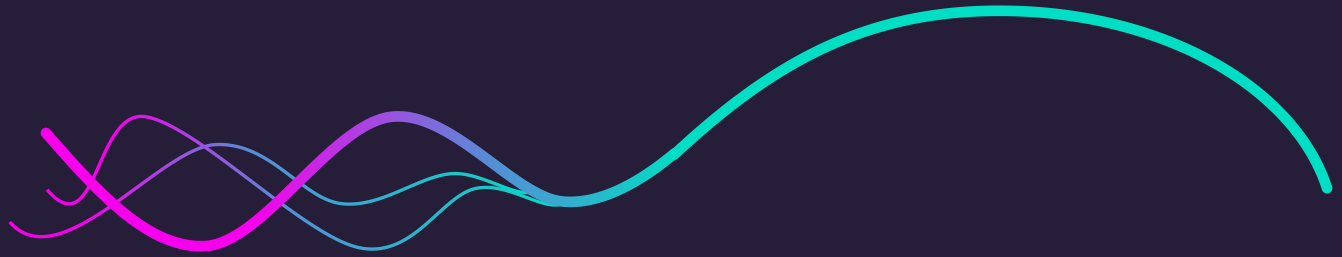
设计师在织物上使用塑料和金属内部结构，這種具有坚硬而坚固的主体材料可以支持服装的三维造型，而不仅仅是将它们隐藏在服装中。
“使用坚硬的计算材料来为服装创建结构”的设计主题促成了此建议。

Conclusion, Limitations & Further Work

以上建议对于希望将技术组件引入其设计但不熟悉它们的服装设计师来说，可作为指导和启发点。这些建议与以前的工作有所不同，对于设计人员在发现现有设计中时尚和计算材料的不同组合可能产生的结果时也很有用。

通过可分离的计算材料实现的处理方法可能会在可穿戴设计中创造可持续的实践意義。

对织物如何结合计算材料以创建可回收材料组合的探索对于可穿戴设计的可持续性可能是有价值的。通过向设计师介绍建议并要求他们考虑建议来设计可穿戴设备，从而实现建议的贡献與有效性。



4

個人心得

1

該領域的論文探索之角度

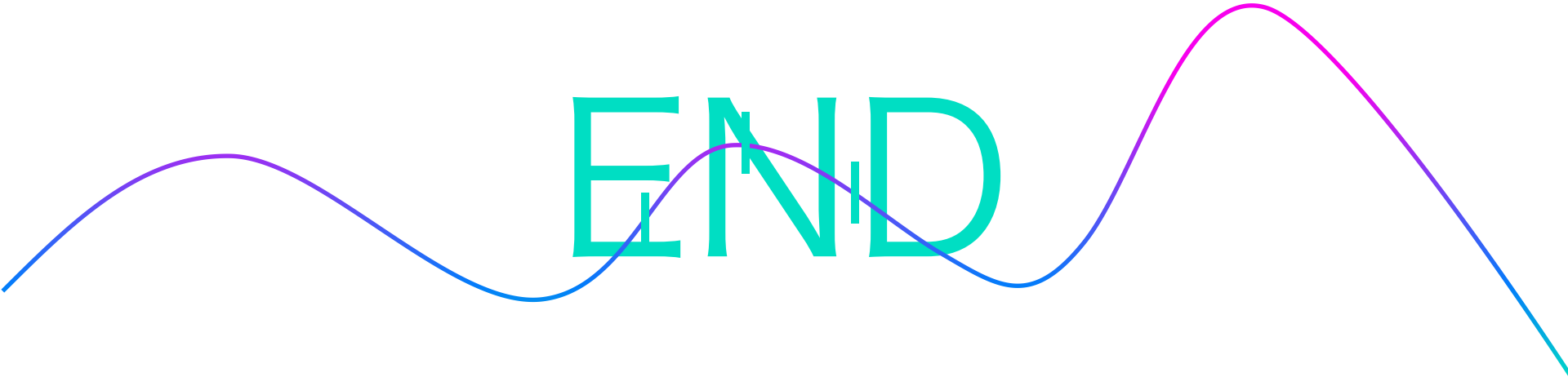
2

給我個人非常大的幫助和啟發
確實在建議中受益

3

該論文的參考文獻同樣值得研究

個人心得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