

The possibility of modeling on mannequin using liquid fabric to develop fashion design and displaying it using digital programs (3D)

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Received date: 20/11/2022

Acceptance date: 18/05/2023

إمكانية التشكيل على المانيكان باستخدام النسيج السائل لتطوير تصميم الأزياء وعرضها باستخدام البرامج الرقمية (ثلاثية الأبعاد)

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Abstract

With the technological advancements in fashion design and the textile industry, the research explores the integration of three main axes: the formation axis on the mannequin, the liquid fabric axis, and the digital fashion axis. These are interconnected through the establishment of a robust technological infrastructure that enables work in the realms of textile technology and digital transformation in the field of fashion design. Despite these advantages, there are obstacles limiting its full potential. Can this technology be applied to the mannequin in a room with a temperature resembling the human body to safeguard and showcase it using 3D virtual displays? Thus, the research problem emerges, leading to the following question: What is the extent of the possibility of molding the mannequin using liquid fabric to contribute to the development of fashion design and presenting these designs using digital fashion? Its application in the field of fashion design ?

Since the liquid textile industry is modern in the fashion world, this research aims to study the possibility of using liquid fabric in the development of the fashion industry and formation of mannequin instead of the human body in a way that helps preserve the environment. This is done by conducting an experimental and descriptive study to achieve some liquid texture strategies shaping the mannequin in the fashion design industry and by linking them to digital fashion using the experimental method and the descriptive method to compare and analyze the results. The results were as follows:

1. Obtain multiple and varied creations in the field of fashion design
2. Speed up the design and production of models
3. Save time, effort, and money.
4. Use modern technology in applying the world of virtual fashion with ease, facilitating electronic commerce.
5. Easily recycle liquid fabric after obtaining the raw material of its product into a liquid material that can be re-sprayed and reshaped, thereby preserving the environment from pollution.

Keywords: Liquid fabric, Sculpting on the mannequin, Digital fashion

الملخص

ومع التطور التكنولوجي في تصميم الأزياء وفي صناعة الأنسجة تناول البحث الجمع بين ثلاثة محاور أساسية هي (محور التشكيل على المانيكان-محور النسيج السائل ومحور الأزياء الرقمية) والربط بينها، وذلك عن طريق إنشاء بنية تحتية تكنولوجية قوية تمكنها من العمل في مجال تكنولوجيا النسيج والتحول الرقمي في مجال تصميم الأزياء وعلى الرغم من هذه المزايا إلا أن هناك معوقات تحول دورها على أكمل وجه وهل يمكن تطبيقها على المانيكان في غرفة درجة حرارة مماثلة لجسم الإنسان بدلاً من الإنسان لحمايته وعرضها باستخدام العروض الافتراضية 3D، ومن هنا انبثقت مشكلة البحث فجاءت الدراسة حول التساؤل الآتي: ما مدى إمكانية التشكيل على المانيكان باستخدام النسيج السائل للمساهمة في تطوير تصميم الأزياء وعرض هذه التصميمات باستخدام الأزياء الرقمية وتطبيقها في مجال تصميم الأزياء؟

وحيث أن صناعة النسيج السائل حديثة في عالم الأزياء لهذا هدف البحث إلى دراسة إمكانية استخدام النسيج السائل في تطوير صناعة الأزياء والتشكيل على المانيكان بدلا من جسم الإنسان بطريقة تساعد في الحفاظ على البيئة .
وذلك بعمل دراسة تحليلية تجريبية لتحقيق بعض استراتيجيات النسيج السائل في التشكيل على المانيكان في مجال صناعة تصميم الأزياء وربطها بالأزياء الرقمية باستخدام المنهج التحليلي التجريبي والأساليب الإحصائية للمقارنة بين النتائج وتحليلها. والنتائج التي حصلنا عليها: الحصول على إبداعات متعددة ومتنوعة في مجال تصميم الأزياء. والسرعة في تصميم وإنتاج الموديلات، وتوفير الوقت والجهد المبدول وأيضا المال، واستخدام التكنولوجيا الحديثة في تطبيق عالم الأزياء الافتراضية بسهولة ويسر وتسهيل التسويق والتجارة الإلكترونية. وآخر النتائج هي سهولة إعادة تدوير النسيج السائل بعد الحصول على خامة منتجة إلى خامة سائلة مرة أخرى يعاد رشها وتشكيلها مما يحافظ على البيئة من التلوث.
الكلمات المفتاحية: النسيج السائل، التشكيل على المانيكان، الأزياء الرقمية.

