

Design and Construction of Parcel Wrapping System using Arduino

Nwe Nwe Oo, Ma Naing, Moe Myint Aung

Lecturer, Department of Electronic Engineering, Technological University (Magway), Myanmar

How to cite this paper: Nwe Nwe Oo | Ma Naing | Moe Myint Aung "Design and Construction of Parcel Wrapping System using Arduino" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-3 | Issue-5, August 2019, pp.378-381, <https://doi.org/10.31142/ijtsrd25291>



ABSTRACT

This paper describes about the automatic parcel wrapping system using arduino UNO. Packaging automation is the process or procedure of packaging a product without human assistance. It can range from individual equipment to simple process or complete packing lines. This system provides smart workflows and eliminates redundant tasks, allowing them to do more with less. This system has three sensors which used to sense the box, objects and the end of the conveyor. This system is commanded to insert 10 objects and the count numbers of objects are displayed on the 7 segment display. Moreover, two flat belt conveyors are used to carry objects and boxes. DC motors are also used for moving conveyor. The first conveyor that run one motor is to carry boxes and the second that runs another motor is to carry objects. IR sensors are used to sense the object and the boxes. Then, the conveyor for carrying the boxes that has filled objects will again to start run and will stop at end sensor. This machine can be used in industries for recording the amount of product.

KEYWORDS: LDR sensor, Belt Conveyors, DC Motor, Arduino, 7 Segment Display

Copyright © 2019 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



I. INTRODUCTION

According to the technological developing country, manufacturing is also partly important. Nowadays, automatic machines are extensively used. An automatic machine or device is one which has controls that enable it to perform a task without needing to be constantly operated by a person. In technical part, automatic parcel wrapping machines are used.

Automatic parcel wrapping machine is one which to count and packing objects. This machine provides smart workflows and eliminates redundant tasks, allowing them to do more with less. This machine reduces damages and unsalable. It improves safety and requires fewer workers to complete a task than manual processes. Proper packaging protects products from a variety of external forces during transport and storage. By replacing slower more intense manual processes, employee safety can be improved and reduce the waste of time, the costs of workplace injuries. Moreover, manufacturing can be quick, human resources can be reduced, and the amount of products can be improved.

Fig.1 is the block diagram of Automatic Parcel Wrapping Machine. This system has three sensors which used to sense the box, object and the end of the conveyor. Two motors are used for moving conveyor. Arduino microcontroller has three inputs from LDR sensor 1 (END) and LDR sensor 2 (BOX) and LDR sensor 3 (OBJECT). Sensors are given 5V by using LM7805. Seven segment displays are used to display the number of the objects and DC motors are used to drive the conveyors for carry the boxes and objects. 12V is applied to L298n (motor driver) from LM 7812 and then L298n gives back 12V to DC motors.

II. System Block Diagram

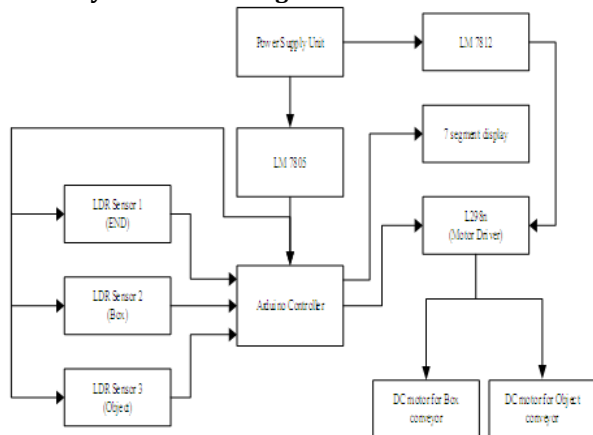


Fig.1: Block Diagram of Parcel Wrapping System

III. System components

A. Light Dependent Resistor

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance.

B. Direct Current Motor

A direct current or DC motor converts electrical energy into mechanical energy. It is one of two basic types of motors: the other type is the alternating current or AC motor. Among DC motors, there are shunt-wound, series-wound, compound-wound and permanent magnet motors. A DC motor consists of a stator, an armature, a rotor and a commutator with brushes. Opposite polarity between the two magnetic fields inside the motor cause it to turn. DC motors are the simplest

type of motor and are used in household appliances, such as electric razors, and in electric windows in cars.



C. Seven Segment Display

Seven segment display is an array of 8 LEDs connected or arranged in a special pattern together to form or display the digits from 0-9. The 7-segments are arranged as a rectangle of two vertical segments on each side with one horizontal segment on the top, middle, and bottom. These segments come in two configurations, namely, Common cathode (CC) and Common anode (CA). In CC configuration, the negative terminals of all LEDs are connected to the common pins. The common is connected to ground and a particular LED glows when its corresponding pin is given high. In CA arrangement, the common pin is given a high logic and the LED pins are given low to display a number.



D. L298N Dual H-Bridge Motor Driver

The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A. The module has two screw terminal blocks for the motor A and B, and another screw terminal block for the Ground pin, the VCC for motor and a 5V pin which can either be an input or output.



