

AUTOMATIC CONTROL SYSTEM PALEMBANG SONGKET SHAWL BASED ATMEGA32

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Abstract -Automation weaving machines are expected to contribute the craftsmen to improve results weaving it's , such as looms and supplies sensors and application programs that can be used and then will make the craft of weaving typical areas of South Sumatra. This research is expected to produce a patent for songket and scarf with a automatic machine patents and developed with several motifs.

This research is a prototype machine songket shawl automatically controlled and then, the research will measure are performance of automatic by showing results of measurement of the strength or speed DC motor to throw and pull the threads, be it gold thread and yarn, will then be shown the results of the use of simulation algorithms splay tree.

When a thread already determined the maximum distance that the duty cycle of the PWM value of 0 cm distance position obtained 0 % duty cycle and from a distance of 30 cm till maximum gained 3.12% duty cycle. Furthermore, measuring the value of the AT Mega 8 is connected to the amplifier IC L293D DC motor with which the process of making a semi automatic loom requires a 12 MHz crystal so that the cycle speed to $12 \text{ MHz}/12 = 1 \text{ MHz}$, which means time is 1 microsecond pulse period. Loom's will be connected to a computer for programming process as data base in terms of the AT Mega 32 language in use, so that the output of the weaving songket shawl can be arranged with advance determined motives that would be desirable is useful to prevent or protect hurling thread - the thread excessive, so that motifs are in use should be appropriate.

Keywords: Artificial Intelligent, Expert System, Microcontroller, Sensor and Transducer, Splay Tree Algorithm

I. INTRODUCTION

Songket shawl woven from South Sumatra is the result of craft which came down of hereditary. This songket shawl scarf istypical of Palembang. A lot of crafts done by the mother-housewife and her daughter.

Woven songket shawl requires about 21 days to get completed by performing two parts, namely the determination of the motif itself and the shawl as the end of result. Device makers of songket consists of a crutch, stick motif maker, dividers, putter, and the bobbin. Songket shawl craftsman should diligently within 21 daysand work more or less in 5 to 7 hours per day. The yarns used are: thread for tumpal, gold thread, yarn limar [11].

Songket shawl craftsmen often booked maker motif by an agent called with the lever. Lever in working order fabric pattern for 6 days to 10 days, depending on the booking form patterns that are difficult or not. Lever in fact already has a formula or motives parent to complete the work ordered by the craftsmen. No motive was known by craftsmen motif "Lepus, Bungo and Bungo Ms Cino. Craftsmen in Palembang which available in certain areas, such as the area of Domestic Worker Tank, 3 - 4 Ulu and areas in South Sumatra. Songket weaving craftsmanship done sitting and rest on wood as a crutch to pull the threads that are woven yarn kept tidy and tangle-free. Pains are often felt by craftsmen are the symptoms of low back pain. Songket shawl made with equipment that is ordered by the

equipment manufacturer weaving songket cloth. Equipment for weaving songket for weaving songket shawl and scarf. Songket shawl size measure by 45 cm x 150 cm. Once completed in weaving songket shawl diporing / layer with a plain basic hero and in accordance with songket cloth color usually dark red. The goal is that the colors do not fade quickly and comfortable to wear. Design loom realized in the activities of Competitive Grants are made of a semi-automation system looms by regulating the tensile strength of the yarn and implement these motives in the formulation of splay tree algorithm with reference to the expert system [11].

II. SUBJECT RESEARCH

The subjects of the study are intended to implement control technologies specifically; reference to the expert system, then be applied to the equipment in automation weaving songket shawl, where that has been done with the sequences logic whic is hereditary.

III. OBJECTIVE AND BENEFIT OF RESEARCH

The aim of the research his to identify, which once attracted researchers for the purposes of this songket weaving tools are applied with the use of AT Mega 32. So that willa chieve the objectives and benefits of the research, including :

1. Automation control system Palembang songket shawl is expected to accelerate the completion of craftsmen

to help the formation of motifs, taking into account controls sufficient to tighten the thread in accordance with, the extent of the thread, here the researchers will compare them with the use of ATmega 32.

2. Automation control system Palembang songket shawl is also expected to contribute to an active role in the technology exhibition, and also can contribute to the craftsmen in order to improve the quality of its weaving.
3. The results of this study in addition to the form of automatic looms in operation using sensors, application programs with the Bascom programming language.

