Semi-Automation of Palembang Typical Tajung Cloth Weaving Tools Based on Internet of Things

Eka Susanti[1*], Adewasti[2], Abdul Rakhman[3], Sholihin[4]

[1-4]*Politeknik Negeri Sriwijaya*
Srijaya Negara Stret, 30139,Indonesia
ekasusanti@polsri.ac.id

Abstract. *Weaving is a fabric made through a weaving process with the technique of crossing warp yarn and weft yarn. Tajung cloth is a typical Palembang fabric without gold thread and is usually used by men as a sarong. has been known since the time of the Palembang Sultanate. The process of making Tajung fabric takes a long time, from dyeing natural yarn to winding, bombing, and weaving. Although Tuan Kentang village in Jakabaring District, Palembang is the center of woven fabric production. However, the tools used are still traditional. The number of artisans is still minimal due to the lack of interest of the younger generation. To overcome the shortage of human resources, the use of automatic looms based on the Internet of Things (IoT) is an effective solution. IoT technology used for data transmission through the network can replace the role of humans in the weaving process and improve the production efficiency of Jung fabrics. With these problems, the use of information and communication technology can make Tajung fabric looms based on the Internet of Things (IoT). The development of IoT can be seen starting from the use of the Massachusetts Institute of Technology (MIT) application and is also assisted by the strength of key components such as power supply, Motor Driver, DC Motor and Nodemcu ESP 32. By using these elements, it is possible to create a semi-automatic Tajung fabric loom that is expected to help produce Tajung fabric.*

Keywords*: **Weaving, Tail Fabric, Internet of Things, power supply, Motor Driver, MIT application, DC Motor, Nodemcu* **ESP 32**

1. Introduction

Weaving is a fabric created from the weaving process using the technique of crossing warp yarn with weft yarn and accompanied by dyeing techniques using natural materials. In South Sumatra, woven fabrics have been known since the time of the Palembang sultanate. One of them is the Jung cloth. Tajung is one of the woven fabrics without gold thread that is usually used by men as sarongs.

The process of weaving tajung cloth is quite long. Starting from the yarn dyeing process using natural materials. Next, the yarn that has been given the color will be rolled on the warp or yarn roll place. After that, there will be a process of inserting the strands of yarn into the iron (Gun). This process is commonly referred to as yarn bombing. This yarn bomb takes 10 days because of the yarn drying process and also the process of inserting yarn into the Gun. The gun functions to arrange the thread as well as the formation of a fabric pattern, where this gun will move up and down alternately which is moved using the foot.

After the yarn passes through the Gun, it will then pass through the weaving comb on the hand hand (hand pull). The weaving comb functions so that the yarn does not get tangled when weaving. In hand gedogan, you need binoculars that contain a pallet of

N. L. Husni et al. (eds.), *Proceedings of the 8th FIRST 2024 International Conference on Global Innovations (FIRST-ESCSI 2024)*, Advances in Engineering Research 261,
https://doi.org/10.2991/978-94-6463-678-9_9

weft threads (horizontal threads). When gedogan (hand pull) is played, the binoculars will automatically pass through the thread and start weaving.
One of the cloth weaving places that still uses traditional methods is in Tuan Kentang village located in Jakabaring District, Palembang. In Tuan Kentang village, it is designated as a destination for woven fabric producing cities and also as the economic center of the city of Palembang. Although Tuan Potato is the center of making typical Palembang fabrics, the number of craftsmen who work on the fabric is still small, especially the production of end fabrics. The declining interest of the younger generation in the world of weaving to make Tajung fabric must be the concern of the community and the Palembang City Government so that this typical Palembang fabric remains sustainable [1].
With these factors, a creative idea arose to be able to divert the production of tajung fabric by using a semi-automatic fabric loom that can be controlled through *Mobile*. This semi-automatic is a combination of manual and automatic movements. This movement is in the form of binoculars movements in gedogan (hand pulling), where the movement is a combination of automatically moved hand pulling movements and binocular movements that are still driven using human power.
With the use of information and communication technology so that it can make Tajung fabric looms based on *the Internet of Things*. *The Internet of Things* is a concept or program where an object has the ability to transmit or transmit data over a network. One of the developments in IoT can be seen starting from the use of *the* MIT application. And assisted by several main components such as *switching power supply*, *motor drivers*, power from DC motors and Nodemcu ESP 32.
So, with the Internet of Things-based automation technology for Tajung Cloth Weaving Tools typical of Palembang, it can speed up the process of weaving Tajung cloth, which can streamline the time, place and human resources needed and increase production results.

