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Analysing The Quality Of A Fabric Using Arduino Uno

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Abstract— The textile market has wide variety of clothes which depend on factors like cost and the quality. The quality of the clothing depends on the company producing it and many companies deceive the customers by producing low quality garments or clothings. In order to prevent the low quality clothings from being bought, we use a system to detect the quality of the clothes being produced. Our proposed system consists of arduino , flex sensor, load cell,hx711 sensor and RFID tag. An addition of metal sensor can be used if this system is to be used in textile industries. The load cell measures the weight of the cloth and with the help of the hx711 sensor directs it to the arduino for display. The flex sensor also known as bend sensor is used to check the thickness and resistance offered by the cloth. At last, the RFID tag is scanned by the RFID reader and if the specifications set by us are met. The fabric is fit for use and it is of good quality. This device can be used in industrial purposes too with the addition of a metal sensor. Overall, if the system is correctly used, we can stop the influx of the low quality products into the market and help the customer choose the best quality cloth.

Keywords- Arduino Uno, Flex sensor, Load cell,RFID reader,RFID Tag,HX711 sensor

I. Introduction

The ultimate aim of the project is to find the good quality clothes and separate it from the bad quality ones. This technique can be incorporated by the manufacturing companies to improve the quality of the fabric. This in turn allows the customer to buy quality products and they can ignore the bad quality products in the market. If this happens, there will be a lot of competition among the manufacturers and this might be helpful for the buyers as well asa the sellers. Not only the quality of the clothes is found out after it is being displayed in the market, it can be checked in the industry itself and discarded if it is deemed as not fit to use. This improves the productivity of the manufacturing company and more resources and time can be spent on producing good quality clothes.

QUALITY OF CLOTHES

Customers will always look for that quality in any person who might come and work for our company .There is a certain pleasure in recognising something that has been well made. Good design is about using materials that are fit for purpose. The product has to be aesthetically pleasing, has to be functional – and if it has extra character to it, too, well, then that's something else. It is always possible to tell when someone cares about what they're making. ground, wash them, line them up carefully.One reason people look for that care is because they think for someone to make something that's going to last, there is undoubtedly an amount of love as well as skill that goes into that. And things that last are important. Buyers will be happy to pay more for something if they see it as an investment. They would rather spend £80 on a jerkin if it means that I'll be buying one that lasts. People will always feel that about things, rather than thinking something is too expensive. People nowadays think like that about clothes – they'll have fewer but better quality.

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III AVAILABLE TECHNOLOGY

A. *High speed real tracking for texture tracking and thread counting*

In garment manufacturing, an automatic sewing machine is desirable to reduce cost. To accomplish this, a high-speed vision system is required to track fabric motions and recognize repetitive weave patterns with high accuracy, from a microperspective near a sewing zone. In this letter, we present an innovative framework for real-time texture tracking and weave pattern recognition. Our framework includes a module for motion estimation using blob detection and feature matching. It also includes a module for lattice detection to facilitate the weave pattern recognition. Our lattice-detection algorithm utilizes blob detection and template matching to assess pair-wise similarity in blobs' appearance. In addition, it extracts information of dominant orientations to obtain a global constraint in the topology. By incorporating both constraints in the appearance similarity and the global topology, the algorithm determines a lattice that characterizes the topological structure of the repetitive weave pattern, thus allowing for thread counting.

B. *SAR IMAGE TEXTURE TRACKING USING A POINTWISE GRAPH-BASED MODEL FOR GLACIER DISPLACEMENT MEASUREMENT*

This paper investigates the problem of glacier flow estimation using Synthetic Aperture Radar (SAR) image data. Our motivation is to exploit a weighted graph model constructed from characteristic points (i.e. keypoints) to measure the displacement vectors located at their positions. In fact, characteristic points are capable of capturing the image's radiometric and contextual information. Then, by encoding their interaction and inter-connection, a graph model is able to characterize both intensity and geometry information from the image content, which is relevant for texture tracking task. In this work, we employ a graph-based similarity measure to track the local texture information around each keypoint in order to figure out its correspondence from the other image and calculate the associated displacement. The proposed approach is tested and evaluated using high resolution TerraSAR-X images acquired from the Argentiere Glacier located in the French Alps. Our preliminary experimental results show the algorithm's capacity to provide a fast and reliable estimation of glacier flows, especially over highly textured and structured regions.

C. *An automated process for inclusion of package dies and circuitry within a textile yarn*

The integration of small electronic components into textile fabrics, without compromising the textile qualities such as flexibility and conformability, is necessary in ensuring wider adoption of electronic textiles. A solution is to use flexible, electronic yarns that incorporate electronic components within the fibers of the yarn. The production of these novel yarns was initially a craft skill, with inclusion of electronics within each section of yarn taking 60 – 90 minutes. A prototype, automated production process was developed to speed up the manufacturing process to 6 minutes. This paper describes the process, using machinery and methods from both electronics and textiles applications.

