Praful Randive, et. al. International Journal of Engineering Research and Applications
www.ijera.com
ISSN: 2248-9622, Vol. 12, Issue 5, (Series-II) May 2022, pp. 20-23

RESEARCH ARTICLE OPEN ACCESS

Design and Fabrication of Automatic T-shirt Folding Machine

Praful Randive
Professor
Mech. Engg. Dept
AGPCE Nagpur

Vijay Talodhikar
Professor
Mech. Engg. Dept
TGPCE Nagpur

Maninder Singh Ghatode
UG Student
Mech. Engg. Dept
AGPCE Nagpur

Tanmay Taywade
UG Student
Mech. Engg. Dept
AGPCE Nagpur

Harish Kudewal
UG Student
Mech. Engg. Dept
AGPCE Nagpur

Shubham Ughade
UG Student
Mech. Engg. Dept
AGPCE Nagpur

Pandit Thombre
UG Student
Mech. Engg. Dept
AGPCE Nagpur

Abstract – This T-shirt folding is not difficult to use for any age of people and its economically very useful process in the world of tortoise and rabbit race. The motive of this project is to fold T-shirt by just push a button. This machine is fully automatic where one has to just put down the T-shirt on the flip board and push the start button and within fraction of second the T-shirt will get folded. This machine will definitely very helpful or useful for Laundry, Hospitality and for Household. In this machine, we use four dc motors in which they control the folding motion and rotate the flip board according to a program insert in an arduino which uses microcontroller. The microcontroller use in this machine is controls the overall motion of the folding. The outcome shows that by using this system, the time for folding clothes by manual method can be reduced by this machine.

Date of Submission: 04-05-2022 Date of Acceptance: 18-05-2022

I. INTRODUCTION

In this era, human beings have been living with busy schedule in their daily life. That is why Automation is required to make less the work load or time. Everyone nowadays wants fast delivery and standard quality in product. If you want to sustain in the markets for a long time, automation is needed for every organization to complete the customer requirement. Automation is used in industry to increases productivity in the production of goods and delivery of services. The main intention for applying automation in industries is to increase productivity, and quality beyond that possible with current human labor levels to become cognizant to economies of scale, and perceive expected quality levels. In the scope of industrialization, automation is a step forward of mechanization. Whereas mechanize machine required human operators with machine to assist them, automation decreases the requirement of human sensory and mental requirements while optimizing load capacity, speed, and repetition. Automation plays vital role in the world economy and in daily experience.

II. LITERATURE REVIEW

N. Gomeshal et. Al Photovoltaic powered t-shirt folding machine offers an excellent solution to these work by providing a automated machine which folds a t-shirt approx. in 2 seconds .Finally, the t-shirt folding machine has been more efficeints as compared to manual folding.

Suraj Shah et. Al takes one jump against automation by folding the t-shirts by sorting mechanism. Folding has been automated by the usage of micro-controller which can be easily replaceable and easily available in shops.

Xudong li et. Al works on the safety of people during the folding of clothes, they include photo sensors and infrared sensor to track the human invasion, they also found solution on power supply.

Mukesh P. Mahajan et. Al works on using mechanical gear motors in folding machine whereas same as the photovoltaic t-shirt folding machine. To overcome this conventional task it can be used in household also. This will results on the past

complex designs and rare failures.

Yiwei Liu et. Al deals with the process and design, the main motive of this machine is to reduce human interference by using folding machine. It must have two place of patterns and also completes in just 20 seconds.

S. Divya1 I. K. Santhosh David2, M. A. Prince Ray Raj T- shirt folding is a process used to pack the clothes and keep them neat and tidy. The textile industry hasn't observed the growth in the field of automisation in the manufacturing sector of the clothing industry. In addition, automisation mechanism has been used in this machine. Automation has been attained by designing with the help of sensors and other actuators. This will brings a automated technology in textile industry which it has not been appearance for years.

At present the system will be generate based on materials and components available to bring simple and cheap cost in the system. The whole system can be easily execute to the current system without any high changes in the industries.

Bansari Shetye, Pooja Randive, Snehal Shedbale T-shirt folding process is not difficult to use and very useful process in this world. The main intension of this project is to fold t-shirt by just pressing a button. This folding machine is fully automatic where one have to just place the t-shirt on the flip board and push the start button and within fraction of seconds the t- shirt will get folded.