2. Method

The research method used is by searching and collecting data about the object to be created from scientific books, magazines, reports or other sources. Design and match with theories obtained in lectures, the internet and sharing with several sources trusted by the research team. Enter formula variables to obtain an empirical approach and some supporting data in designing.
The aim of the technology implementation plan is to produce a tool that has an accurate design structure and is in accordance with what has been designed. If the research team carries out the design stage well and meets the specified standards, then the designed tool will operate as expected. Electronic design is about all stages related to all device circuits, for example circuit layout schemes and component installation.
While, mechanical design is the process of completing a tool which includes making tool mechanics to optimize the appearance of the tool being made. Below, a research flow chart will be displayed for each stage that the researcher will carry out

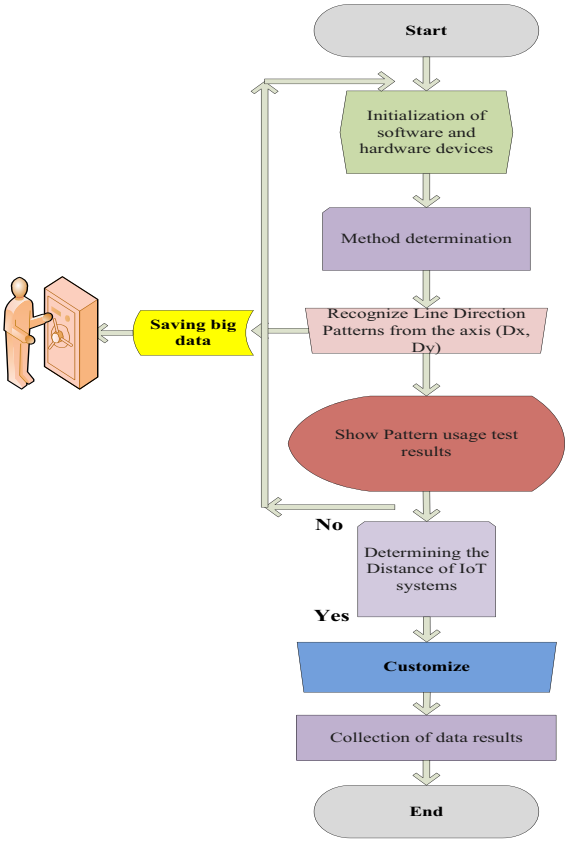

Fig.1. Flowchart of the Internet of Things-Based semi-Automation of Tanjung Cloth Weaving Tools Typical of Palembang

Next, the research team will design a tool that is a description of the tool that will later be made. The design of this tool displays the front view, back view and side view of the design of the tool. The design of this tool also displays the layout of the components that will be used in the tool. The following is an overview of the automation of Palembang's Typical Tajung Cloth Weaving Equipment Based on Internet of Things.

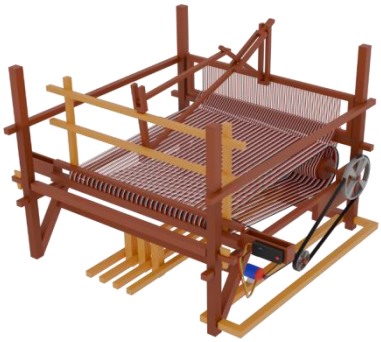

Fig.2 Design of semi-Automation for Tajung Cloth Weaving Equipment Typical of Palembang Based on Internet of Things

3. Result and Discussion

After taking measurements on the traditional tajung cloth loom, the data results were obtained in the following time.