IV. PROPOSED TECHNOLOGY

In this work, we present a system which overcomes the disadvantages of the previous system. Previously,the elongation was not found out and the originality of the cloth was found out instead of finding out whethere the cloth is a quality one or not. Sensors like flex sensor ,hx711 sensor and RFID reader is used to accomplish the given tasks. The tasks give the output to their Arduino which then displays in the Arduino serial monitor. The system uses a transformer which along with Power supply acts as a input and helps carry out the task easily.

COMPONENTS USED

A. *Arduino Uno*

The Arduino Uno is a microcontroller board based on the ATmega328.It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

B. *Flex Sensor*

A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending. Usually, the sensor is stuck to the surface, and resistance of sensor element is varied by bending the surface. Since the resistance is directly proportional to the amount of bend it is used as goniometer, and often called flexible potentiometer. Flex sensor is used in wide areas of research from computer interfaces, rehabilitation, security systems and even music interfaces. It is also famous among students and Hobbyists.

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C Load cell

Strain gauge load cells are the most common in industry. These load cells are particularly stiff, have very good resonance values, and tend to have long life cycles in application. Strain gauge load cells work on the principle that the strain gauge (a planar resistor) deforms when the material of the load cells deforms appropriately. Deformation of the strain gauge changes its electrical resistance, by an amount that is proportional to the strain. The change in resistance of the strain gauge provides an electrical value change that is calibrated to the load placed on the load cell.A load cell usually consists of four strain gauges in a Wheatstone bridge configuration. Load cells of one strain gauge (quarter bridge) or two strain gauges (half bridge) are also available.[1] The electrical signal output is typically in the order of a few millivolts (mV) and requires amplification by an instrumentation amplifier before it can be used. The output of the transducer can be scaled to calculate the force applied to the transducer. Sometimes a high resolution ADC, typically 24-bit, can be used directly.

D RFID reader

In 1945, Léon Theremin invented a listening device for the Soviet Union which retransmitted incident radio waves with the added audio information. Sound waves vibrated a diaphragm which slightly altered the shape of the resonator, which modulated the reflected radio frequency. Even though this device was a covert listening device, rather than an identification tag, it is considered to be a predecessor of RFID because it was passive, being energized and activated by waves from an outside source. Similar technology, such as the IFF transponder, was routinely used by the allies and Germany in World War II to identify aircraft as friend or foe. Transponders are still used by most powered aircraft. Another early work exploring RFID is the landmark 1948 paper by Harry Stockman, who predicted that "... considerable research and development work has to be done before the remaining basic problems in reflected-power communication are solved, and before the field of useful applications is explored."Mario Cardullo's device, patented on January 23, 1973, was the first true ancestor of modern RFID, as it was a passive radio transponder with memory. The initial device was passive, powered by the interrogating signal, and was demonstrated in 1971 to the New York Port Authority and other potential users. It consisted of a transponder with 16 bit memory for use as a toll device. The basic Cardullo patent covers the use of RF, sound and light as transmission media. The original business plan presented to investors in 1969 showed uses in transportation (automotive vehicle identification, automatic toll system, electronic license plate, electronic manifest, vehicle routing, vehicle performance monitoring), banking (electronic checkbook, electronic credit card), security (personnel identification, automatic gates, surveillance) and medical (identification, patient history).[6]

An early demonstration of *reflected power* (modulated backscatter) RFID tags, both passive and semi-passive, was performed by Steven Depp, Alfred Koelle, and Robert Frayman at the Los Alamos National Laboratory in 1973. The portable system operated at 915 MHz and used 12-bit tags. This technique is used by the majority of today's UHFID and microwave RFID tags. The first patent to be associated with the abbreviation RFID was granted to Charles Walton in 1983

E Transformer

A transformer is a static electrical device that transfers electrical energy between two or more circuits. A varying current in one coil of the transformer produces a varying magnetic flux, which, in turn, induces a varying electromotive force across a second coil wound around the same core. Electrical energy can be transferred between the two coils, without a metallic connection between the two circuits. Faraday's law of induction discovered in 1831 described the induced voltage effect in any coil due to changing magnetic flux encircled by the coil.Transformers are used for increasing or decreasing the alternating voltages in electric power applications, and for coupling the stages of signal processing circuits.Since the invention of the first constant-potential transformer in 1885, transformers have become essential for the transmission, distribution, and utilization of alternating current electric power.[3] A wide range of transformer designs is encountered in electronic and electric power applications. Transformers range in size from RF transformers less than a cubic centimeter in volume, to units weighing hundreds of tons used to interconnect the power grid.

VI. WORKING PRINCIPLE

The project contains flex sensor, RFID reader ,load cell,hx711 sensor for implementation of the inputs and for providing the output to the user. The flex sensor gives out the elongation of the cloth and tells whether it is durable or not. The load cell calculates the weight of the cloth and gives it to the Arduino through the HX711 user. The RFID reader scans the RFID tag for the specifications and if they are met, they are said to be good otherwise they are deemed to be average or bad. The transformer regulates the power supply from 12 v to 5 v and distributes the power to rest of the components using the splitter.

