
Application of Roboduino ATmega 2560 in the Manufacturing of Goods Moving Beetle Robots

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ABSTRACT

In the development of science and technology in the field of electronics today, there are many benefits that can be felt by the community, one of which is facilitating work in industry and households. Technological developments in the industrial sector such as warehousing have experienced many advances, one of which is the process of moving goods more easily without human intervention but automatically so as to make the logistics process of goods more precise and accurate. The existence of processes that can run automatically can make work processes more efficient, flexible and run continuously. And often see the work of lifting goods that are very human, then a robot function is made to help make human work lighter. Control and automation can be done easily, efficiently and quickly. The control of this item moving robot uses Arduino UNO ATmega 2560 as the robot's control center. The motion system on the robot uses a motor drive, a servo motor to raise and lower the goods hook which functions to lift and lower goods and a DC motor which aims to move the robot from one place to another. The goods moving robot will work continuously until the inventory can be moved completely.

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1. INTRODUCTION

Human needs for the use of technology are growing, so technology is growing very rapidly in providing basic needs that have become the subject of technology itself, such as speed, accuracy, and automation that do not stop interfering with the running of a process that is directly related to the technology used. Technological developments cover various fields, one of which includes the warehousing sector. In the process of warehouse performance, there are many obstacles and factors that support failure in moving warehouse goods. Warehouse employees need a long time to move warehouse goods because warehouse employees have to move these items to each warehouse that has determined the rules for the type of goods. The load of goods is also an obstacle in the process of moving goods to the warehouse, sometimes the weight of the goods can reach one ton or more and it is necessary to have additional workers to lift the goods to the specified warehouse. With so many items falling with so many types of items, warehouse employees often make mistakes in placing their respective warehouses. Physical accidents can occur due to the presence of goods that can harm the body in question during the process of moving the goods. Based on this background,

the authors conducted research on the application of the roboduino ATmega 2560 application in the manufacture of goods moving robots.

A. Arduino ATmega 2560

Arduino ATmega 2560 is a microcontroller board based on ATmega 2560. Arduino ATmega 2560 has 54 digital input/ output pins, of which 15 pins can be used as PWM outputs , 16 pins as analog inputs , and 4 pins as UART (hardware serial port) , 16 MHz crystal . oscillator , USB connection , power jack , ICSP header , and reset button. This is all that is needed to support the microcontroller. Simply connect it to a computer via a USB cable or power it with an AC-DC adapter or battery to start activating it. Arduino ATmega 2560 is compatible with most shields designed for Arduino Duemilanove or Arduino Diecimila. Arduino ATmega 2560 is the latest version that replaces the Arduino ATmega version. The Arduino ATmega 2560 differs from the previous board , in that the latest version does not use the FTDI USB-to-serial driver chip. However , it uses the ATmega 16U2 chip (ATmega 8U2 on the Revision 1 and Revision 2) boards programmed as a USB-to-serial converter. The Arduino ATmega 2560 Revision 2 has an 8U2 HWB line pull resistor to Ground , making it easier to put into DFU mode. 16 Arduino ATmega 2560 Revision 3 has the following new features:

1. Pinout Added an SDA pin and an SCL pin close to the AREF pin and another two new pins placed close to the RESET pin , IOREF allows the shield to adapt to the available voltage on the board.
2. RESET Circuit The reset circuit is the reset program path. where this feature can be used when there is a programming error. or want to change the program.
3. The ATmega 16U2 chip replaces the ATmega 8U2 chip using the ATmega 16U2 chip (ATmega 8U2 on Revision 1 and Revision 2) boards programmed as a USB-to-serial converter. Arduino ATmega 2560 Revision 2 has an 8U2 HWB line pull resistor to Ground , making it easier to put into DFU mode

