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Virtual Wardrobe: An IoT based Closet

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Abstract:
We propose an Internet of Things (IoT) system where the user can check the dress for perfect fitting and also know how good they look in that dress either personally or with the help of a virtual stylist at the back end. We make use of RFID reusable tags as well as Eddystone technology in order to send dynamic information to the user within the range of the shop.

Keywords: Internet of Things (IoT), RFID, Eddystone

I. INTRODUCTION

In our day to day lives we experience tedious tasks in choosing stylish outfits from stores. In order to find out if the dress is fitting or not one has to wear it and check to know if it's perfectly fitting. One also needs additional help or a second opinion to know how they look in that dress. Currently several applications are being created to sort out this issue, but in vain. We have come up with a comprehensive plan and an idea to implement an innovative concept using Internet of Things, whereby this whole issue can be sorted out making it a one stop solution for all our clothing needs.

II. PROPOSED WORK

A. Input

Firstly, we need inputs from the user requiring their measurements. Once it is inputted, the image of the user with their measurements is created and displayed. Some people may not know their measurements, they can simply proceed to the virtual trial room from where their perfect size is mapped, but this increases the time to select the perfect dress.

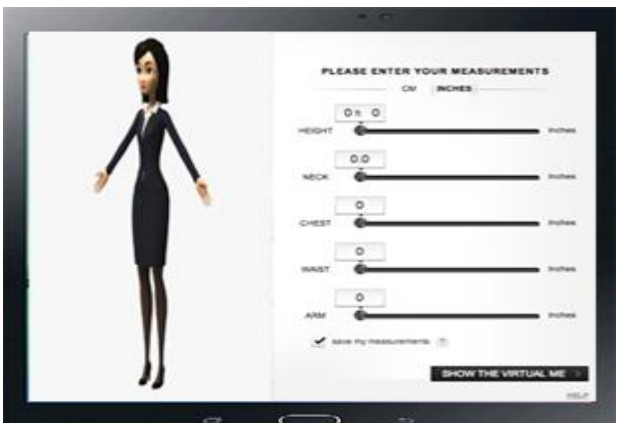

Figure.1. Perfect Dress

B. RFID tags and Eddystone technology

RFID tags are usually found on any commodity we buy in the market these days and they contain only the basic information about the product like product ID and cost. Here, we propose an IoT based RFID tag which is linked to the internet. The specialty of these tags is that they are updateable and also connected over the internet, therefore the communication between the tag and the user's device is possible. Another important technology used is Eddystone which basically sends information about the products around it. While the user passes through a shop, the Eddystone technology sends the information to the user's device about the products around it, in this case the clothes. Once the user, on reading the information, enters the shop in search of that particular dress, they will have to swipe their device on the RFID tag of that dress. Now the user's device reads the RFID tag, the information present in the tag is displayed on the user device.

C. Image Mapping

The next phase is the collaboration of the first and second stages where the user's body image, based on their input measurement, is displayed along with the information stored on the RFID tag. Now the user can view themselves on the display screen wearing the dress that they wish to buy and also the mapped graphical image of that dress separately on the side of the screen along with information about that dress like the cost, discount etc.

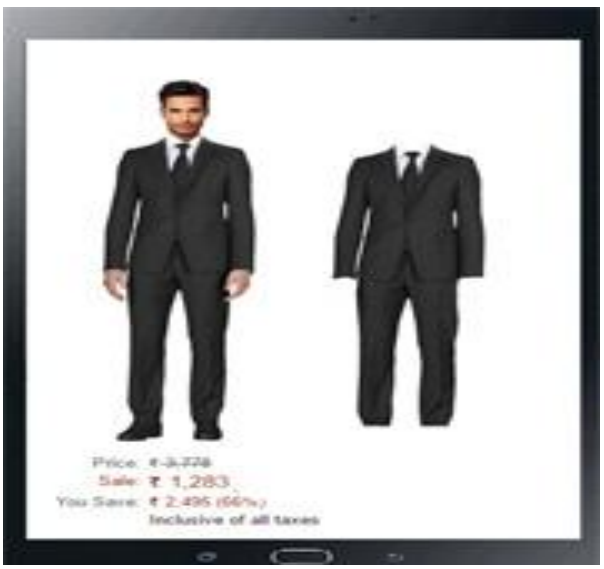

Figure.2. Information about dress like the cost, discount

D. Secure Payment

Waiting in queues for payment is a tough task in this fast paced environment. Therefore we have implemented a secure payment portal by which once the user is done with the virtual trial they can proceed to the shopping cart and purchase the product with a simple swipe of a button.

III. RFID TAGS

The communication using IPv6 is a challenge for RFID tags being equipped with limited resources only. Modern tags are able to store and compute data, or even hold sensors. In order to draw advantage from this increased functionality the integration into the IoT is essential. Powerful application scenarios can be developed when two-way communication with tags can be established via the network. This provides the concept of enabling a two-way end-to-end communication with passive RFID tags via the Internet.

A. Type of RFID Tag used

Class 1 GEN2 EPC (GEN2) - these RFID tags are the latest type of UHF tag. These tags are 96 bits or larger and contain advanced features, such as lock after write and CRC read verification. These tags greatly reduce (if not eliminate) the ghost tag problem, using a mandatory hardware based CRC. The CRC is created when the tag is encoded, and the reader verifies the CRC when the tag is read. If the CRC does not match, the data read is considered invalid. In addition, more tags can be read simultaneously when using GEN2. The amount of data encoded depends on the bit size of the tag, minus any fields that may be required. Refer to the formatting section below for examples. The maximum decimal value for a field is calculated with the formula of *2^n-1* where *n*=the fixed number of bits in the field.

