



An Automatic Rice Threshing Machine For Fast Filterization

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Automatic rice threshing machine, Filterization system, Microcontroller, Automatic, Proximity Sensor.

Abstract. For farmers, good quality and clean rice is their selling point. Automatic rice threshing machines are a new breakthrough that can be offered to them. This machine has adopted energy-saving technology and is very practical in operation. One of the technologies is a filterization system, this system is a separator between clean rice and rice grain, so that the quality of the clean rice produced will increase. By controlling the motor speed in this system, less power is used so it will be more energy efficient. This system is supported by other devices in the form of a Proximity Sensor, ATmega 2560 Microcontroller and Dimmer. So this system runs automatically based on the falling rice debit.

1. INTRODUCTION

Paddy or rice is still the staple food for the Indonesian people, so its availability must always be there throughout the year. Rice is a plant that is easy to live in almost all parts of Indonesia, both in the dry and rainy seasons. This is also due to the strategic location of Indonesia's territory which is crossed by the Equator so that the sun always shines all year round. Apart from that, rice is also easy to breed and has a relatively fast harvest time. Almost every region in Indonesia has a rice harvest area that is able to meet the needs of its people. However, in the process of producing good rice productivity, farmers often have to experience problems after each harvest.

Most farmers in Indonesia still carry out post-harvest processing manually, especially in the process of threshing the rice grains from the stalks. This manual method, apart from causing ergonomic problems for the operator, also results in relatively low productivity. Post-harvest handling of rice is a very strategic effort to support increased rice production. The contribution of post-harvest handling to increasing rice production can be reflected in reducing yield losses, reducing the level of yield damage during rice threshing and achieving the quality of grain or rice according to quality requirements, in order to support the business of supplying raw materials, industrial raw materials, especially domestic foodstuffs, increase added value and farmers' income.

In this technological era, with advances in the fields of information, electricity, electronics and computer systems, rice threshing machines have also experienced improvements in terms of fuel, efficiency, effectiveness in rice threshing, as well as in terms of environmental friendliness and the application of renewable energy sources in operating the equipment. the rice thresher. The separation (Filterization) between clean rice and rice grain in the rice threshing process also did not escape the attention of the author, this affects the quality of the harvest obtained. The amount of dirt and empty grain mixed into clean rice is a factor in reducing the quality of the farmer's harvest. In the filtering process the author also considers the efficiency and effectiveness of the power used by the tool so that in the application process the author will use a sensor to activate the filtering circuit in the rice thresher. Therefore, the author wrote a thesis entitled Design and Development of a Filterization System in a Microcontroller-Based Automatic Rice Thresher Machine. It is hoped that the harvest results obtained by farmers using this rice thresher will be of higher quality so that they can reduce the number of losses incurred both in terms of economics and energy. This tool also supports government programs for appropriate and energy-saving technology.

Literature Review

Rice Thresher Machine

In post-harvest handling, one of the problems that farmers often face is the lack of awareness and understanding of farmers regarding good post-harvest handling, resulting in high yield losses and low quality of rice. To overcome this problem, it is necessary to carry out post-harvest handling by developing tools that are able to lose yields and maintain the quality of rice yields. In line with the current global era and technology, we are trying to build an appropriate

innovation and technology tool that can be used by farmers. Our main goal in developing this technology is to simplify the standard of living of farmers by providing solutions so that the work carried out can be more effective, efficient and of better quality so that the harvests obtained are of higher quality and quality so that they can compete in the world market.

