

# TAGTANSU: A WARDROBE TO SUPPORT CREATING A PICTURE DATABASE OF CLOTHES

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## **Abstract**

*We propose a novel capture and annotation system called TagTansu, which can easily capture pictures of clothes and add annotations to support creating a picture database of clothes. TagTansu consists of hook sensors and capture components attached inside the doors of a tansu (a wardrobe). Using TagTansu, users can easily take pictures of clothes and add annotations (e.g. types and weight of clothes) to the pictures just by hanging the clothes on a hook. In this paper, we describe the concepts and implementation of the system.*

## **1. Introduction**

Recently many websites for fashion-oriented people have appeared. For example, fashion SNS (Social Network Services)<sup>3</sup> help people find friends with similar preferences for fashion, and communicate with them. Moreover, online auction services enable people to sell/buy their used clothes with each other. Furthermore, people can easily obtain various information about fashion and clothing from the web. However, while these websites offer frameworks for publishing pictures and related information of users' own clothes, most people only browse/buy existing items.

One of the significant reasons behind this problem is the difficulty of capturing pictures of clothes and uploading them to a website. The difficulty of this process is outlined as follows: (1) finding a clear background, (2) taking pictures of clothes with a digital camera, (3) transferring the pictures to a PC, (4) grouping them using folders or annotations, (5) adjusting the size of the pictures using image-processing software, (6) uploading the pictures to a website using a web browser or a ftp client.

We believe that we can help users publish pictures and related information of their clothes on a website by offering a system for capturing/uploading pictures of clothes quickly. For these reasons, we propose a novel capture and annotation system called "TagTansu", which helps users easily take pictures of clothes and add several annotations to the pictures only by hanging clothes on hooks

## **2. TagTansu**

TagTansu is a novel capture and annotation system which can quickly capture pictures of clothes with simple annotations to support creating picture database of clothes. TagTansu mainly consists

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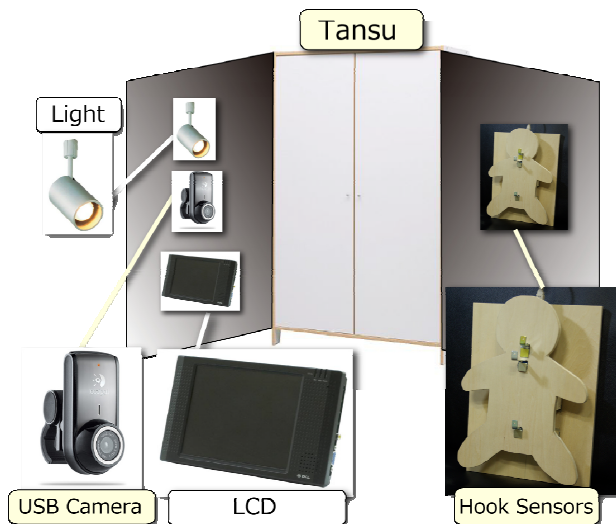
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<sup>3</sup> <http://www.fashmatch.com/>, <http://shareyourlook.com/>

of sensors and capture components attached to the inside doors of a tansu (a wardrobe)<sup>4</sup>. We selected a wardrobe with double doors to utilize both door surfaces. As shown in *figure 1*, we attach hook sensors to one door and attach capture components -a camera, lights and an LCD- to the other door. By attaching these devices to an existing wardrobe, TagTansu has following advantages: *space-saving*: TagTansu doesn't require additional space in the users' rooms, *sufficient focal distance*: TagTansu can create enough distance between a camera and clothes by attaching them to separate sides of double doors, *consistent environment*: TagTansu can easily keep capture environment(e.g. background and lighting) stable.

We explain the usages of TagTansu briefly. First, when a user opens the doors, the lights are turned on automatically. Next, when the user hangs his clothes on a hook sensor, an image of the clothing is captured by the camera. Since TagTansu has multiple hook sensors, he can indicate the type of clothing by hanging it on different hooks (See next section for details). Moreover, hook sensors also detect estimated weight of clothes. Thus, TagTansu can capture types and estimated weight of clothes in addition to the picture itself. Finally, the captured picture is uploaded to a web/file server via http/ftp.



**figure 1. Basic Concept of TagTansu.** Sensors and capture components are attached inside double doors of a tansu (a wardrobe): (1) hook sensors to a door and (2) a camera, lights and an LCD to the other.



**figure 2: Prototype of TagTansu.** (1) hook sensors, (2) lights, (3)LCD, (4) USB camera, (5) a magnet switch, (6) a host PC.

### 3. Implementation

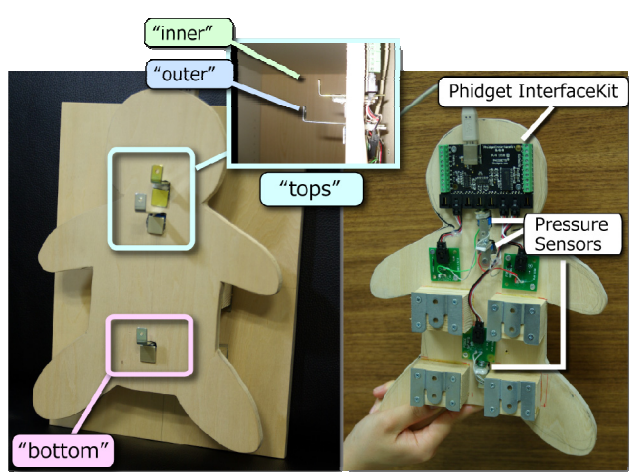
We developed a prototype system of TagTansu with the above features (*Figure 2*).The prototype consists of sensors -hook sensors and a magnet switch-, capture components -a USB camera, two fluorescent lights, and an LCD- and a host PC. There are three hook sensors attached on a human-shaped wood plate (*Figure 3*). We embedded a pressure sensor to each hook for detecting weight of clothes hung on the hook. These sensors are controlled by the host PC via a Phidget Interface Kit.

