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DESIGN PANDAN WEAVER MACHINE CONTROLLED AUTOMATICALLY BASED ON MICROCONTROLLER ARDUINO UNO

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Abstract

Pandan Leaves weaver engine technology as an alternative and a solution to improve industrial productivity at Kaluku Bodo village that is now getting worse and the marginalized. This deterioration is due to increasingly lower turnover due to the many similar products are mass produced by modern factory producing a mat of synthetic material. The advent of factories capable of producing mass goods is a common mechanization process of a science and technology development. Therefore, the need for innovation in the field of technology that can cope with such conditions, including through the design of pandanus weaver engine technology that can improve the productivity of industrial mats and have a value and high competitiveness. Proposed settlement of the problems are as follows: 1) Production results craft woven mats are of high quality so that it can be marketed to consumers and markets; 2) Design and Manufacture cooper engine that quickly and effectively and improve the skills of craft makers in operating machine woven wicker fast and with quality. The method used is to design and test the machine in accordance with the standardization of quality mat over the years. Stages of the activities to be taken include: planning concepts and design, machine design, construction, and development of shape / design, engine refinement. Furthermore, it takes a motor control that can make the rounds that drive torque so that it can perform webbing. With the initial conditions are already in the setting of sensors on the program, the microcontroller which also acts as an executor can drive actuators. This tool design consists of a power supply circuit, sensor circuit, DC motor drivers, and the minimum system of microcontroller Arduino Uno.

Keywords: machine woven, Microcontroller

1. Introduction

Takalar is one of the Level II country in South Sulawesi, with an area of 566.51 km, consists of six sub-districts and 73 villages / wards. Kabupaten Takalar is a district in the province of South Sulawesi, Indonesia. Its capital is located in Pattallassang. Kab. Takalar consists of eight districts, namely Pattallassang, South Polombangkeng, North Polombangkeng, Galesong, South Galesong, North Galesong, Mappakasunggu and Manggarabombang. This district has an area of 566.51 km² and a population of as much as ± 250,000.

Takalar also has potential plantation, plantation sub-sector in the economy Role Kabupaten Takalar of 4 to 4.5 percent of the total economy. This plantation produces a wide variety of crops such as lontara, tree sap, and pineapple. With the production of good plantation, it can increase productivity for a variety of crafts for the industry.

Industrial companies in Kabupaten Takalar 2009 2.229 pieces with the number of workforce of 7,220 people. This amount is not increased compared with the previous year when there were 2,229 to 7,220 person workforce [Takalar dalam Angka, 2010].

For industrial woven pandanus mats in Takalar as many as 332 companies and 567 workers, while for industrial woven palm leaves as many as 157 companies and 529 workers. For the amount of investment value woven pandanus mats in the district. Takalar 31 465, the value of raw materials 32 500, 125 788 and the production value of industrial added value amounted to 93 288. Sedangkan of woven palm leaves in the district. Takalar 14 557, the value of raw materials 14 650, 50 750 and the production value of industrial added value amounted to 36 100 (Takalar in Figures, 2010). Based on the data above the industrial potential of mats woven pandanus and palm mats are very large. However, in the

processing of the mat still using traditional equipment, to the need to increase the productivity of mats woven by craftsmen mat in Takalar in general and in particular bontoramba.

Craftsmen mats in the area Kabupaten Takalar has long elaborated by village communities Kaluku Bodo. Most artisans are mothers to the elderly, because it can no longer bersawah then choose a job as a craftsman mat. Most among the craftsmen still use traditional methods in making mats. Use of traditional tools have limitations that became one of the problems there are other issues besides partners.

Under the conditions / characteristics of the group of mats as in the analysis of the situation pointed out above, the problems faced by artisans in the village Kaluku Bodo mat as partners are:

1. Equipment used by partners is still very modest, ranging from cutting the leaves up the drying process and the drying mats
2. mat weaving is still done by hand, so production is very slow. A mat can be completed in days to weeks.

Along with advances in technology, many brings about changes in the textile factory automation. one of which is a process

that is a process penganjian woven pandan leaf in order to produce woven mats on certain conditions by entering pandan leaves in the process. In this study, made loom control system with PID control method in the DC motor rotation with 8535 microcontroller and sensor hall effect encoder as data acquisition and assisted with pressure sensor circuit. This system is used to simulate the process of weaving [Rahmat, 2015] with the pandanus leaves.

Dikemukakan reality as the above draw our attention to training and change the mindset of society Kaluku bodo so that will add to its earnings. to improve the quality of woven handicrafts production through the application of engineering technology and operate the tools that can make it easy to manufacture woven handicraft artisans to community groups in the district Takalar woven handicrafts.