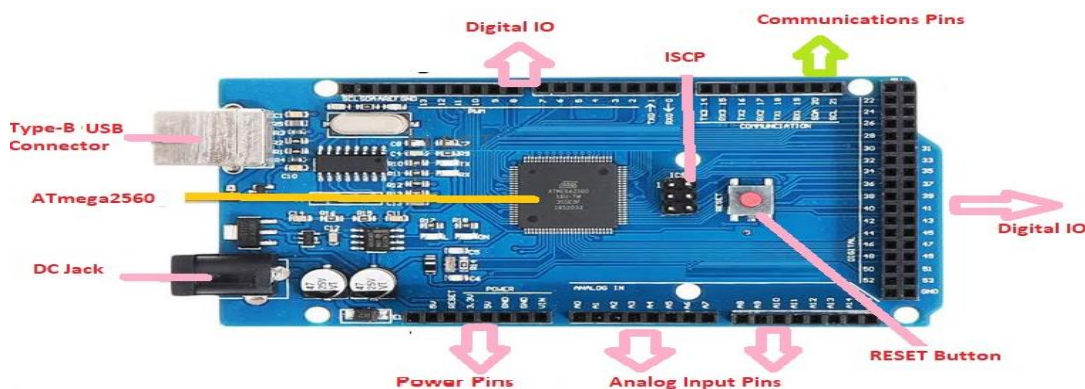


Figure 1. Arduino ATmega 2560

B. Light Sensor

A light sensor is a device used to convert light into electrical quantities . The working principle of this tool is to convert energy from photons into electrons . Ideally one photon can generate one electron. Light sensors are widely used, one of the most popular being digital cameras . At this time there is already a tool used to measure light that has only one photon. The sensor used is a type of Light Dependent Resistor (LDR). LDR sensors can change their resistance when exposed to light. The LDR sensor is used as a trigger to move the fork on the robot as well as an indicator of whether the robot is lifting goods or empty. This sensor is placed between the forks, if there are objects on the fork , the LDR sensor will automatically close, increasing the resistance in the LDR. So the fork will be pulled up. The ldr light sensor is as shown in the image below.



Figure 2. LDR . light sensor

C. DC Motor Driver

An electric motor is an electromagnetic device that converts electrical energy into mechanical energy. This mechanical energy is used to, for example, rotate the pump impeller, fan or blower, move the compressor, lift materials, etc. Electric motors are also used at home (mixers, electric drills, wind fans) and in industry. Electric motors are sometimes called the "work horse" of industry because it is estimated that they use about 70% of the industry's total electrical load. DC motors require a direct voltage supply to the field coil to be converted into mechanical energy. The field coil in a dc motor is called the stator (the non-rotating part) and the armature coil is called the rotor (the rotating part). If there is a rotation of the inner armature coil in a magnetic field, there will be a voltage (emf) that changes direction in every half turn, so it is an alternating voltage. The Motor Driver uses an IC which is a type of driver IC and is able to deliver an electric current to each module of 2 Ampere. IC L298N consists of transistor logic transistors (TTL) using NAND gates which are useful for making it easier and can determine the rotation of a DC motor. The motor driver gets a supply from the power supply contained in the microcontroller which is 4.8 V or gets a maximum voltage of 35 V when using an external power supply. The motor driver in this design uses a module as shown in the image below.

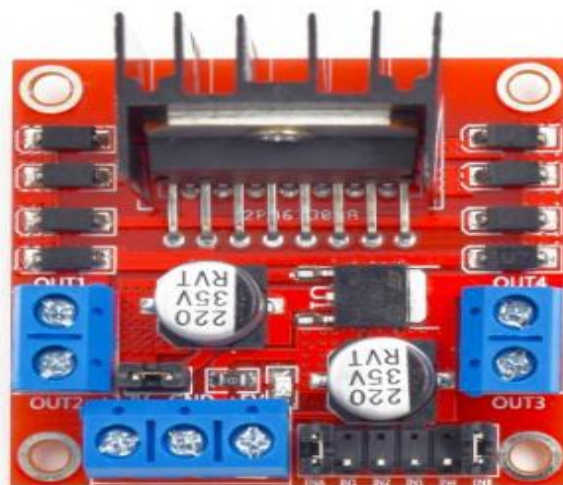


Figure 3. DC Motor Driver (Dynamo)