Introduction:

Art is the ability of humans to express themselves, translating their feelings and describing their surroundings. Technology includes the tools, processes, and systems that humans use to enhance their creative abilities in art and capabilities in implementing artistic work. Creativity involves producing something new, useful, and original that captures attention, distinguishing each artist from others through their creations. Every era has its own set of tools that creators must utilize. Hence, the research idea in fashion design and contemporary fashion, using liquid weaving techniques for shaping on mannequins and three-dimensional design programs for displaying these designs, emerged by adapting modern technology to create designs that align with the technological advancements in current fashion. This adaptation aids fashion designers in achieving excellence (2).

Research Problem:

With technological advancements in the textile industry and digital transformation, the research integrates three main axes: forming on the mannequin, liquid fabric, and digital fashion. These are interconnected through the establishment of a robust technological infrastructure, enabling work in textile technology and the digital transformation of fashion design. Despite its advantages, obstacles exist, such as determining whether it can be applied to a mannequin in a room with a temperature similar to the human body, instead of using an actual human being, to protect it and showcase it using 3D technology .

What is the extent of the possibility of using liquid fabric for forming on the mannequin to contribute to the development of fashion design and presenting these designs using digital fashion in the field of fashion design?

Research Aims:

1. Develop the fashion design and industry.
2. Form designs on mannequins using liquid fabric in the fastest possible time.
3. Market products through digital fashion shows.

Research Importance:

1. Explore the possibility of using liquid fabric in designing and shaping mannequins.
2. Contribute to environmental preservation, time efficiency, and cost savings during design implementation.

Research Hypotheses:

1. There is a direct relationship between using liquid fabric for mannequin formation and the demand among fashion designers for designs resulting from its use.
2. There is a direct relationship between using liquid fabric for mannequin shaping and the ease and speed of marketing designs resulting from its use.

Research Methodology:

The analytical method, experimental method, and statistical methods are employed to compare and analyze the results in order to achieve the research objectives.

Search Tools:

1. Digital Fashion Design - Utilizing 3D software.
2. Using questionnaires to evaluate implemented designs.
3. Implementing designs using liquid fabric.

Search Limits:

The research focused on designing a group of models using 3D programs, followed by implementation through weaving on mannequins, and then displaying them for marketing.

Temporal Limits: From January 16, 2022, to May 30, 2022 AD.

Keywords: Liquid Fabric

It is a liquid substance composed of a group of cotton fibers that take shape when sprayed onto the body, transforming into cotton clothes. These clothes can be easily taken off and worn like traditional garments, providing a modern approach to clothing manufacturing. This innovative method allows the creation of clothes in less than half an hour, tailored to individual preferences. (11)

This liquid clothing material includes "polymer" elements and additional substances that contribute to preserving the clothes, preventing them from disintegrating or tearing due to external factors. The inventor of this discovery highlights that the garments can also be recycled into the liquid, allowing for reshaping and alterations in both form and color. (10)

Forming on the Mannequin

It is both a science and an art with scientific origins, complemented by the skill required for acquisition and mastery. This process demands imagination and innovation to demonstrate creatively transformative elements when working with fabrics, colors, and body size. It grants the freedom to use these elements to manifest the creative prowess of the designer-artist, expressing their unique vision and artistic sensibilities. The production of fashion is distinguished by sophistication and beauty.