2. METHODS

Block Diagram

To explain the dc motor control system is necessary to know the block diagram of the system.

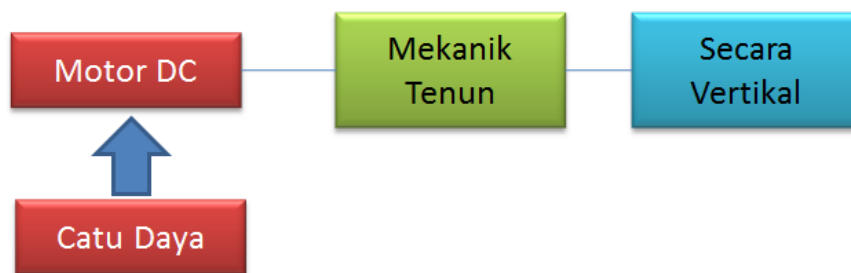


Figure 1. Block diagram of the dc motor control as a mechanical drive

DC motors

Motor DC or Direct Current Motor is an electric machine that converts direct current electrical energy into mechanical energy. There are two (2) basic principles underlying the work of DC motors. The first is the flow of the current through a conductor or penghantar. Dimana, there will be a magnetic field surrounds the conductor. The second is

the force on a conductor moving in a magnetic field. The amount of force exerted to drive the change is proportional to the strength of the magnetic field, the magnitude of the current flowing in the conductor, and the length of the penghantar.gaya often called the Lorentz force.

Permanent magnet DC motor can rotate when there is current flowing in the coils, causing flux anchor anchor. The anchor flux

interacts with the main magnetic flux which generates a force to rotate the anchor (torque). The direction of the capstan is dependent on the direction of electron current flowing to the coil anchor. DC motor shaft can rotate clockwise and counter-clockwise.

Power supply

In this system uses two kinds of power supply, the power supply I and II .The power supply which the characteristics and different functions, power supply I used to dole microcontroller, limit switch, IR receiver, and a DC motor driver. While the second power supply voltage source used for members of DC motors mechanical drive box cover, bracket LCD projector and screen walls (wallscreen).

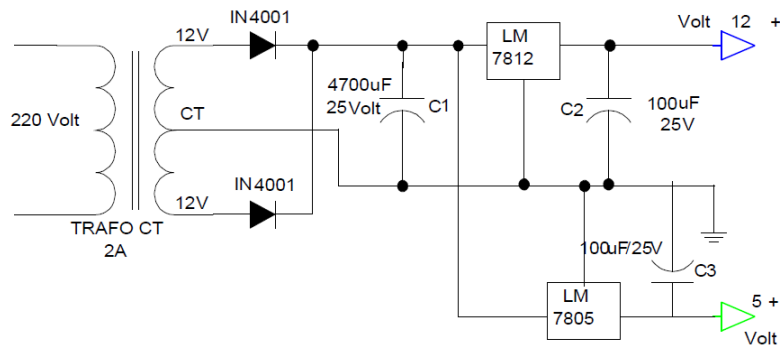


Figure2. The power supply I

In this circuit uses IC LM 7812 and LM 7805 is used as a regulator or a voltage stabilizer with a maximum current carrying capacity of 500 mA. Sehingga output voltage of this power supply is 12 Vdc and 5 Vdc. Where the voltage of 5V is to distribute the microcontroller, the circuit limit switch, IR receiver, and the motor driver circuit dc. Sedangkan 12 Volts relays are used to distribute the DC motor driver circuit.

The series microcontroller AT89S51

In this system, the AT 89S51 microcontroller IC and IR receiver and integral coordinate with each other. Where microcontroller AT89S51 is central to controlling the work function of the overall system. Rangkaian microcontroller system is a single-chip system which only consists of a chip AT89S51 with 12MHz crystal oscillator and 4 ports can be operated as an I / O.

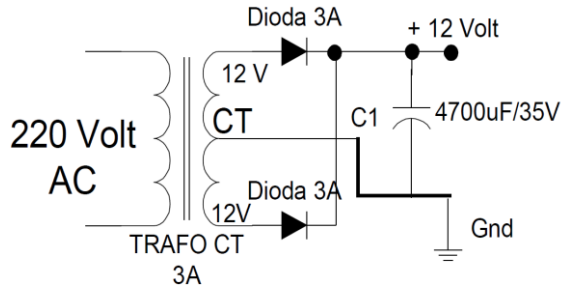


Figure 3. Power Supply II

In this second power supply circuit is equal to the power supply circuit I, just that the circuit is not using the IC regulator because it is used to distribute the burden of the high current carrying Namely dc motor.