E. Arduino UNO

Arduino is an open source computer hardware and software company and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. Arduino Uno is a microcontroller board. It has 14 digital input/output pins (of which 6 can be used as PWN outputs), 6 analog inputs, a 16MHz quartz crystal, a USB connection, a power jack, an ICP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC to DC adapter or battery to get started.

IV. Overall System Flowchart

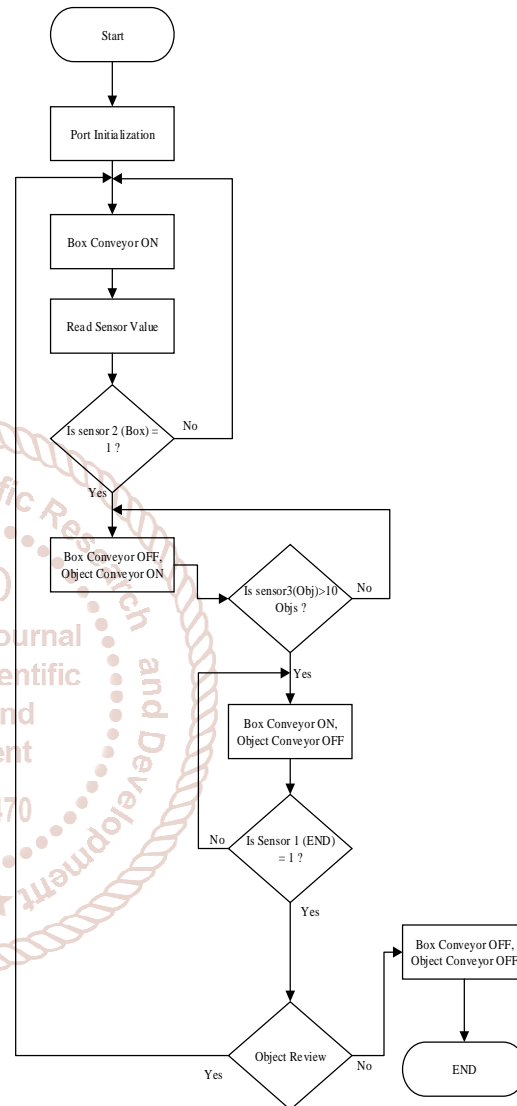


Fig.2: Overall System Flowchart

The first conveyor is to carry boxes and the second is to carry objects. If start button is pressed, the conveyor which carries box is firstly run. When the box sensor senses box, the box conveyor will stop and the conveyor which carries objects start to run. If the box sensor must not sense the box, the box conveyor will continue to run and the object conveyor will stop. The objects that exist on this conveyor will fall down in the box. The number of objects are sensed by the object sensor and displayed on the 7 Segment display. If 10 objects simultaneously full on the conveyor, carrying objects will stop and the box conveyor starts to run. But, if 10 objects do not full, the box conveyor will continue to stop and the object conveyor will run. Then, the box conveyor that has filled objects will again to start run and will stop at end sensor. Only if to remove this box that exists near the end sensor, this process can start again. The overall system is wanted to be stop; the stop button can be pressed.