D. Servo Motor

Servo motor is an electromechanical device designed to use a closed loop type control system (servo) as a driver in a circuit that produces torque and speed based on electric current and applied voltage. These motors are applied to a wide range of equipment, from the simplest such as electronic toys to the complex ones such as industrial machines. Servo motors are types of electric motors that use a closed loop type system. This system is used to control the speed and acceleration of electric motors using a fairly high level of accuracy. In addition, these motors are commonly used to convert electrical energy into mechanical energy by the interaction of two permanent magnetic fields. The motor can also be defined as a rotary actuator or similarly called a motor, which is designed using a closed loop type control system (servo). Thus, it can be set to determine and confirm the angular position of the output shaft. The image of the severti motro servo is shown in the following figure.

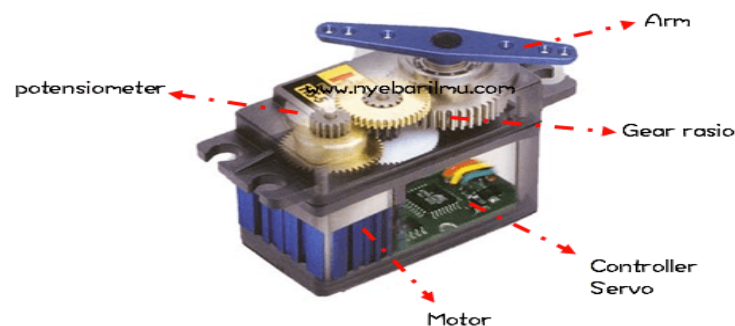


Figure 4. Servo motor

2. RESEARCH METHOD

Based on the study to be researched, namely the application of the Roboduino Atmega 2560 in the manufacture of the Goods Mining Beetle Robot. The flowchart of this research is as shown in the following figure.



Figure 6. Research flowchart

3. RESULTS AND DISCUSSIONS

A. Set of tools

The series of tools as shown in the image below.

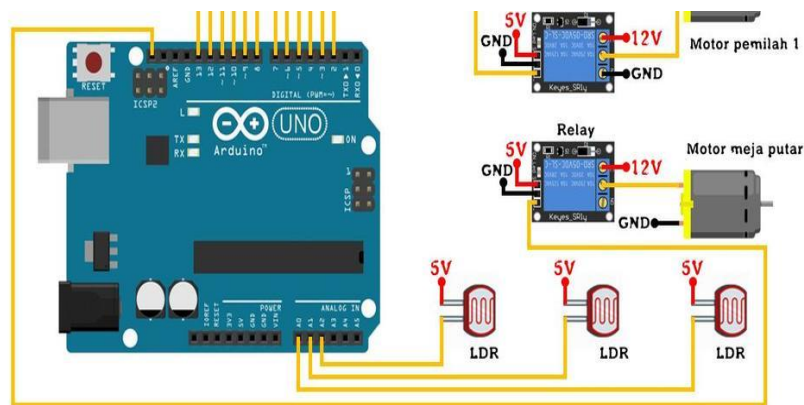


Figure 7. The series of moving goods

B. Lifting test results

The results of testing the lifting of goods with robots are as shown in the table below.

Table 1. Test results of lifting goods

Test	Response
1	Succeed
2	Succeed
3	Succeed

C. Goods drop test results

The results of testing the decrease of goods with robots are as shown in the table below.

Table 2. Test results for the decline of goods

Test	Response
1	Succeed
2	Succeed
3	Succeed

4. CONCLUSION

This study discusses the application of Roboduino Atmega 2560 in the manufacture of beetle robots that move goods . The results of this study can be concluded as follows:

1. In 3 trials on lifting goods the robot can work well.
2. In 3 trials on dropping items the robot can work well.

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