Two hooks are located at neck level, and one hook is located at waist level of the human shaped model. Users can add different tags by hanging clothes on different hooks: a "tops" tag on the upper

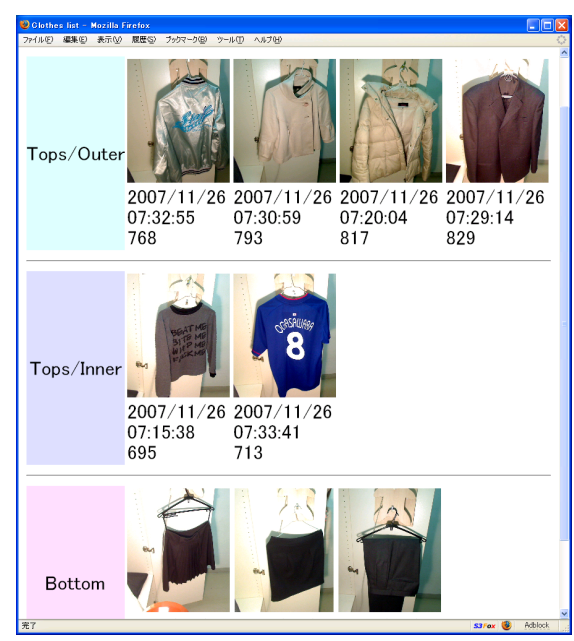
<sup>4</sup> Tansu is a Japanese traditional wardrobe made of fine woods.

hooks and a "bottom" tag on the lower hook. Moreover, as shown in *figure 3*, each upper hook has different length. Users can add an "inner" tag on the short (inner side) hook and an "outer" tag on the long (outer side). In this way, users can easily select types of their clothes using a natural mapping like human body. The magnet switch detects the open/close states of the doors for turning the lights on/off.

Next, we explain the system procedures for taking pictures. First, when a user hangs his clothes on a hook, the pressure sensor detects weight of the clothes. Then, when the weight exceeds a threshold and remains over the threshold for a given amount of time (e.g. one second), the system begins countdown for capturing pictures<sup>5</sup>. After a few seconds (three seconds in the current prototype), the system captures an image of the clothes with the USB camera and plays a shutter sound. The captured picture is displayed on the LCD and saved to the host PC in a JPEG format. The system also adds annotations -one of the three types and estimated weight of the clothes, and a timestamp- to the picture as EXIF information. *Figure 4* shows examples of pictures captured by TagTansu. These pictures are uploaded to a website and categorized by types of clothes using a CGI program.



**figure 3: Prototype of hook sensors.** Three hook sensors are attached on a human-shaped wood plate. Users can add different tags by hanging clothes on different hooks: a "tops/outer" tag on the upper/ longer hook, a "tops/inner" tag on the upper/shorter hook, and a "bottom" tag on the lower hook.



**figure 4: Examples of pictures captured by TagTansu.** These pictures are categorized by types of clothes using a CGI program. Three types (tops/outer, tops/inner and bottom) and estimated weight of clothes, and timestamps are automatically detected.

#### 4. Related Work

Digital Decor [3] attached a camera and an LCD to a drawer to help users find lost items and communicate with friends in long distance. While Digital Decor also embedded capturing components in furniture, TagTansu focused on taking pictures of clothes with simple annotations.

<sup>5</sup>Clicking sound is played every one second in the countdown step.

There are several research projects on wearable computing. Affective Wearables [2] and Emotional Wardrobe [5] propose context-aware accessories and clothes. For example, the color of earrings changes with the heart rate of the wearer. Smart Clothing [1] and Augmented Reality Through Wearable Computing [6] proposed a way to integrate and provide ubiquitous computing resources seamlessly integrated in ones clothing. TagTansu is fundamentally different in that the computing resources are utilized to capture and catalog the clothing but not to alter their usage.

Magic Wardrobe [7] proposed a new wardrobe which serves as a physical interface for online marketplace. For example, when a user picks up a jacket, the system would look for matching shirts from the online marketplace. What am I gonna wear?[4] is a fashion recommendation system which provides coordinate of clothes for users' purposes based on tags of the clothes. Although these projects proposed interesting applications of fashion, users may feel troublesome to add tags to all their clothes manually. Since TagTansu can capturing/annotating pictures of clothes quickly, we believe our approach strongly supports these kind of fashion applications.

WillCam[8] captures various context information in addition to the photo itself. While WillCam focused on automated annotation techniques for more general purposes, TagTansu focuses on techniques for creating an annotated picture database of clothes.

## 5. Conclusion

We developed a novel capture and annotation system called TagTansu, which enables users to easily take pictures of clothes and add annotations (e.g. simple types and estimated weight of clothes) to the pictures by simply hanging clothes on a hook built into a wardrobe. We will develop new techniques to detect types of clothes more flexibly (e.g. dresses, coats, and boots) and to browse captured images of clothes more effectively using these annotations.

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