III. PROBLEM DEFINITION

According to literature survey only few of textile manufacturing uses some variety of automation in INDIA. In a manual folding process, For folding 'm' number of t-shirt in textiles industry, hospitality and laundry is very tedious process. As it takes 18-20 second for a single t-shirt, so the time consumption for the folding t-shirt also very high.

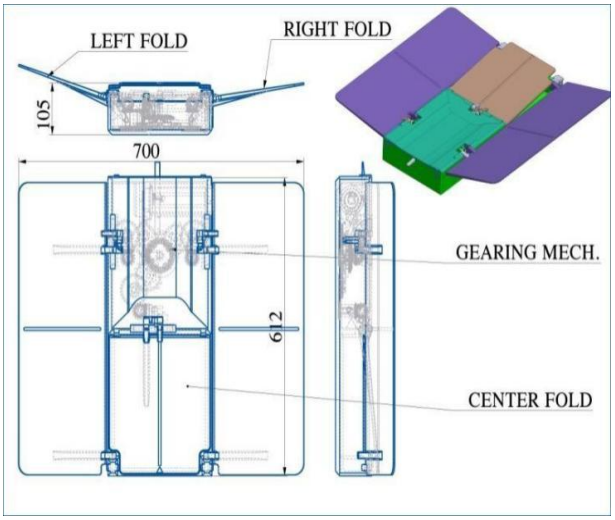
The folding of manual process causes error in folding and sorting mechanism and the capacity to fold clothes in same size.

It cost approx Rs 30 to fold 100 t-shirt manually, so that the manual folding is not time efficient as well as cost well suited for textile industry.

Suggest Methodology of solving Identified Problem

For folding one T-shirt manually human takes approx 18- 20 seconds, but T-shirt folding machine hardly takes approx 3 – 5 seconds for folding a single T-shirt. If we take comparison between manual folding and automatic folding machine, for 1 hour manual (3600 seconds) folding by human only folds 170 T-shirt, whereas automatic T-shirt machine can fold 860 T-shirts in same 3600 seconds. Comparison between two automatic t-shirt folding machine and manual folding, Efficiency of T- shirt folding machine is so much greater than the manual folding.

Automatic T-Shirt Folding Machine (ATFM) is cost well suited than other folding mechanisms when a worker in large scale industry folds approx 1600 cloths per day at a salary costs approx Rupees. 500, The ATFM reduces the time to fold cloths and it folds approx 7500 cloths per day costs approx Rupees. 500.



In case some sample/prototype has to be fabricated then its tentative design and procedure for making.

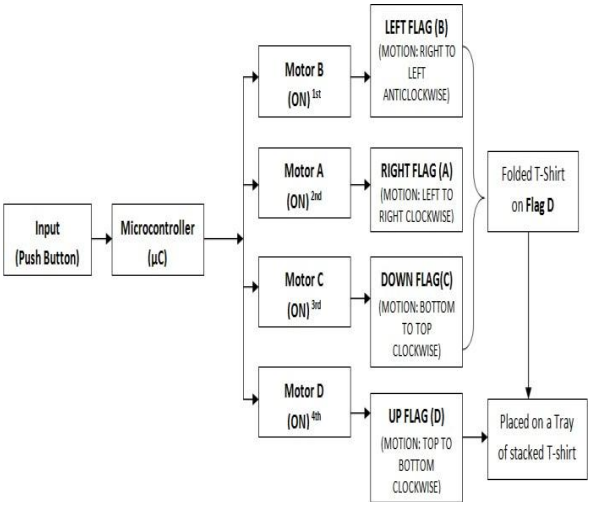


Chart -1: work flow chart

Process of this automatic t-shirt folding machine will start once the push button is pressed. When the push button is pressed,

Motor A or flag will rotate clockwise. Once it come to the time set in the program, it will stop. Then motor A or flag will back to the original position by rotating counterclockwise. Then the flow of the motor will be same for motor B, C and motor D simultaneously. This process is simplified in Figure.

The folding motion of this machine is track by the motor which is attached with the folding material listed as Motor A, B, C and D as in figure. Motor A is the first motor to rotate clockwise where it will make the A flag to rotate from right to left. Then follows by motor B will lift up and make flag B to rotate from right to left. Then followed by motor D from bottom to top to complete up the folding mechanism and finally motor C will move from top to bottom to move the folded t-shirt on a conveyer tray that will stacked the folded t-shirt. This machine motion is continues until the t- shirts are finish.

