

AUTOMATIC CLOTH FOLDING AND COLOR BASED SORTING MECHANISM

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Abstract: This paper is the study and design of Automatic Cloth folding and color based sorting mechanism with a result being a cost effective automated system that will fold and sort the clothes without any human intervention. The design of folding mechanism will be sub-divided in to main sections namely the Folding Mechanism and a Sorting Mechanism.

Key Words: Cloth Folding, Sorting Mechanism, Folding mechanism, Arduino UNO, Sensors

I. INTRODUCTION

The textile industry hasn't witnessed the growth in the field of technology aiding the industry to the most optimum of the availability of the mechanism in towards world; that mainly being altogether automation in the manufacturing sector of the textile industry. Our main aim is bringing Automation in the Cloth Folding Technique used in Textile Manufacturing Industry. In addition to the automatic folding mechanism of the cloth, we also intend to introduce more automation by designing an automated sorting mechanism based on the color of the cloth. This will ensure the full automation in textile industry which it has been lacking. The system will be designed with the present available materials and components so as to bring simplicity and more importantly cost effectiveness in the system. The Implementation of the entire assembly can be easily incorporated with the current system being used in the industry without any high volume changes.

II. LITREATURE SURVEY

- The textile industry in INDIA currently doesn't use the automation in cloth folding and sorting mechanism based on color of the cloth.
- It is very necessary to bring automation according to the literature survey only 89% of manufacturers uses any kind of automation in INDIA
- The Indian textile and clothing industry currently accounts for about 16 percent of industrial production and about 4 percent of GDP.
- It employs close to 82 million people, 35 million and 47 million in the textile and allied sectors respectively.
- The total employment by 2015 will be close to 99 million people, 42 million and 57 million in the textile and allied sectors respectively
- There is very high demand to bring in automation in the cloth folding as well as in the sorting mechanism in the manufacturing industry and also in high

maintained mechanically operated laundries.

- Currently in laundries mechanism used is only limited to cleaning and ironing of cloths and not on the distribution or sorting of the cloth in INDIA. But cloth folding mechanism majorly found in U.S and CHINA.
- The distribution and sorting of the cloths is a very time consuming effort and prone to error manually, the automation in this field will save time and error free distribution or sorting of cloth can be achieved.

III. PROPOSED MODEL

The mechanism is designed with the help of the some technologically advanced and error free components such as Arduino UNO, DC motors, Ultrasonic Sensors and IR sensors, The cloth folding mechanism has been prepared with the help of wooden ply, aluminum holders and hinges for solid rigidness and of the system. The color sorting mechanism makes use of a small robot to carry the cloth to the desired path making the overall mechanism futuristic as well as technologically advanced and an overall system the industry is yet to witness.

A. Folding Mechanism

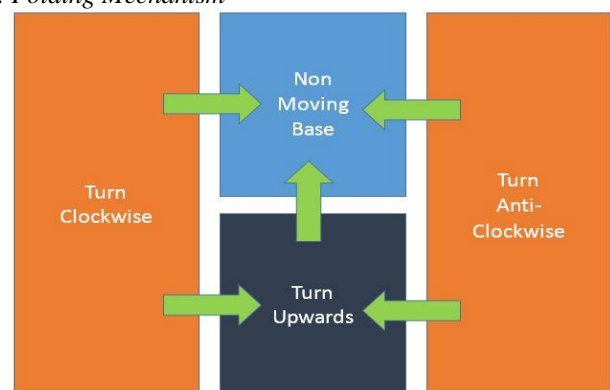


Fig. 1 Block Diagram of Folding Mechanism

The folding mechanism is made up of the Arduino UNO board, DC motors which are mounted on the wooden ply which acts the platform in the mechanism on which the cloth to be folded in placed. The schematic block diagram has been shown the figure. The mechanism has four steps to perform in order to execute the overall folding of the cloth. The aluminum rods are connected to the DC motors which turn the flaps i.e. the wooden planks in clockwise or anti-clockwise direction and the final half fold in the upward

direction. The DC motors which are mounted on the aluminum rods are interfaced with the Arduino Uno and programmed to perform the rotations required to perform the necessary folds.