Alternatively, it involves the application and artistic shaping of fabric on the mannequin or directly on the human body, adhering to precise patterns that elegantly drape over the body. (7)

Digital Fashion

Three-dimensional fashion, also known as intangible fashion, can only be worn in the digital world. It encompasses commercial images used for publication on social media and in video games, serving the purpose of visualizing how certain clothes appear on individuals. It is characterized by vibrant colors and the ability to move in accordance with the wearer. (5)

The theoretical side

The spinning and weaving industry has developed in recent times, becoming one of the most important industries globally. It has transitioned from a manual process to a mechanical one, with the establishment of numerous factories. Presently, liquid textiles have emerged as part of this industry. (3)

With technological development, a recent innovation in clothing has surfaced—clothes that are sprayed directly onto the body. This marks the latest trend in the fashion industry, departing from the conventional and entering a distinct modern realm within the evolving landscape of global fashion. Spanish scientist Manuel Torres, a fashion designer, is credited with inventing this peculiar and unique type of clothing. These sprayed clothes are formed when a liquid substance, containing cotton fibers, is sprayed onto the body. The body's temperature aids in transforming it into cotton clothes, which can then be taken off and worn in a direct and ordinary manner, akin to familiar clothes. (10)

Recent years have witnessed the emergence of programs capable of designing fashion in 3D, with one of the most notable being 3d-Max (Fashion Virtual - Marvelous Design).

The previous studies were divided into three parts:

First: Studies dealing with formation on the mannequin –

A study (Najwa Shukri, Afaf Tuaima, 1992) entitled "Evaluation of the Mannequin Formation Method from the Graduate Students' Point of View and Identifying Deficiencies" aimed at evaluating the mannequin style from the graduate students' point of view and identifying the shortcomings, in addition to identifying the strengths. The study concluded that the mannequin suits the models that need a special skill in forming (6).

A study (Iman Abdel Salam - 1997) entitled "The Effect of Staging Models of Some Forming Techniques on the Mannequin on Control and Matching" aimed at highlighting the role of the mannequin style in the production stages of ready-made garments in Egypt and concluded the importance of using the mannequin in conducting the adjustment and conformity of the produced clothes (1).

A study (Noor Al-Huda - 2011) entitled "Using perforated fabrics to make designs for women's clothes using the design method on the mannequin" aimed to create modern fabrics and use them in the shaping method. It came to creating designs with a high degree of innovation and creativity (8).

Second: Studies dealing with digital fashion

A study (Nouf Al-Matani-2014) entitled "Creating fashion designs by designing a flat model, and then converting it to a three-dimensional model" dealt with three-dimensional programs as they are an aiding factor for designers in contributing to creating fashion designs. The study emphasized designing a flat model and then transforming it into a 3D model that simulates reality, eliminating the problem of design failure and the waste of tools and materials. This approach allows designers to create accurate and exquisite fashion styles without requiring technical assistance, resulting in a realistic appearance (9).

A study (Randal El-Kharbawy and Amira Abdullah Nour Al-Din-2019) entitled "Sustainable development of Islamic decorations using 3D printing and its use in designs to decorate women's abaya" aimed to achieve sustainability for Islamic motifs through 3D printing and information technology for decorating women's abaya (4).

A study (Prof. Dr. Mohamed El-Badri Abdel-Karim and Prof. Amr Gamal El-Din Hassouna-2021) entitled "The Effectiveness of Using Augmented Reality Technology on Developing Digital Fashion Design Skill" aimed to verify the effectiveness of Augmented Reality in developing fashion design skills for the students under study. The study also sought to identify the possibilities of augmented reality as an advanced approach in fashion design. The study concluded that the effectiveness rate of using augmented reality technology was (818.0), exceeding the threshold of (6.0) set by Mc Gujian to judge effectiveness. This indicates that the effectiveness of using augmented reality technology in designing ready-made clothes is significant (5).