IV. SUPPORTING THEORY

A. Expert System

The expert system is a computer program that shows the degree of expertise in solving problems in specific areas comparable to an expert. Expert system expertise in solving a problem of how to represent knowledge obtained by one or more experts in a particular format and store the min the knowledge base. *Rule-based expert system* is an expert system that uses *rules* to represent knowledge in its knowledge base. *Inference engine* is part that act as a finder solution of a problem, based on existing rules in the knowledge base of an expert system. During the process of inference, inference engine examines the status of the knowledge base and *working memory* to determine the facts of what is known and to add new facts generated into the working memory. The facts are the result of the inference process sis stored in the working memory [10].

B. Develop the panels

Building panels each stage and made the operating system and also its scheduling panel. The step scan be viewed with a pattern recognition algorithm, that is :

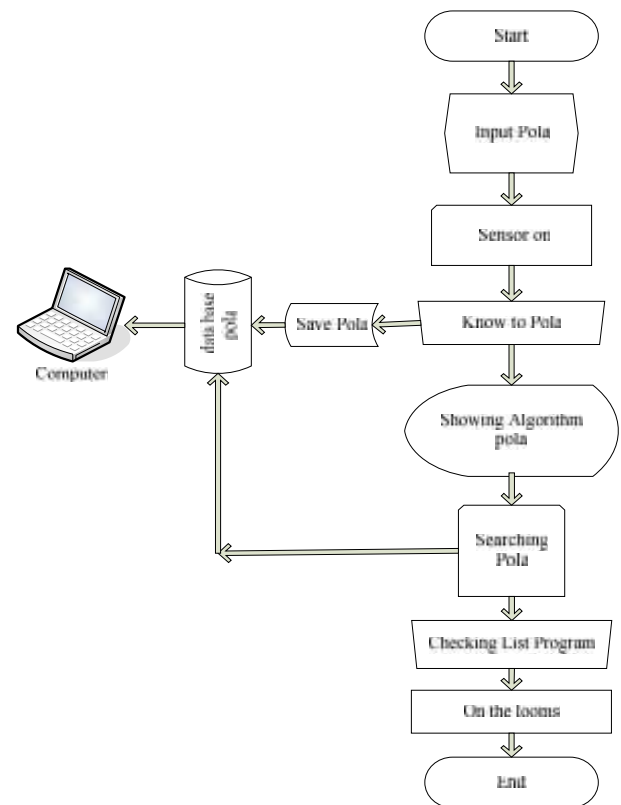


Fig. 4. Flowchart of Semi Automation Weaving Machine

C. DC Motor Speed Control

Dc motor speed(N) can be formulated with the following equation [3].

$$N = \frac{V_{TM} - I_A R_A}{K \Phi} \quad (1)$$

In the case of dc motor speed control, the motor terminal voltage V_{TM} is a variable that is set to obtain the desired motor speed. The terminal voltage regulation can be done by using pulse width modulation (PWM), so we get the formula [3]

$$N = \frac{\frac{T_{on}}{T} V_{TM} - I_A R_A}{K \Phi} \quad (2)$$

D. Driver Motor

To drive a DC motor typically requires a large current, for the use of ICL293D consisting of a transistor amplifier circuit or use as a power amplifier IC controller moto Pr round. ICL293D serves to control a DC motor, then just give the corresponding pulse or logic at IN_1 - IN_2 , with the amplified output OUT_1 - OUT_2 . [3]

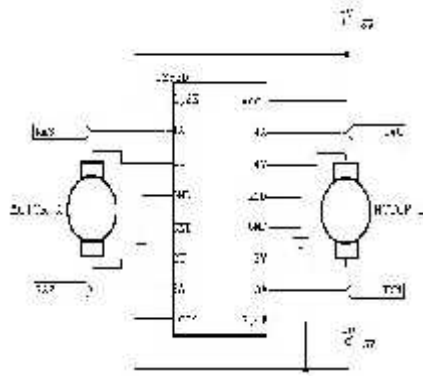


Fig. 5. Driver of ICL293D circuit for DC motors

E. Control device (AT Mega32)

ATmega8 microcontroller is a CMOS microcontroller with low power which has 8-bit RISC AVR. Instructions packed in 16-bit code and run only by one clock cycle. The structure of the I/O are good with little additional components beyond. Internal facilities contained on ATmega32 microcontroller is UART, Pulse Width Modulation (PWM), ADC, Analog Comparator, timers, SPI, pull-up resistors, Oscillators and watch-dog timers. ATMEGA32 is a new type of artificial ATMEL microcontroller and have some advantages than others [1].

