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Automatic Cloth Folder

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Abstract

This project entitled "Automatic Cloth Folder" serves and functions as the fabric/cloth folding device and/or machine for fabrics such as T-shirts, shirts in predefined pattern or packaging requirements automatically. This project runs on Arduino microcontroller, Servo motors and slotted adjustable wooden platform. By putting target cloth/ fabric on platform and pressing GO button on dedicated keyed remote controller this machine will automatically folds the target cloths/fabrics in required pattern.

Keywords- *Arduino microcontroller, Servo motors, Adjustable slotted wooden platform, Keyboard controller*

I. INTRODUCTION

This document provides and fulfills desired idea, concept and working methodology with design implementation of Automatic Cloth Folder. To conquer time consuming yet tedious manpower behind one of the field of entire Textile Industry this idea was born. Before reaching to consumers hands the cloths and fabrics, came from manufacturing process and folding- packaging process. After manufacturing one of the major task is to packing and not just ordinary packing, it has to be so durable so it can bear the transport and shipping conditions and protects the cloths till it reaches to consumers. This Automatic cloth folder machine will automatically packs the target cloth without interruption and with accuracy and yet saves the incredibly great time as far as manpower concerns. To achieve the one of the task among packing and folding this device will only serving folding operation. For that it uses Arduino Nano microcontroller board having Atmel's SMD SOC numbered ATMEGA-328. It contains 14 digital Input/ Output pins among which 6 of them serves as the PWM digital Output pins. Among of 6 PWM channels this device uses 3 PWM for direct interface of Servo motors to Arduino Nano microcontroller. A small two key remote controller is provided for below processes

1. **Go** Key- For start the folding operation after putting cloth on the platform
2. **Stop** Key- For emergency stop button

After the pressing Go key, machine will automatically folds the cloths and automatically **resets** itself for new target cloth. So yes, entire operation is so simple that this machine can be operated without any skilled technicians or trained human being. The version which represented here is small scale prototype version of actual version.

II. MOTIVATION

This section discusses the origin of entire idea came into existence. Authors of this paper attempted technological survey of Ahmedabad's well known Cloth Market. This is main hub of entire city and may be even for entire Gujarat state for cloth manufacturing and packaging and distribution chain. While surveying the market, authors observed at some area that manpower is not utilizing its optimum value at folding stage of cloths after it reaching to suppliers after manufacturing process. That was the turning point of entire idea and authors took responsibility to at least build a prototype which can be implemented as furthermore for Technological Advancement for Textile Industry.

III. DESIGN

In this section different yet major component and tools discussed such as hardware and software as well.

3.1. Arduino Microcontroller

Arduino Microcontroller is nowadays very rapid and small prototyping compact micro-controller system for hobbyists, artists and engineers to design small project based on microcontroller. This controller used its own developing environment called as Arduino IDE. Automatic Cloth Folder uses Arduino Nano microcontroller.

Arduino Nano is AVR based Atmel AT-Mega 328 microcontroller with clock speed of 16 MHz and 14 Digital Input/ Output pins with 6 analog inputs and 6 PWM (Pulse Width Modulation) output pins. Servo motors of this system are connected on these PWM pins of Arduino Nano.

3.2. Servo Motor

A motor is used to convert electric current to motion. Current may be alternating or direct, depending upon application. As far as motion concern electric motor used to rotate 360, but some specific application such like one is requires only few degrees of rotation. To achieve this accurately Servo motor is used. Servo motor rotates 0-180 instead. In Arduino IDE there is library available for Servo motors for easiness and fast interfacing. For this Arm three servo motors used to get desired motion of Arm and a separate 5VDC power supply.

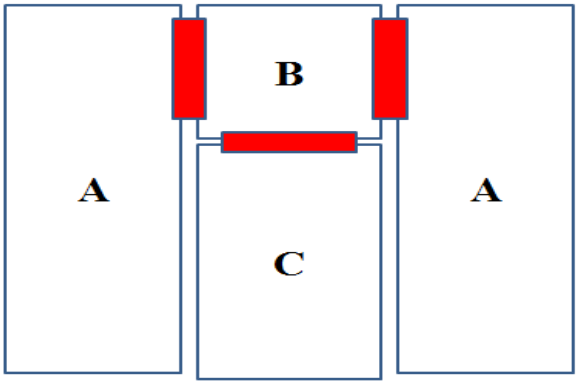
3.3. Keyed Remote Control

A small 2-Key pushbutton switch is interfaced with the system to operate. Keys are labeled as below

a. **GO** key- For start the folding operation after putting cloth on the platform
b. **STOP** Key- For emergency stop button

IV. WORKING METHODOLOGY

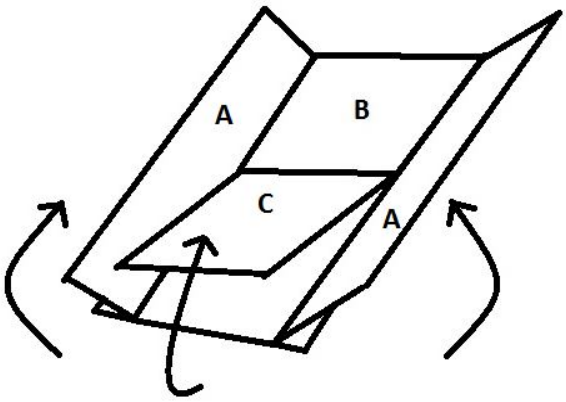
This section covers the working methodology of the Automatic Cloth Folder.