Third: Studies dealing with liquid fabric

Previous studies in this area are unavailable due to the recent discovery of this innovation in the field of textile and clothing industry; therefore, so there are no prior studies.

Comment on previous studies

The Hungarian research shares similarities with earlier studies, focusing on shaping mannequins to achieve distinct designs and utilizing modern technology for creating digital costumes.

The uniqueness of the current research lies in its exploration of using liquid fabric for spraying and shaping on the mannequin, considering body temperature, and displaying

designs through digital fashion. This approach aims to drive innovation and development in fashion design.

The application side:

Study results and discussion

The search results are divided into two parts as follows:

The first section of the results: Includes proposed designs and their applications.

A group of various programs were used in conducting research designs and then evaluating these designs.

1-1 (Marvelous Designer 3 Program)

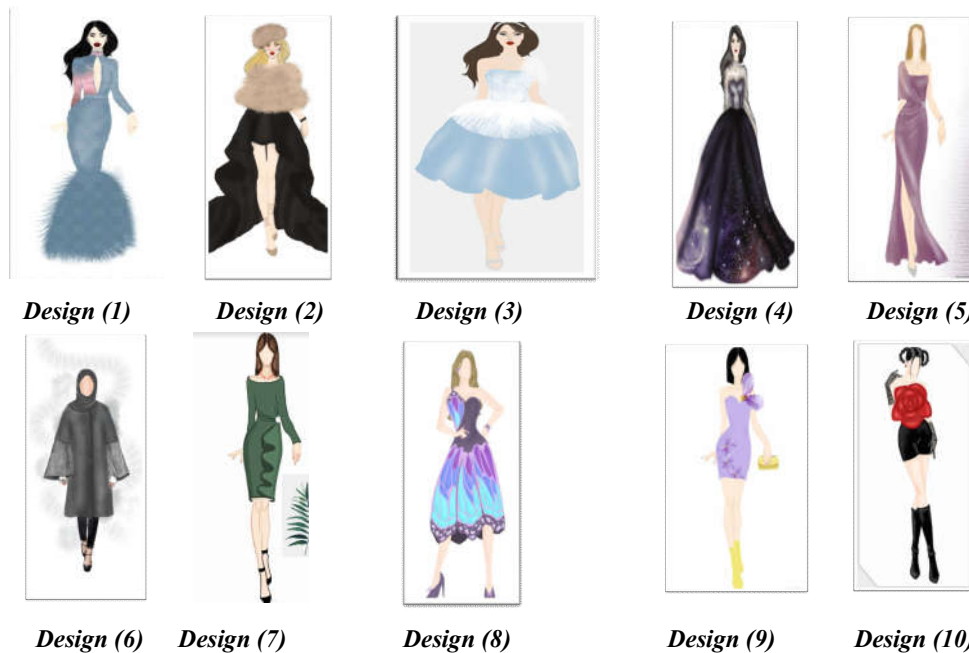
This program can depict the three-dimensional shape of the costume, showing the fabric's patterns, draping around the mannequin's body, as well as presenting colors, prints, and the movement of the mannequin.

3D-Max (1-2)

It is used in 3D design, 3D animation, and games. This program was employed to design a fashion show, incorporating camera and lighting elements, inserting the model, and recording its movement in video format.

(Movie Maker) 1-3

Through it, you can combine photos and videos, transforming them into movies. Additionally, you can add music clips or songs. This program was used to gather video clips from the 3D Max program, edit them, and produce a comprehensive video clip of the implemented fashion show.



After completing the designs and determining the models to be implemented, the liquid fabric is sprayed on the mannequin at a temperature of 36.5 degrees.

It is possible to control and shape the fabric immediately after spraying and before it dries, and thus a variety of models can be formed from it, as it needs half an hour to dry. As seen in Model 5, 7 and more.