One of the rice production processes is the rice threshing process. The process of threshing rice is done manually, namely by slamming it. The manual process takes a long time, because it relies heavily on human power. Along with technological developments, rice threshing machines were made. Therefore, we need a high-tech machine that is capable, easy to operate, and applies renewable energy technology. So that Not only can it save work time, it can also save fossil fuels. (Ibrahim, 2015)

A rice threshing machine, known as a thresher, is a tool for threshing rice grains. Threshing is an integral part of the post-harvest rice handling process, where rice that is ready to be harvested is threshed to separate the straw grains. The general working principle of a thresher is to insert rice that is ready to be harvested into the machine, so that the separator made of iron rotates until the rice grains separate from the stem. The rice that has been released will then be separated from the remaining grain that is still attached using a blower that produces air right before it is placed in the storage container. usually called a filtering system. The full rice will be removed under the thresher and the straw and empty grain will be separated from the filled grain. Control device for changing speed (Rpm) which is adjusted to the type of rice.

The following is a simple rice thresher, this tool can be made by combining wooden planks with bamboo which are arranged in such a way as in the picture:



Figure 1. Simple rice threshing machine

Technological developments have played a big part in the development of rice threshing machines, until humans thought of making a simple machine using diesel to thresh rice. The following are diesel rice thresher machines:



Figure 2. Diesel Rice Thresher Machine

Until current developments, there are rice threshing machines, which can also be said to be rice harvesting machines, this machine is more complex and saves more time in harvesting rice, this machine can harvest rice very quickly. Apart from that, this machine can also be used to plow fields. The following are modern rice threshing/harvesting machines:



Figure 3. Modern Rice Thresher Machine

From the development of rice threshing machines above, humans, especially farmers, can save time and operational costs in harvesting rice, so that farmers become more productive.

Microcontroller

Currently, technological developments are increasingly rapid thanks to microcontroller technology, so that control circuits or control circuits are increasingly needed to control various equipment that humans use in everyday life. From this series of controls a tool will be created that can control something. A control circuit or control circuit is a circuit that is designed in such a way that it can perform certain control functions according to needs.

Starting from the creation of Integrated Circuits (IC). Apart from ICs, tools that can function as controls are chips, the same as ICs. Chips are a development of ICs, where chips contain electronic circuits made from silicon articles that are capable of carrying out logic processes. The chip functions as a storage medium for programs and data, because RAM is available on a chip where this data and program is used by the logic chip to carry out the process.

Chips more synonymous with the word microprocessor. A microprocessor is part of the Central Processing Unit (CPU) found on a computer without the memory, I/O needed by a complete system. Apart from the microprocessor, there is another chip known as a microcomputer. In contrast to microprocessors, this microcomputer has I/O and memory. Microcontrollers are different from microprocessors and microcomputers. A microprocessor is part of the CPU without memory and supporting I/O of a computer, while a microcontroller generally consists of a CPU, memory, certain I/O and other supporting units.

Basically, there is a very striking difference between microcontrollers and microprocessors and microcomputers, namely in their applications, because microcontrollers can only be used in certain applications. Another advantage lies in the comparison of Random Access Memory (RAM) and Read Only Memory (ROM). So that the size of the microcontroller board becomes very compact or small, from the advantages there are advantages to using a microcontroller with a microprocessor, namely that the microcontroller already has RAM and supporting I/O equipment so there is no need to add more. Basically, the structure of a microprocessor is similar to a microcontroller. Microcontrollers are usually grouped into one family, respectively

Microcontrollers have their own specifications but are suitable for programming, for example the MCS-51 family produced by ATMEL such as the AT89C51, AT89S52 and others, while the AVR family such as the Atmega 8535 and so on. (Aprianah, 2013) With advances in technology and the rapid development of chips, now a chip contains CPU memory and I/O controls. Thi



Figure 4 Microcontroller Chip

A microcontroller is a chip in the form of an IC (Integrated Circuit) which can receive input signals, process them and provide output signals according to the program entered into them. The microcontroller input signal comes from the sensor which is information from the environment, while the output signal is directed to the actuator which can have an effect on the environment. So in simple terms, a microcontroller can be thought of as the brain of a device/product that is able to interact with the surrounding environment.