4.1. Platform Configuration

Above diagram shows the simplified cloth folding platform. The platform itself folds and then its folds the cloth or target cloth after putting on it and pressing GO button. The RED joined area shown on above figure are the joints for Servo motors. After GO button is pressed the sequence of program runs in this way, A(left)-A(right)-C-B.

4.2. Platform movement/ position



The diagram in second picture makes this idea very clear. Entire motion is lateral with respect to platform B. Platform section B remains in no motion and used as collective platform section.

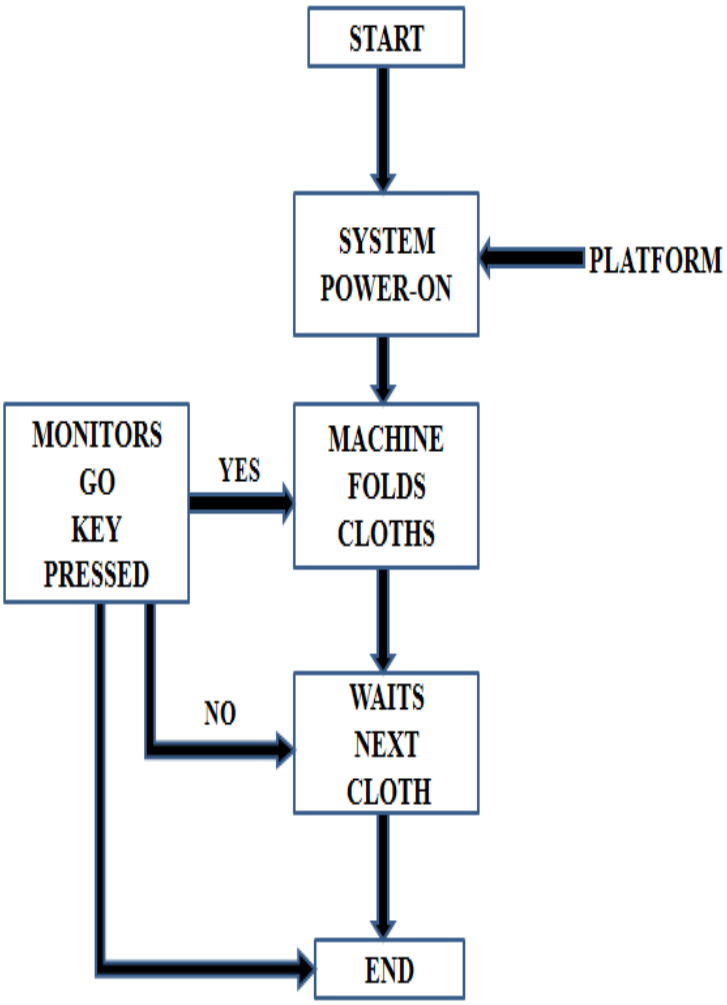
4.3. Program Execution Flow

The sequence of the program called and defined here is "sequencer". First it will after pressing Go button

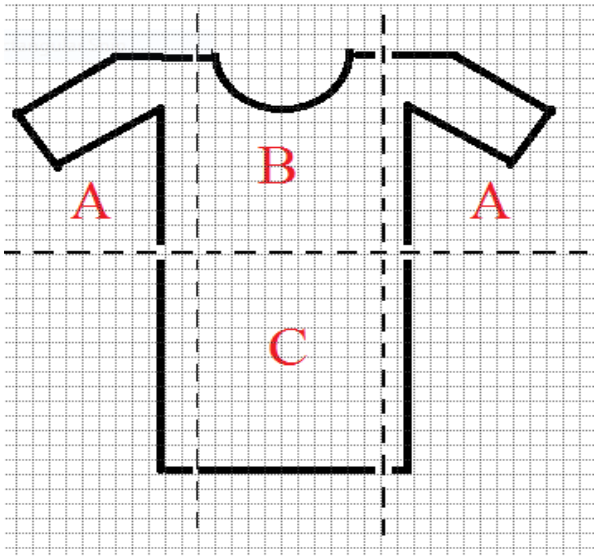
a. Turns left A section to 180° clock-wise
b. Comeback to original position section left A by 180° counter clockwise direction
c. Turns right A section to 180° counter clock-wise
d. Comeback to original position section right A by 180° clockwise direction
e. Turn the platform C to upward direction by 180°
f. Comeback platform C to downward direction by 180° to its original position
g. Comeback all the motors in their original position

- All the a-g are restricted to POV top view of 4.1 diagram

4.4. Final Flow Chart



4.5. Final Folded Cloth



Above diagram shows how the actually cloth is being folded step by step using this machine using only 3 Servo motors. For this project the platform is used is 5mm plywood is used. Servo motor is used are all metal gear and uses all metal horns to grab the wooden platform sections.

V. CONCLUSION

Concluding this article, this project is under testing and under execution stage with calibration. Its functionality can be made unique by autosensing the cloth automatically. Advancing further a single human supervision alone needed for up to 10-20 machines alone. The main advantage of this machine is it has very or handful components to take care of. Decreasing its maintenance and increase in productivity with efficiency exponentially.

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