F. Splay Tree Algorithm

Splay algorithm Tree is a binary search that has implemented of adapt mechanisms. These mechanisms do in the following way: each time you access a node tree, either for insertion or retrieval, it will rotate (as in the AVL tree), lifting the newly inserted/accessible node along the way, so that the root of the tree is modified. Node in the tree is rotated such that it becomes more balanced. NOT splay tree height balanced tree because there are situations when a node may have a different balance factor of -1, 0, or +1.

Frequently accessed node will often be appointed as the roots, and the roots will spread too far from the top spot. Active node, on the other hand, will slowly push farther and far from the root. There is a possibility that the tree can be widened very unbalanced, so the access to the tree node can be quite confusing. However, here will prove that, a long sequence of access, splay tree is not at all complicated and guaranteed requires not much of operation even of AVL tree analysis, a lot of rotation performed for each insertion or retrieval in a tree, even rotation is done along the path from the root node to the target which is being accessed. Widened node structure similar to the one that used a binary search tree [8].

Concepts splay tree algorithm, can be shown as below; When a single rotation is done in a *binary search tree*, some nodes move higher on the tree and some lower. In the left rotation, the parent node moves down and right child moves up one level. Double rotation, consisting of two single rotations, and one node is moving up two levels, while others move up or down to at most one level. By

starting with the target node only being accessed and worked up the road to the roots, so that it can perform a single rotation at each step, thus lifting the target node all the way to the root. Here's a picture of the movement of a zig-zig, zig-zag and zag performed by the splay tree algorithm

Zig-Zig

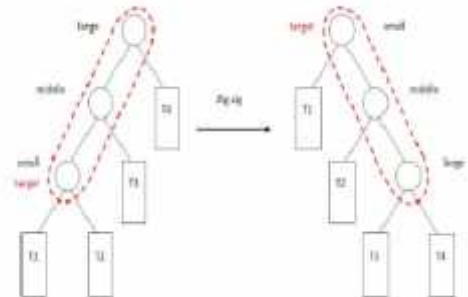


Fig. 6 The movement of Zig-zig

Zig-Zag

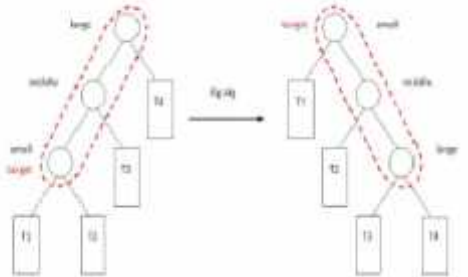


Fig. 7. The movement of Zag

Zag

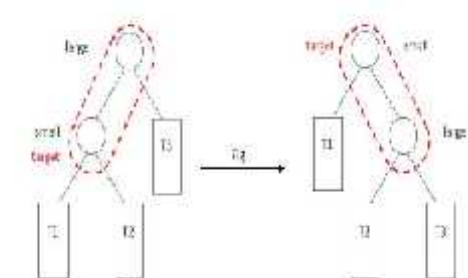


Fig. 8. The movement of Zag

V. CURRENT RESULTS

From the results of the manufacture of semi-automation weaving machine, we can do the retrieval of data that measure the strength or speed of a DC motor to throw and pull the thread, whether it's gold thread or yarn, which is set Pulse Width Modulation (PWM) in table 1, so that the performance of the motor can be set of

the speed, measure the results for the motor of weaving machine. Then will measure the value of microcontroller ATmega32 amplifier which connected to a DC motor with ICL293D in table 2. Then the next will be connected to the computer for the programming process as a database so that the output of songket weaving shawl is can be arranged with advance in the specified motives which is based on demand, and the use of sensors will be in need for preventing or protecting the hurling thread-excessive thread, so that the motif is used should be appropriate.

The following table for the results of measurements that have been conducted by researchers including; measuring the motor of the weaving machine, weaving machine drive motor connected to the PC and perform measurements with the sensor connecting the motor. For more details can be seen in the table of following measurements in table 3.

Microcontroller system works with a variety of single-chip operation so that no external memory required. Microcontroller machine cycle is set using 12 MHz crystal so that the speed of the machine cycle to 12 MHz/12 = 1 MHz, which means the period of time is 1 microsecond. Microcontroller responsible for managing the operation of other hardware, including distance measuring amplifier tone and motors. P1.5 is connected to the leg reset of the sender to set the transmitting signal in fig.7. Foot INT 0 is connected to the output of the receiver system so that the information it receives the reflected signal which is obtained. P3.6 is connected to the enable pin L293D amplifier to regulate the activation of the amplifier. P2.6 and P2.7 are connected to inputs 1 and 2 as input amplifier which drives the H-bridge motors in table 2.