Table 1. Measurement of Traditional Jung Fabric Loom

No.	Time	Measurement Results (Fabric length)
1.	1 minute (60 seconds)	3 cm
2.	5 minutes (300 seconds)	8 cm
3.	10 minutes (600 seconds)	15 cm
4.	15 minutes (900 seconds)	22 cm
5.	30 minutes (1,800 seconds)	30 cm
6.	1 hour (3,600 seconds)	56 cm
7.	2 Hours 10 minutes (9,000 seconds)	120 cm

After taking measurements on the tajung cloth weaving tool through *Internet of Things* and *Bluetoot*. So, the data results are obtained in the following time.

Table 2. Testing the NodeMCUESP8266 wifi signal connection distance

No.	Time	Measurement Results (Fabric length)
1.	1 minute (60 seconds)	1.5 cm
2.	5 minutes (300 seconds)	4 cm
3.	10 minutes (600 seconds)	8 cm
4.	15 minutes (900 seconds)	14 cm
5.	30 minutes (1,800 seconds)	25 cm
6.	1 hour (3,600 seconds)	45 cm
7.	2 hours 30 minutes (9,000 seconds)	120 cm

After measurements, data was obtained that it took 2 hours and 30 minutes to produce one semi-automatic woven tajung cloth. After a trial of weaving fabric, it was found that the result for weaving one piece of tajung cloth was not much different between traditional and semi-automatic looms. In traditional loom tools, it takes 2 hours and 10 minutes, while semi-automatic takes 2 hours and 30 minutes. There is a 20-minute time difference between the two tools. This is due to the factor of the movement of components that move alternately and also the time delay given to the gedogan to move the binoculars manually on a semi-automatic loom. So that the fabric weaving results are less than traditional tools.

Fig. 3 Weaving Results of Semi-automatic Loom Loom Fabric

Table this below, we will present some of the results of the movement test on binoculars on a semi-automatic tajung cloth looming tool, including.

Table 3. Motion Test on Binoculars during Fabric Weaving

Time	Binocular Movement		Information
	Succeed	Constraints	
1 Minute	4 times	3 times	When the binoculars are moved from right to left or vice versa, it has been calculated that during 1 minute the binoculars move 7 times. With 4 binoculars successfully driving perfectly and 3 binoculars experiencing problems. The obstacle is that the binoculars are related to the thread.
5 Minutes	20 times	15 times	When the binoculars are moved from right to left or vice versa, it has been calculated that during 5 minutes the binoculars move 35 times. With 20 binoculars successfully driving perfectly and 15 binoculars experiencing problems. The obstacle is that the binoculars are related to the thread.
10 Minutes	40 times	25 times	When the binoculars are moved from left to right or vice versa, it has been calculated that during a period of 10 minutes the binoculars move 65 times. With 40 binoculars successfully driving perfectly and 25 binoculars experiencing problems. The obstacle is that the binoculars are involved in the thread and the binoculars move out of the gedogan (hand pull) path.
15 Minutes	50 times	25 times	When the binoculars are moved from left to right or vice versa, it has been calculated that during a period of 15 minutes the binoculars move 75 times. With 50 binoculars successfully driving perfectly and 25 binoculars experiencing problems. The obstacle is that the binoculars are involved in the thread and the binoculars move out of the gedogan (hand pull) path.

4. Conclusion

This tool has three modes, namely *Internet of Things* (IoT), *Bluetooth*, and manual buttons. These three modes cannot be run at the same time. If the manual button is active, the tool will ignore IoT and *Bluetooth modes* and will work following the manual button.
Testing on the use *of the Internet of Things* (IoT) depends on the signal strength used. The long delay is due to slow signal speed and vice versa.
The woven fabric produced by this semi-automatic tajung fabric weaving tool is less than the weaving result of traditional tools. This is because the components installed on the loom move alternately and there is a delay given to the hand swing to move the binoculars.
The speed of the DC motor greatly affects the working of the tool. If you use a DC motor with low voltage, then the gedogan and gun cannot run. Therefore, a DC motor with a large voltage is needed, namely on this loom device installed by 12 volts.