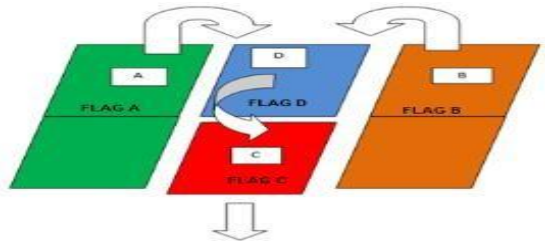


Fig: Flag Mechanism

Advantages

Speed: A folding machine can fold many more clothes per hour than even than someone doing it manually.

Cost: A folding machine has the capacity to reduce the manpower and time required to fold clothes. Think about it, folding that conventionally may have needs a team of manpower to manually fold and stack the clothes could be automatically completed in a fraction of the time.

Consistency: If one have ever spent time ironing, folding and stacking clothes, they knew how difficults it is to be consistent. The chances of folding and stacking every clothes in exactly the same pattern are pretty slim.

Accuracy: Another common issue with manually-folded clothes is accuracy. When people are folding a lot of clothes, they will get tired. Fatigue sets in. Mistakes happen. Most modern folding machines are fitted with advanced features, such as fast folding time and ironing, which helps greatly to reduce the chances of these issues occurring**.**

Parameters to Analysis:

{1} Time

When human manually fold t-shirt , it take approximate 8 seconds to fold one t-shirt but with using this t-shirt folding machine that time is reduced to 2 seconds.

{2} Size

When a human manually fold t-shirt, the size of every fold varies with the t-shirt size. But when a machine fold a t-shirt is size does not varies with size, its means that every fold of t-shirt will give a same size and pattern.

IV. EXPECTED OUTCOME:

Table 1 given below shows that time completed to fold 1000 t-shirts. From the it shows that by using this t-shirt folding machine, time to fold 1000 pieces of t-shirt will only take 35 min compare to manually folding the t-shirt which take up to an hour and 8 min. This clearly shows that the time saved by using the machine is approximately half an hour compare to manually folding 1000 t-shirt.

	Human	Machine
Folding time (sec)	Nearby 28 to 30 sec	7 sec + 1 sec (t-shirt sensing delay)=8 sec
1000 t-shirt (min)	500mins/approx. 8 hrs	150min/ approx. 3 hrs

V. CONCLUSION

The traditional way of house hold refrain, in terms of folding t-shirts are now done faster and did not need high attention or observations. With the help of micro-controller and dc motors proposed prototype / sample is developed with the aim of automation in textile industry or garments. This project is very helpful for small scale textiles or garments, where shirt are fold by manual method. This machine helps these types of garments to reduce their work time, also increase work efficiency and this machine needs only one person to operate it.

Using this machine every small scale textiles and garments profits increases minor and it is helpful.

REFERENCES

[1]. N. Gomesh, I.Daut, V.Kumaran, M.Irwanto, Y.M.Irwan, M.Fitra "Photovoltaic Powered T-Shirt Folding Machine" Energy Procedia 36 (2013) 313 – 322.
[2]. Suraj Shah, Utkarsha Mahajan, "Automatic cloth folding and color based sorting mechanism" IJTRE, Volume 2, Issue 7, March-2015
[3]. Xudong L, I Anran Su, Suicheng Zhan "automatic cloth folding machine". Senior Design, spring 2017TA: Yuchen He3 May 2017
[4]. Mukesh P. Mahajan, Srishti Prasad, Tejal Binnar, Monika Tambe Automatic T-shirt Folding Machine. International Journal of Computer Applications, Volume 162, No 10, March2017
[5]. Liu, Yiwei; Tran, Dung; and Wang, Kexin, "Cloth Folding Machine" (2017). Mechanical Engineering Design Project Class.66.
[6]. S. Divya I. K.Santhosh David2, M. A. PrinceRay Raj1Assistant Professor, Dept. Of Mechanical Engineering, Sri Eshwar College of Engineering, Coimbatore, India 2,3UGStudent, Dept. of Mechanical Engineering, SriEshwar College of Engineering, Coimbatore, India.
[7]. Bansari Shetye, Pooja Randive, Snehal Shedbale U. G. Students, department of Entc, Bharti Vidyapeeth's Collage of Engineering, Kolhapur, Maharashtra,India.

Praful Randive, et. al. "Design and Fabrication of Automatic T-shirt Folding Machine." *International Journal of Engineering Research and Applications (IJERA)*, vol.12 (05), 2022, pp 20-23.