B. Sorting Mechanism

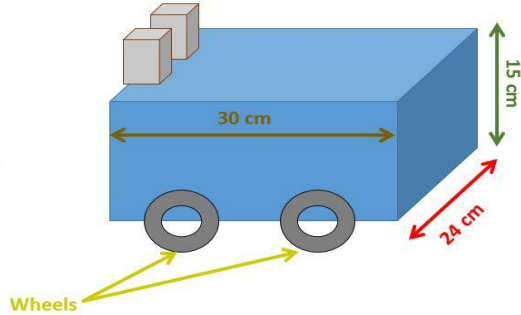


Fig. 2 Sorting Mechanism Robot

The robot is basically the heartbeat of the cloth sorting mechanism. The overall assembly of the cloth sorting mechanism is placed on the robot which is as shown in the following figure. The Arduino UNO board is mounted on the robot. The IR and Ultrasonic sensors which are interfaced with the Arduino Board are paced on the robot as shown in the following figure. The dimensions of the board are shown in the figure.

IV. COMPONENTS

A. Ultrasonic Sensor for Obstacle Sensing



Fig. 3 Ultrasonic sensor

The ultrasonic sensor provides an easy method of distance measurement. This sensor is perfect for any number of applications that require you to perform measurements between moving or stationary objects. Interfacing to a microcontroller is a snap. A single I/O pin is used to trigger an ultrasonic burst (well above human hearing) and then "listen" for the echo return pulse. The sensor measures the time required for the echo return, and returns this value to the microcontroller as a variable-width pulse via the same I/O pin.

Specifications:-

Working Voltage	-5V (DC)
Working Current	- 15mA
Working Frequency	- 40Hz
Max Range	- 4m
Min Range	- 2cm
Measuring Angle	- 15°
Dimension	- 45*20*15mm

B. Arduino UNO

Arduino is a flexible programmable hardware platform designed for artists, designers, tinkerers, and the makers of things. Arduino's little, blue circuit board, mythically taking its name from a local pub in Italy, has in a very short time motivated a new generation of DIY of all ages to make all manner of wild projects found anywhere from the hallowed grounds of our universities to the scorching desert sands of a particularly infamous yearly arts festival and just about everywhere in between. Usually these Arduino based projects require little to no programming skills or knowledge of electronics theory, and more often than not, this handiness is simply picked up along the way. Central to the Arduino interface board, shown in Figure, is an onboard microcontroller—think of it as a little computer on a chip.



Fig. 4 Arduino UNO

Specifications:-

Operating voltage	- 5V
Input voltage (recommended)	- 7-12V
Input voltage (limits)	- 6-20V
Digital I/O pins	- 14
Analog Input Pins	- 6
DC current per I/O Pin	- 6
Flash Memory	- 32KB
SRAM	-2KB
EEPROM	-1KB
Clock Speed	-16 MHz
Length	-68.6 mm
Width	-53.4 mm