To maximize the number of evaluations, a link was generated containing a video of a three-dimensional hypothetical fashion show featuring the proposed designs. This aimed

to introduce liquid fabric to women consumers and illustrate its impact on the fashion industry. An electronic evaluation form on the link was distributed to 250 individuals of diverse nationalities, including specialists and consumers.

Second: Results of the Questionnaire - After evaluating responses from a diverse group of specialists and consumers, the researcher analyzed their feedback using a design evaluation questionnaire. The arithmetic mean was calculated and presented in a statistical table illustrating the percentages of their responses. The total number of participants was 250 (refer to Appendix 1).

N: represents the number of consumers and specialists (N=250)

D: represents the number of implemented designs (D=10).

Table (1) The values of the arithmetic mean coefficients for each axis for the opinion of specialists and consumers

Resolution axes	SMA	indication
First: from an aesthetic point of view	230.13	0.001
Secondly, The importance of using 3D, liquid texture, and digital art in the development of fashion design	220.2	0.001
Third, will liquid fabric and 3D technology become an alternative to clothing factories or development it?	215.93	0.001

Table (2) Calculating the averages of the evaluations of specialists and consumers for the first axis (from an aesthetic point of view)

Items	Design10	Design9	Design8	Design7	Design6	Design5	Design4	Design3	Design2	Design1
C1	226	231	231	215	213	245	233	237	233	226
C2	243	234	226	222	229	231	236	243	242	242
C3	225	231	220	221	226	240	225	230	224	225

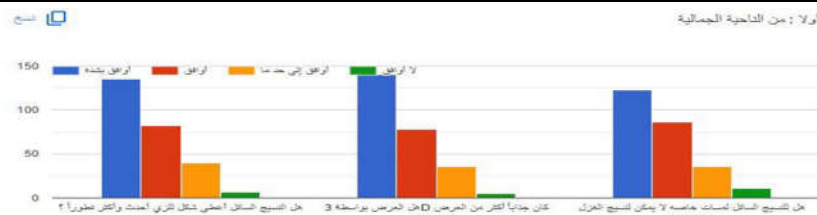


Chart No. (1) For the first axis from an aesthetic point of view

From the previous graph (1) and Table No. (2), it becomes clear that there is a demand from both consumers and specialists for the use of liquid fabric. This realization aligns with the hypotheses of the research. There is a statistical indication of designers' acceptance of using liquid fabric in shaping on the mannequin, attributed to its speed of implementation and its role in saving time, effort, and money. Additionally, it contributes to environmental preservation through the possibility of recycling.

Table (3) calculating the averages of specialist and consumer evaluations for the second axis, the importance of using 3D, liquid texture, and digital art in the development of fashion design

Items	Design10	Design9	Design8	Design7	Design6	Design5	Design4	Design3	Design2	Design1
C1	226	217	211	208	219	216	218	230	228	226
C2	229	217	212	206	215	218	216	225	229	237
C3	218	220	213	209	216	221	223	224	217	242

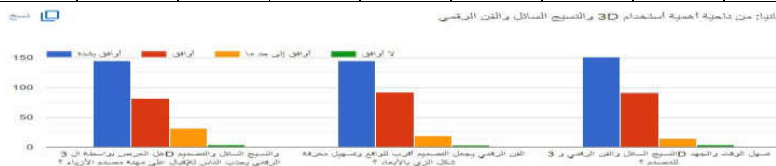


Chart No (2) shows consumer and professional acceptance of liquid texture and digital art

Through the previous chart (2) and Table No. (3), it is clear that there is a direct relationship between the demand of consumers and specialists for the use of three-dimensional design in implementing designs. This relationship extends to the application

of designs with liquid texture on a mannequin and the display of designs in digital art. Thus, the research hypotheses are fulfilled.