BLOCK DIAGRAM

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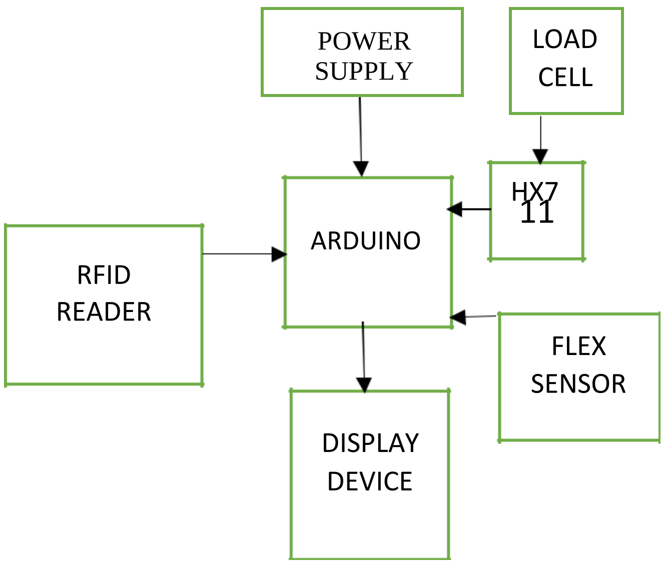
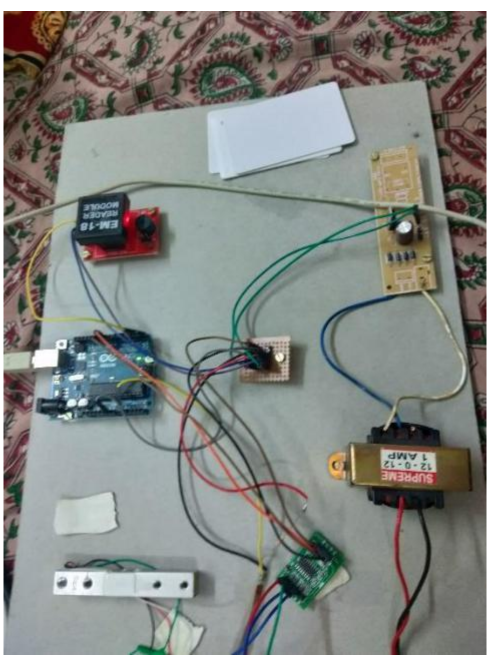
A. *Block Diagram of the system analysing the quality of a fabric*



RESULT

A. *Prototype Of Automated Trash Collector*



B. *Output of a example product*

```
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
0
Load : 0.0 pounds
210087E3C98C
MOMME = 12 mm
NO OF COUNTS = 200
ENDS PER INCH = 15
AIR PERMEABILITY = 10
AVERAGE PRODUCT
0
```

C *Finding the weight using load cell*

```
Load : 1.2 pounds
0
Load : 9.8 pounds
0
Load : 4.1 pounds
0
```

D *Result table*

TYPE OF CLOTH	*LOAD CELL*	*THEORETICAL ELONGATION*	*PRACTICAL ELONGATION*
Cotton	*6.1*	*1025*	*1023*
Wool	*10*	*765*	*767*

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Linen	*8.5*	*580*	*585*

. The proposed system has many advantages over the existing method. This uses various sensors to find out the required quality of the cloth and gives it to the user.Instead of finding the authenticity ,finding the quality gives a customer satisfaction while buying the product. This also enhances the competition among various stakeholders and thus it benefits the customers while buying the cloth.

VII. Project Implementation Summary

The main focus of the proposed system is that it creates awareness among the customers while going to a shop or mall Our idea has the potential to be implemented in markets,retail store and even in the industry. The use of cost-efficient components is of crucial importance to facilitate widespread adoption of the system. Therefore this method usesRFID reader, RFID tag, Flex sensor, load cell , hx711 sensor and the transformer.

IX Recommendations

Our project has the ability to be accepted globally as it is very simple to be implemented. This system is not meant only for retail stores, it can also be utilised in the industry as well.What we have implemented is a prototype of a bigger projects which can adopted by the textile industries.The textile industries can implement this system since they can invest in this efficient system for finding the quality of clothes. The RFID tag can be added in a cloth material in the future like a chip to find out the quality of a cloth

X Conclusion

In this work, we present a system where the components are efficiently used in order to get the desired output..RFID Tags are used in this system as it is a prototype. The RFID reader scans the RFID tag and therefore displays what is there in the tag. 3 tags are used to find whether the quality of the cloth is either good, average or bad. The weight of the cloth acts as a extra parameter and it is measured by a load cell. The transformer and the power supply takes care of the overall operation and ensures that overall supply of power is constant and no anomalies are found while displaying the result. This system implemented globally can prove to be a gamechanger as it is transparent and also creates awareness among the buyers.

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