The data processing speed on a microcontroller is lower when compared to a PC. On PCs, the speed of the microprocessors used today has reached the order of GHz, while the operating speed of microcontrollers generally ranges from 1 – 16 MHz. Likewise, the capacity of RAM and ROM on a PC can reach the order of Gbytes, compared to microcontrollers which are only around the order of bytes/Kbytes.

Even though the data processing speed and memory capacity of microcontrollers are much smaller compared to personal computers, However, the capabilities of the microcontroller are sufficient to be used in many applications, especially because of its compact size. Microcontrollers are often used in systems that are not too complex and do not require high computing capabilities.

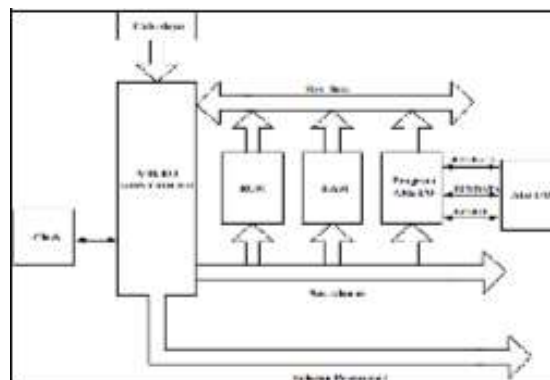


Figure 5. General Microcontroller Block Diagram

2. METHOD

The filterization system on this automatic rice threshing machine is designed for makes it easier for farmers to separate rice from grain compared to using a conventional rice thresher machine. The filtering system on this machine uses motor speed regulation using Proximity sensor technology and a Dimmer circuit. So this machine is more efficient and more technologically appropriate than rice threshing machines in general. For further explanation about the design and construction of this machine, the author will discuss it in the review below.

Therefore, the author used a rice threshing machine that was already available on the market and carried out a complete overhaul starting from the motor, supply, filtering system to the rice

separated from Then the rice stalks will be separated again from the dregs that are still attached to the rice. This separation process is called the Filterization system, where the motor will rotate to exhale rice dregs based on the amount of rice that falls, the more rice that falls, the faster the motor speed will be. After the filtering process is complete, the rice will be weighed automatically by this machine too.



Figure 8. Automatic Rice Thresher Machine

Working Principle of the Filterization System in Rice Thresher Machines

Testing is carried out after the tool work is completed and is carried out on each block. Circuit testing aims to see the results of the circuit that has been designed. The test result data is used to analyze and carry out circuit repairs if the results obtained are not as expected. In this section, circuit testing is carried out based on the block diagram. The stage to be tested is the Proximity Sensor, Module Relay, Dimmer Module and Motor Speed.



Figure 9. Location of Proximity Sensor

The author uses 2 proximity sensors placed right above the filter fan. The sensors are arranged parallel to the top and bottom.



Figure 10. Proximity Sensor Testing When Detecting



4. CONCLUSION

Based on the results of the design, manufacture and testing, design of the filtering system for the microcontroller-based automatic rice thresher machine, the following conclusions were obtained: The way to design a filtering system for a microcontroller-based automatic rice thresher machine is by preparing an Arduino module, proximity sensor, relay module, 220 V to 12 V power supply, AC motor, and dimmer module as a motor speed controller. All these components are assembled and connected so that they are well integrated. The proximity sensor detects the rice discharge that falls from the threshing machine, the results of the reading will be processed by the Arduino module which will determine the rotation speed of the AC motor. The Relay Module which works on commands from the Arduino module functions as an automatic on/off for the dimmer module, which in principle works by regulating the speed of the AC motor into 3 conditions, namely low, medium and high. The filtering system on this automatic rice thresher machine functions well and can be activated immediately as soon as the sensor detects falling rice and will turn off once no rice has fallen. From the tests carried out, it can be seen that the fan motor speed measurement results are between LOW, MEDIUM and HIGH not too far. This is due to the motor used small capacity so the speed required to fly the grain must be large.

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