Table (4) calculating the averages of the evaluations of specialists and consumers for the third axis

Items	Design10	Design9	Design8	Design7	Design6	Design5	Design4	Design3	Design2	Design1
C1	215	217	216	212	214	221	215	225	220	215
C2	207	217	211	211	213	220	218	222	207	206
C3	218	231	209	204	217	218	214	218	222	225

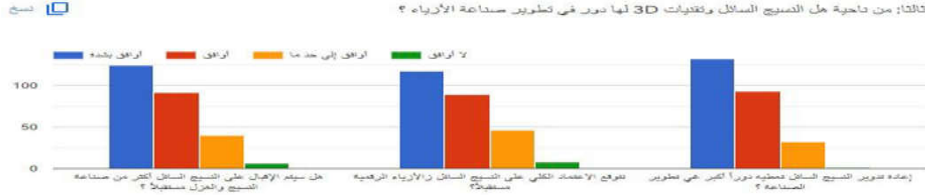


Chart No. (3) For the third axis will liquid fabric and 3D technology become an alternative to clothing factories or development it

From the previous chart (3) and Table No. (4), it becomes clear to us that consumers and specialists use liquid fabric in shaping on the mannequin to speed implementation and save time, effort and money and also contribute to preserving the environment with the possibility of recycling it into a liquid and then a different fabric again in a revolution Industrial in the manufacture of textiles.

Summary of results:

From the previous analysis of the results, they are summarized in the following points

1. Obtain multiple and varied creations in the field of fashion design
2. Speed in designing and producing models.
3. Save time, effort and money
4. Utilize modern technology for applying virtual fashion effortlessly, facilitating electronic commerce
5. Easily recycle liquid fabric after obtaining the raw material of its product into a liquid material again, which preserves the environment from pollution.

Recommendations:

1. Attention to the study of liquid fabric because of its impact on the field of clothing and textile manufacturing.
2. Interest in the world of virtual fashion (digital fashion) because of its multiple and influential effects in the field of fashion shows and e-commerce.

This research was supported by the General Research Program of the Deanship of Scientific Research -King Khalid University - Saudi Arabia (GRP \ 50 \ 43) for the year 1443 H.

Appendix 1

تم إعداد الأسئلة باللغة العربية البسيطة على الرابط الذي وزع إلكترونياً باستخدام الواتس أب لتناسب لغة المجتمع العربي المستهلكين (فئة النساء) في المملكة العربية السعودية.

بنود الاستبيان	أوافق بشدة	أوافق	أوافق إلى حد ما	لا أوافق
أولاً: من الناحية الجمالية				
هل النسيج السائل أعطى تأثيراً للذي أحدث وأكثر تطوراً؟				
هل العرض الافتراضي واستخدام 3D كان جذاباً أكثر من العرض المباشر؟				
هل للنسيج السائل لمسات خاصة لا يمكن لنسيج الغزل إعطاؤها؟				
ثانياً: من ناحية أهمية استخدام البرامج ثلاثية الأبعاد والفن الرقمي والنسيج السائل في تصميم الأزياء.				
هل العرض للتصميمات بواسطة الـ 3D والفن الرقمي يجذب الناس للإقبال على التصميمات ومهنة مصمم الأزياء؟				
الفن الرقمي يجعل التصميم أقرب للواقع ويسهل معرفة شكل الذي من جميع الأبعاد وإظهار جمال وتفصيل الموديل				
النسيج السائل والفن الرقمي و3D تسهل الوقت والجهد لمصمم الأزياء.				
ثالثاً: من ناحية دور النسيج السائل والبرامج ثلاثي الأبعاد في تطوير صناعة الأزياء				
هل سيتم الإقبال على النسيج السائل أكثر من صناعة النسيج والغزل مستقبلاً				
من المتوقع الاعتماد الكلي على النسيج السائل والأزياء الرقمية مستقبلاً.				
إعادة تدوير النسيج السائل لها تأثير أكبر في تطوير صناعة الأزياء.				

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