The amplifier is capable of performing high-speed switching functions up to 5 KHz. Legs input 1 is the path to the PWM as switching the motor 20 volt supply voltage. Input 2 is the path 0 Volt, each track generates a voltage to be applied to the pole dc motor with reference to the truth table ICL293D in table 2 and fig. 6.

Table 1: Speed Motor Drive Weaving Machines regulated by PWM

Distance hurling Needles (cm)	Duty Cycle (%)
0	0
5	0,24
10	1,28
15	1,96
20	2,18
25	2,77
30	3,12

Table 2: Truth of IC L293D

INPUT	ENABLE	OUTPUT
HIGH	HIGH	HIGH
LOW	HIGH	LOW

HIGH	LOW	HIGH
LOW	LOW	HIGH

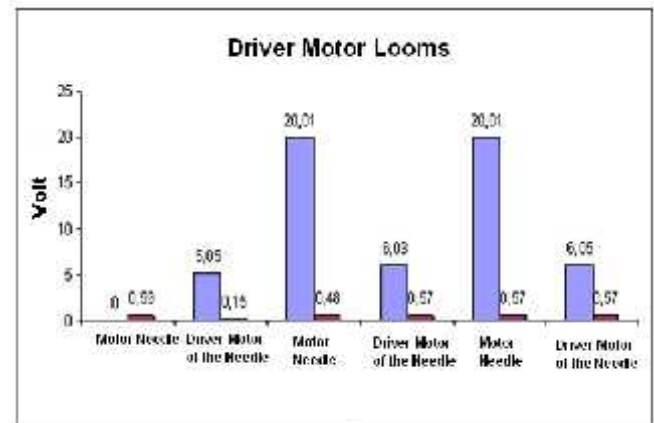


Fig. 9. Comparison of the motor voltage increases with the amount of current weaving machine on the engine weaving machine

Table 3: Weaving Machine Motor Drive is connected to a Personal Computer

NO	DC Motor	Time (Sec)	Voltage at the time of yarn limit level the script to the information of motor	Current with range 20 Ampere	Thread
1	Motor for feeding thread	0,25	2,25	4,25	Gold
2	Motor for feeding thread	0,25	2,25	4,25	Gold
3	Motor for feeding thread	0,25	2,25	4,25	Gold
4	Motor for feeding thread	0,25	2,25	4,25	Gold
5	Motor for feeding thread	0,25	2,25	4,25	Gold
6	Motor for feeding thread	0,25	2,25	4,25	Gold

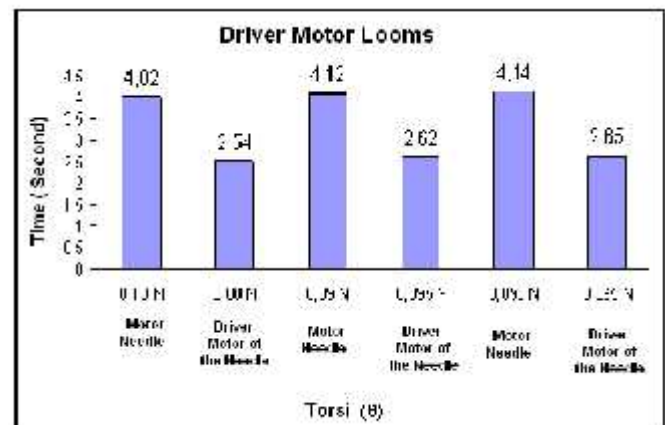


Fig. 10. Comparison increased torque motor weaving machine with the resulting time to reach the threads on the loom

VI. CONCLUSION

Microcontroller ATmega32, amplifier which connected to a DC motor with ICL293D in truth table is compatible. DC motor to throw and pull the thread, whether it gold thread or yarn limar, which is set Pulse Width Modulation (PWM) in distance hurling needles. By the observations that have been made over the years, acquired the characteristics activator motor that serves to

move the needle motor linear needle in knitting yarn, gold and lupus, which is consistent with the use of splay tree with the movement of zig – zag. With the increasing value of the motor torsion, so that motor current value will increase. Rated voltage for motor needle and needle drive motor depending on the weight used.

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