B. RFID Reader

The RFID reader that is used is the NFC (Near Field Communication) technology that is present in most of the smart phones today. It allows them to establish peer-to-peer radio communications, passing data from one device to another by touching them or putting them very close together. It uses electromagnetic induction in order to transmit or receive information over a short space so that by simply scanning an RFID tag, one can know about the information that is stored in it. Therefore using an inbuilt NFC within the smart phone, the RFID tag can be read.

C. Eddystone and Beacon Technology

Eddystone can give devices a better indication of the objects and places around them. Eddystone is used by google for android phones and iBeacon is used for apple products. Here, we utilize either of the two technologies in order to identify the retail stores around the user that contains the dress within the users required budget as well as in accordance with the users choice of required patterns. This technology can be used to gain users within the wide proximity range of the store.

IV. 3-D MAPPING

This involves the mapping of the 3-D modelled human with the 3-D image of the dress that is stored in the RFID tag, read by the NFC in the smart phone. Initially, the 3-D image of the dress is already stored in the RFID tag and this is used by the user to check for perfect fitting. Using the NFC sensor the RFID tag is read and this is displayed on the mobile application along with the 3-D image of the human body. Both are mapped and hence the user will be able to determine if the dress is fitting or not without even wearing it.

A. Dynamic 3-D model

Based on the measurements inputted by the user, the dynamic 3-D model of their own body will be obtained on the mobile application. The various measurements include height, shoulder width and other attributes that are required. Once the 3-D model is prepared, it is mapped with the 3-D model of the respective dress and the fitting can be virtually viewed. Now the user can identify which part of the dress is either too big or small and they can choose accordingly.

B. Virtual Stylist

A virtual stylist is provided at the back end of the mobile application for the user to select a better and an appropriate dress suitable for them. The virtual stylist is responsible f0or giving the user the best advice while choosing their outfits.

V. REFERENCES

[1] [HSE11] HILSMANN A., SCHNEIDER D. C., EISERT P.: Warpbased Near-Regular Texture Analysis for Image-based Texture Overlay. In Vision, Modeling, and Visualization Workshop 2011 (Berlin, Germany, 2011).

[2] [LLB∗10] LIPSKI C., LINZ C., BERGER K., SELLENT A., MAGNOR M.: Virtual Video Camera: Image-Based Viewpoint Navigation Through Space and Time. Computer Graphics Forum 29, 8 (Dec. 2010), 2555–2568. 1,

[3] [PLF05] PILET J., LEPETIT V., FUA P.: Augmenting Deformable Objects in Real-Time. In Proc. Int. Symposium on Mixed and Augmented Reality (ISMAR 2005) (October 2005).

[4] [She96] SHEWCHUK J. R.: Triangle: Engineering a 2D Quality Mesh Generator and Delaunay Triangulator. In Applied Computational Geometry: Towards Geometric Engineering, vol. 1148 of Lecture Notes in Computer Science. Springer-Verlag, 1996, pp. 203–222.

[5] [WHRO10] WANG H., HECHT F., RAMAMOORTHI R., O'BRIEN J.: Example-based Wrinkle Synthesis for Clothing Animation. ACM Transactions on Graphics (SIGGRAPH 2010) 29, 4 (July 2010).

[6] [XLS∗11] XU F., LIU Y., STOLL C., TOMPKIN J., BHARAJ G., DAI Q., SEIDEL H.-P., KAUTZ J., THEOBALT C.: Video-based Characters - Creating New Human Performances from a MultiView Video Database. In Proc. of SIGGRAPH 2011 (2011).

[7] S. Dominikus, M. J. Aigner, and S. Kraxberger. Passive RFID Technology for the Internet of Things. In Workshop on RFID / USN Security and Cryptography, 2010.

[8] M. Feldhofer, J. Wolkerstorfer, and V. Rijmen. AES Implementation on a Grain of Sand. IEE Proceedings on Information Security, 2005.

[9] D. Hein, J. Wolkerstorfer, , and N. Felber. ECC is Ready for RFID - A Proof in Silicon. In Workshop on RFID Security 2008 (RFIDsec08), July 2008.

[10] M. Hutter, M. Feldhofer, and T. Plos. An ECDSA Processor for RFID Authentication. In Workshop on RFID Security (RFIDsec 2010), June 2010.

[11] D. Anguelov, P. Srinivasan, D. Koller, S. Thrun, J. Rodgers, and J. Davis, "SCAPE: Shape completion and animation of people," in ACM SIGGRAPH 2005 Papers, 2005, pp. 408– 416.

[12] Y. Weng, W. Xu, Y. Wu, K. Zhou, and B. Guo, "2D shape deformation using nonlinear least squares optimization," Vis. Comput., vol. 22, no. 9, pp. 653–660, 2006.

[13] S. Bianco and R. Schettini, "Color constancy using faces," in 2012 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)., 2012, pp. 65–72.

[14] Z. Zhou, B. Shu, S. Zhuo, X. Deng, P. Tan, and S. Lin, "Image-based clothes animation for virtual fitting," in SIGGRAPH Asia 2012 Technical Briefs, 2012, pp. 33:1–33:4.

[15] A. Hilsmann, P. Fechteler, and P. Eisert, "Pose space image based rendering," Comput. Graph. Forum (Proc. of Eurographics), vol. 32, no. 2, pp. 265–274, 2013.

[16] L. START TODAY CO., "ZOZOTOWN," zozo.jp/.

[17] P. Guan, O. Freifeld, and M. J. Black, "A 2D human body model dressed in eigen clothing," in Proceedings of the 11th European Conference on Computer Vision: Part I, 2010, pp. 285–298.