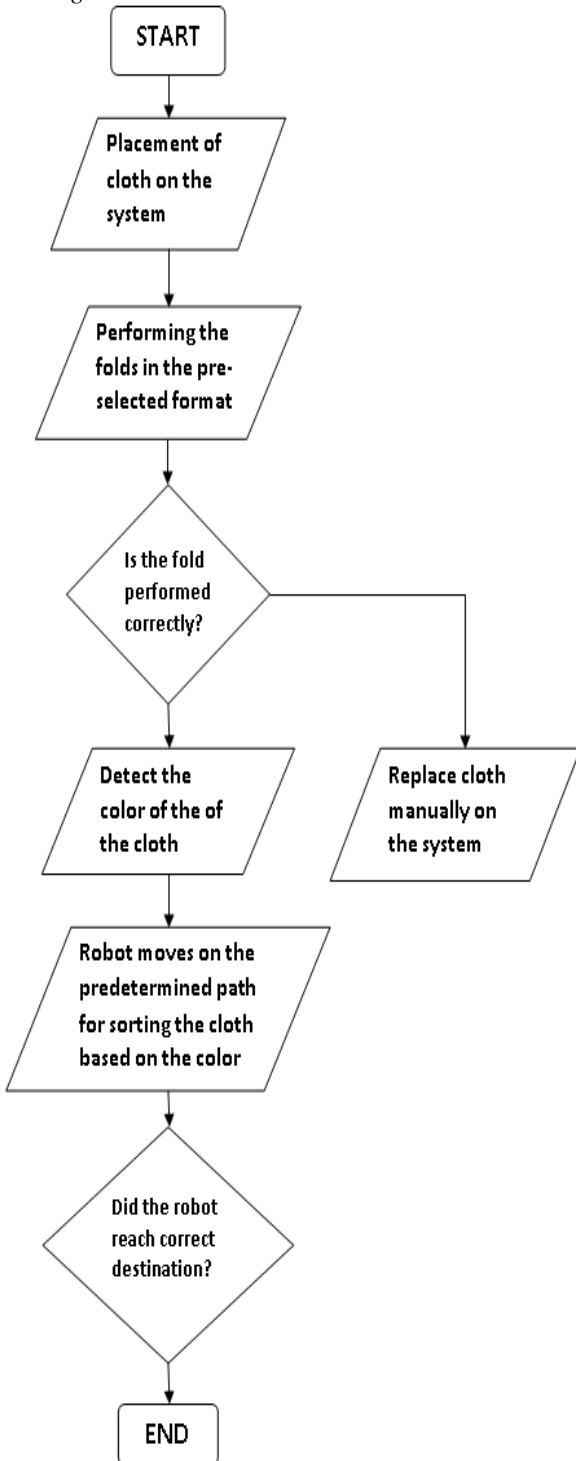
V. WORKING

The working mechanism of the overall system has been framed in a very simple algorithm and logic for its easy implementation in the industry. The mechanism makes use of two Arduino UNO boards of which one is placed on the folding mechanism and other is placed on the cloth sorting mechanism. The DC motors are interfaced with the Arduino UNO placed of the folding mechanism and the Ultrasonic and IR sensors are interfaced with the Arduino UNO placed on the Robot in the Cloth sorting mechanism.

The detailed overall working of the mechanism has been subdivided into two main sections:

- Folding Mechanism
- Color based Sorting Mechanism

A. Working Flowchart



B. Folding Mechanism

Steps of Operation

- Placement of cloth on the board
- Clockwise rotation of DC motor mounted to the rod of the board to perform the 1 st fold
- Anti-clockwise rotation of DC motor mounted to the rod of the board to perform 2st fold
- Upward Clockwise rotation of the board to perform

the half and final fold of the cloth

- Placement of cloth on the moving board(robot) for further process of cloth sorting

C. Color based Sorting Mechanism

The Robot is main engine of the sorting mechanism. The color sensors located on top of the robot detect the color the color of the cloth and on accordance with the color, the cloth is sorted in the respective area as shown in the below schematic diagram of the color sorting arena.

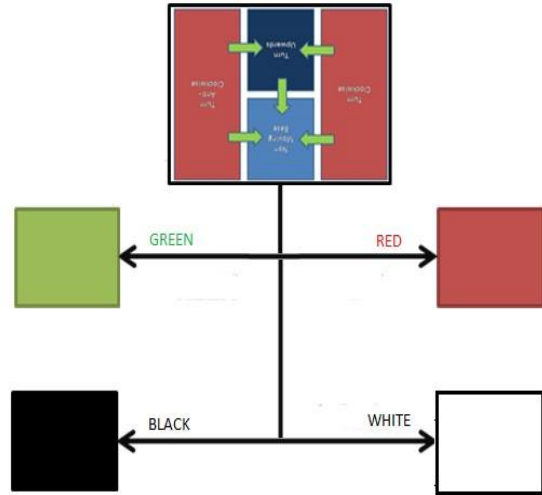


Fig. 5 Color sorting arena

After the sensors have detected the color of the cloth placed, the Arduino board commands the robot to move I the desired arena in accordance with the cloth color. The overview of the color sorting arena is as shown in the figure. The robot will move in the color blocks based on the colors that have been detected accordingly.

VI. ADVANTAGES

- The textile industry currently doesn't use the automation in cloth folding and sorting mechanism based on color of the cloth.
- There is very high demand to bring in automation in the cloth folding as well as in the sorting mechanism in the manufacturing industry and also in high maintained mechanically operated laundries.
- Currently in laundries the mechanism used is only limited to cleaning and ironing of cloths and not on the distribution or sorting of the cloth.
- The distribution and sorting of the cloths is a very time consuming effort and prone to error manually, the automation in this field will save time and error free distribution or sorting of cloth can be achieved.

VII. CONCLUSION

Thus by with the use of Arduino UNO and the proposed model in the paper we aim in bringing automation in the textile industry we also aim to build a product with a lower maintenance cost and easy replacement of any part. We are also making sure that the raw material is easily available in the market.

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