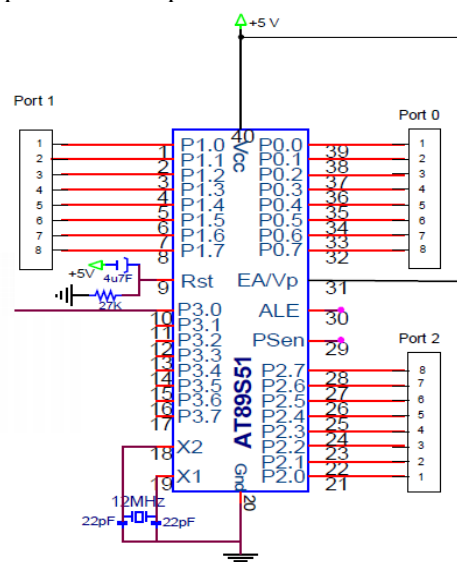


Figure 4. Minimum System Microcontroller AT89S51

Microcontroller AT89S51 has four ports which the system was utilized as follows:

- Port 0 and 2, is used as a connecting line circuit limit switch
- Port 1, is used as output to the motor driver circuit DC
- Port 3, especially on the pin 3.0 is connected as inputs weights.

DC motor driver circuit.

To play the required dc motor driver circuit with major components, transistors and relays. In this tool, equipped with a dc motor driver putaran. Jadi inverting circuit, dc motor driver can set the direction of rotation of the motor forward and reverse. Semua DC motor driver in this system has a series of characteristics and sama. Skema series of dc motor driver is shown in figure 5

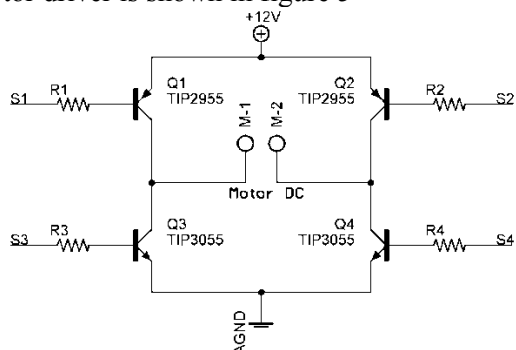


Figure 5. Scheme of dc motor driver circuit

When relay 1 positive work then brush motor will receive voltage source of positive and negative brush motor is connected to a negative pole voltage source. Thus, the motor will spin clockwise direction of rotation (clockwise). With the same way to move the contact relay 2, then the opposite conditions occur that the motor will rotate with the direction of rotation is counter-clockwise (counter clockwise).

3. DISCUSSION

Target outcomes that will be achieved in accordance with the action plan are as follows:

- 1) By using dryers, sharpener, and automatic weaver craftsmen mat / partners can be: a)

Increase productivity with various motifs woven mats; b) Operating the dryer equipment, sharpener, and automatic weaver; c) Have knowledge of appropriate technologies that can help increase industrial production mat; e) Develop tools according to the needs of craftsmen mat, for example, to create a "bosara" (a cake at the reception), "pattapi" (a place to cleanse the rice husk), and "paddinging" (a result of milled rice); 2) Development of a dryer that can be controlled by the temperature automatically. This tool works by using rice husk ash as a heating fuel, Agar dried material quality is maintained then fitted with sensors suhu. Sehingga no longer use the sun as a dryer. By using this tool drying process is faster compared to using solar or wind use.

Process Weaving (Weaving Process)

The main purpose penganjian is to increase the power of weaving mats, because in the process of weaving the warp yarns undergo much friction, pull-pull as well as tugs, for it is necessary to increase the resilience of the friction and tensile strength pandan leaves that ultimately affect the quality of mats produced and can expedite the course of the process of weaving, which broke reduced pandan leaves and pandan leaf blade hairless [Susy, 1995]. Weaving process basically consists of several stages, namely the threads drawn, arranged on the loom is crossed (depending motif), pressed with a roll, dried, and then rolled [Ogata, 1994].

Design Mechanics Tool Pandan Leaf Weaving

Mechanics made using DC motors where the motor shaft is connected with the gearbox connected by a chain and gear players. Figure 6 shows mechanics Weaving Tools created. Control of rounds in it is done by using a microcontroller-based 8535 with PID control method, while the sensor used is a limit switch and a pressure sensor. Figure 6 shows a block diagram of the control system on the weaving machine created with the set point, then the error will provide a response to the manipulated value (mv) as control output and process value (pv) as feedback.