V. Hardware Implementation

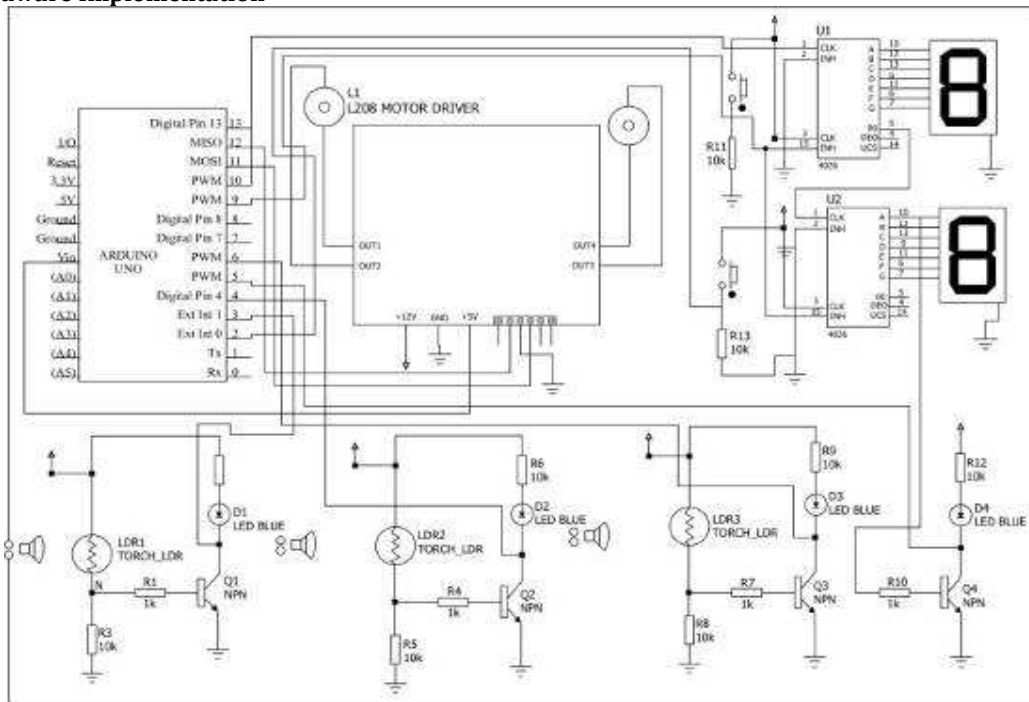


Fig.3: Circuit Diagram of Automatic Parcel Wrapping System

In this system, two seven segment display are used for displaying numbers. One is given clock pulse signal. Firstly, LDRs are used to sense objects and box. If light is received, resistance will less in LDR. If light is not received, resistance will more in LDR. By basing this method, transistor is switching and used as clock pulse signal. LDR and resistor are linked at the base of transistor. They are used as voltage divider. So, if light receive in LDR, resistance will less. When resistance is less, switch on. Due to switch on, plus voltage will arrive to clock pulse signal and number will change. Similarly, if light do not receive in LDR, resistance will more. When resistance is more, switch off. Due to switch off, 0 voltage will arrive to clock pulse signal and number will not change. Whenever clock pulse signal reach, one display will count. 10 objects are simultaneously filled, carry out and enter the second seven segment display. Then, second display will work. Arduino microcontroller counts to determine whether run or stop motor that carry box when how many objects are added into box. If start button is pressed, the conveyor which carries box is firstly run. When the box sensor senses box, the box conveyor will stop and the conveyor which carries objects start to run. The objects that exist on this conveyor will fall down in the box. The number of objects is sensed by the object sensor and displayed on the 7 segment display.



Fig.5: Result for Automatic Parcel Wrapping System

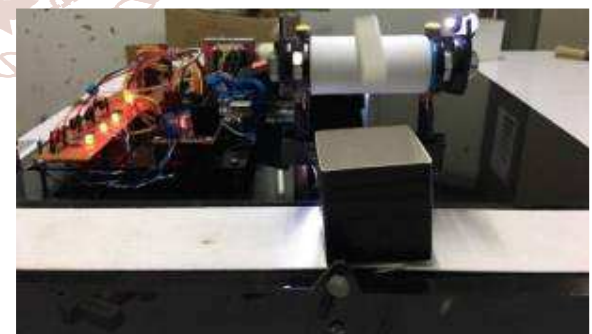


Fig.6: Result for Automatic Parcel Wrapping System

VI. Results

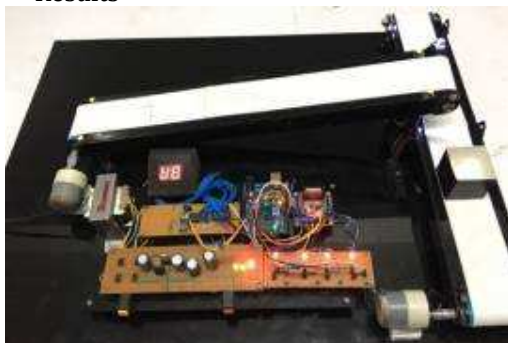


Fig.4: Complete Diagram for Automatic Parcel Wrapping System

VII. Discussion

This paper is discussed about parcel wrapping system that can be used in many industries. Packaging automation is the process or procedure of packaging a product without human assistance. It can range from individual equipment to simple process or complete packing lines. This machine provides smart workflows and eliminates redundant tasks, allowing them to do more with less. Automatic parcel wrapping machine is invented with advanced and it is used to reduce overall cost. DC motors are used for driving the conveyor belt. LDR sensors are used to sense the box and objects. Seven segment displays are used to display the number of

objects. In this paper, Arduino microcontroller is used as a mainly devices that controls the overall system process. So, this system requires fewer workers to complete a task than manual processes. Proper packaging protects products from a variety of external forces during transport and storage. Employees are required to do less hand- on work. By replacing slower more intense manual processes, employee safety can be improved and reduced the waste of time, the costs of workplace injuries. Moreover, manufacturing can be quick, human resources can be reduced, and the amount of products can be improved.

VIII. Further Extension

In this system, the black blocks are used as objects. Foods, cosmetics and other materials can be ordered to count instead of the black blocks. And, LCD can be used instead of 7 segment display. Moreover, IR sensor can also be used

instead of LDR. Automatic parcel wrapping machine can be used in industrial by using PLC. But little modifications will be needed.

IX. References

- [1] Leo Louis, April 2016, "Automation, Communication and Systems", International Journal of Control
- [2] Richard Crowson, 16/7/2018, "Packaging Automation"
- [3] David A (1984), 23/7/2018, "Different Types of Belt Conveyors".
- [4] Anil Kumar Maini, 2007, "Digital Electronics", [5] Tarun Agarwal, 2008, "230V AC to 12V DC and 5V DC"
- [5] Simon Monk, 8/11/2011, "Arduino"
- [6] Mark Balch, 20/6/2003/, "Voltage Regulator"