References

1. Suci Amin, E. D. (2020). DETERMINAN PERKEMBANGAN BAYI DI UPTD PUSKESMAS. *Al-Asalmiya Nursing / Vol. 9, No. 1, Tahun 2020, 9*, 81.
2. Indrianto, M. H. (2021). *Virtual Reality Trafi Sensor.* Jawa Tengah: Lakeisha. (AnggotaIKAPI No.181/JTE/2019).
3. Abdul Aziz, M. J. (2019). *Pedoman Pelaksanaan Model Intervensi.* Jakarta:Perpustakaan Nasional: Katalog Dalam Terbitan (KDT).
4. Tustin, F. (2021). *Autistic states in children.* Routledge.
5. Widiyati, W. (2015). Pembelajaran Sensorimotor Untuk Anak Autis di Paud Inklusi Sebuah Tinjau Psikolog.
6. Pungky Agustine, H. Y. (2020). Pengembangan Interactive Virtual Tour360º PT. Schneider Electric Manufacturing Batam. *Journal of Applied Multimedia and Networking (JAMN), 4*, 2.
7. Priyanto, D. (2009). Pengembangan Multi Media Pembelajaran Berbasis Komputer. *Jurnal Pemikiran Alternatif Kependidikan, 14*, 92-110
8. Wardhana, R. (2009). *Definisi Multimedia.* Universitas Islam Indonesia.
9. Amin, A. (2016). *Pembuatan Film Animasi Cara Umrah Seuai Software Blender.* Malang: Universitas Islam Negeri Maulana Malik Ibrahim.
10. Nurmalasari, Q. (2021). *PENGEMBANGAN MULTIMEDIA 3 DIMENSI SEBAGAI SARANA PEMBELAJARAN PRAKTIKUM ELEKTRONIKATELEKOMUNIKASI BERBASIS VIRTUAL REALITY* (Doctoral dissertation, Politeknik Negeri Sriwijaya).
11. Sholihin, Eka Susanti, “Humanoid Robot Control System Balance Dance Indonesia and Reader Filters Using Complementary Angle Value”, E3S Web of Conferences 31, 2018.
12. Sholihin, Eka Susanti, A. A. Pramudita and M. M. Rose, "MIMO antenna with cross polarisation printed yagi elements for MIMO router", *Proc. 2017 3rd International Conference on Wireless and Telematics (ICWT) Palembang Indonesia*, pp. 65-69, July 2017.
13. Eka susanti, Rosita febriani, Sholihin, Eka susanti, Emilia hesti, 2018, *The design of hand gesture robot software based on wireless technology*, IEEE conferences ICOIACT 2018, Indonesia, p.p 401 – 406.

14. Eka Susanti[*], Ica Admirani, Romi Wilza, Irawan Hadi, Sholihin Sholihin," Automation of The Palembang Semage Fabric Yarn Spinner", Proceedings of the 5th FIRST T1 T2 2021 International Conference (FIRST-T1-T2 2021).
15. Suzan Zefi, Eka Susanti[*], Sholihin Sholihin, M. Zakuan Agung, R.A Halimahtussa'diyah," Innovation Technology of Lekor Dough Mixer Based Internet of Thing", Proceedings of the 5th FIRST T1 T2 2021 International Conference (FIRST-T1-T2 2021).
16. Emilia Hesti Sholihin, Sarjana," Coffee Groping Control System using tcs 3200 Sensor Based on xbee", Journal of Physics: Conference Series,Volume 1167,2019.
17. Amirah fakhirah Emilia Hesti, Sholihin, Adewasti, Sarjana," Internet of thing for the commando Robot Command System", Journal of Physics, IOP publishing ltd, Volume 1500,2020.
18. Emilia Hesti, Adewasti, Rosita Febriani, Sholihin, Eka Susanti," Xbee pro module application in to organize and monitoring earthquake disaster location with the robot control system", International Conference on Information and Communication Technology (ICOIACT) 2018, page 651 – 655, 2018.