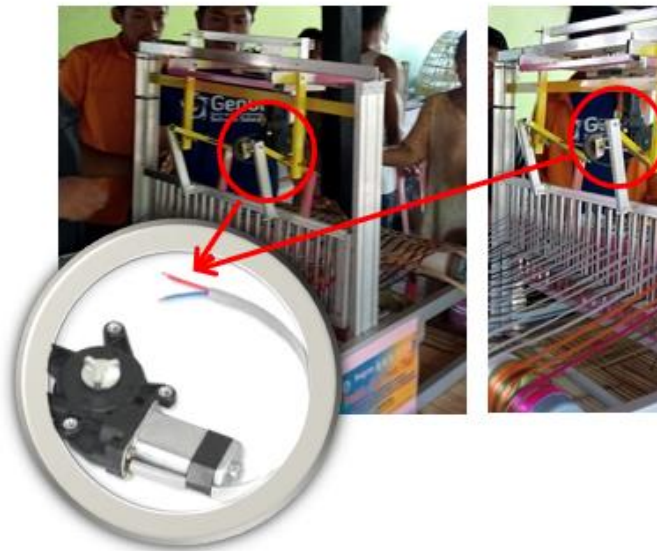


Figure 6. Tool Pandan Leaf Weaving and DC Motor Position

The working principle of dc motor control system as a mechanical drive

To explain the working principle of this system can be easier by knowing this system flow chart. The flow diagram (flowchart) DC motor control system is as follows.

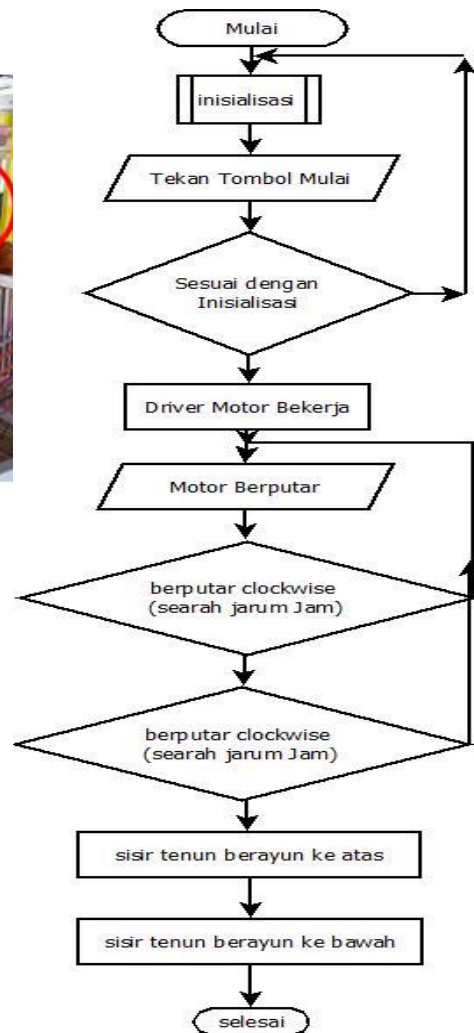


Figure 7. System Flowchart

Design Hardware (Hardware)

Machine woven pandan leaf consists of two Microcontroller 8535 is the main microcontroller and microcontroller slave. Control of motor rotation and heating is done by the main mikrokontorller, while the humidity readings performed by the slave microcontroller which will be sent serially to the main microcontroller.

work processes pandanus weaving machine as follows: 1. Menghani, is a process of preparatory work before the embroiderer. Step-by-step process is as follows: Specifies the width of the leaf commonly produced is 2 cm and 50 cm. Furthermore Rolled Using Yarn Rollers Machine. Every one round can roll 2

meter strand mat. Pandan leaf stab comb to comb number and knives are used depending on the thickness of the leaves. The finer the leaves are used, the number of comb being used increasingly high. Piercing the yarn to the comb are: comb Length: 2 mark. Measure the length of the mat to be made, for example 80 cm, then $300\text{cm} : 2 = 150 \text{ cm}$. Measure from the center equal to the left and to the right; give sign.

To the edge of the fabric, at each segment of comb filled with 2 leaves. Total segment that is filled also depends on the thickness of the leaves. The finer the leaves are used, the number of strands and comb sections are used also more and more. The amounts used are 24.48, or 84 strands. Stabbing can begin. Furthermore Binding Yarn to reel. The next process is the binding of pandan leaves that have been installed on karap and pandan leaf roll comb so that the weaving process can be started.

CONCLUSION

Stages of the activities to be taken include: planning concepts and design, machine design, construction, and development of shape / design, engine refinement. Furthermore, it takes a motorcycle that can control the make the rounds that the drive torque so that it can perform webbing. With the initial conditions are already in the setting of sensors on the program, the microcontroller roomates Also acts as an executor can drive actuators. This tool design consists of a power supply circuit, sensor circuit, DC motors drivers, and the minimum system of microcontroller Arduino Uno.

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