iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** IX **Month of publication:** September 2020

DOI: https://doi.org/10.22214/ijraset.2020.31372

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue IX Sep 2020- Available at www.ijraset.com

Fruits Counting and Packing System using Conveyor Belt Mechanism

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Abstract: ***Most of the industries have advancement in technologies and automation. Due to automation human efforts are goes on deceasing since last decade. The industrial environments are adopting more and more aspects of automation to enhance product quality, accuracy and to reduce product cost. Conveyor system are wildly using in manufacturing industries. The automatic conveyor system is work by mounting the material. The project is gives us an idea about automatic counting and collecting material. Here we are designing and implementing an efficient material counting system using Arduino UNO, Photo Diode and IR Sensor. This project gives high accuracy and performance. It is easy to operate and construct which reduces human error.***

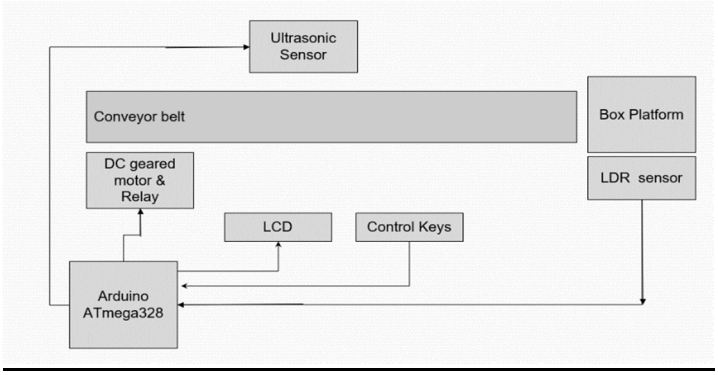
Keywords: Conveyor Belt Mechanism, Arduino ATmega328, DC Geared motor, LDR Sensor, Ultrasonic Sensor, LCD

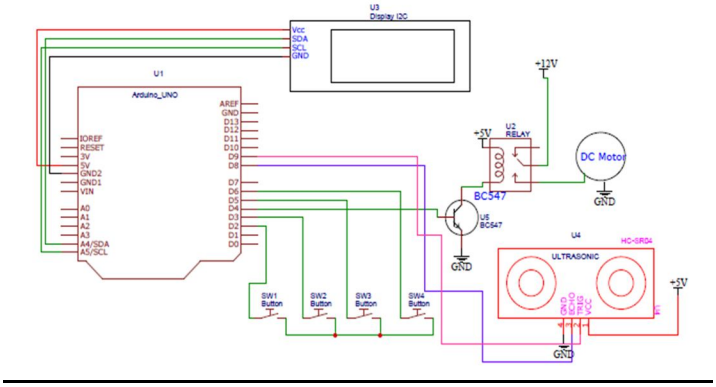
I. INTRODUCTION

Everywhere in industrial sector automation enhancing drastically. Manually material counting and remembering it to for too long time is some how difficult for human brain and also manually counting and separating the material is required more money, time and machine. To reduce these wastage, many companies started to adopt automation in the plant. If the industries use automation, it helps to increase rate of production, with smart utilization of space at reasonable rates. This automatic material removing conveyor system separate the material depending on their counts. It contain Arduino, Conveyor Belt, IR sensor, Photo diode, Servo motor, LCD display. Most of the industry have a conveyor system to move the material. The LED display will help to understand the status of material Count.

II. BLOCK DIAGRAM AND CIRCUIT DIAGRAM

A. As shown in the diagram, Arduino board the main microcontroller ATmega328 is use.





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B. Relays are controlled by the Controller to run the dc motor for conveyor belt
C. Ultrasonic sensor detects the Fruits and count by program.
D. The LDR sensor use to detect if the box is present to put the oranges inside it.
E. Initially we have to set the number of fruits per box by using control keys and display on LCD.
F. The keys are Setup, Increment, Decrement and Run Mode keys assigned in program.
G. As per the count the number of fruits putted in the box using conveyor belt.
H. When the box is filled with the counted fruits the message displayed remove box.
I. when box removed then again message displayed to put the box.
J. when the box is placed the process started again.

III. IMPORTANT HARDWARE REQUIREMENTS

A. Arduino ATmega328
B. DC Geared motor
C. Relay
D. Ultrasonic sensor
E. LDR sensor
F. LCD

IV. COMPONENT SPECIFICATION

A. Arduino ATmega328



1) Microcontroller: ATmega328P.
2) Operating Voltage: 5V.
3) Input Voltage: 7-12V.
4) Digital I/O Pins: 14 (of which 6 provide PWM output).
5) Analog Input Pins: 6.
6) DC Current: 40mA.
7) Flash Memory: 32 KB.
8) SRAM: 2 KB.
9) EEPROM: 1 KB.
10) Clock Speed: 16 MHz.

B. DC Geared Motor



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1) RPM: 10.
2) Operating Voltage: 12V DC
3) Gearbox: Attached Plastic (spur)Gearbox
4) Shaft diameter: 6mm with internal hole
5) Torque: 7 kg-cm
6) No-load current = 60 mA(Max)
7) Load current = 300 mA(Max).

C. Relay

1) 5 Volt DC Single Pole Double Throw Relay
2) Supports 250V AC / 10Amp



3) Supports 110V DC / 15Amp

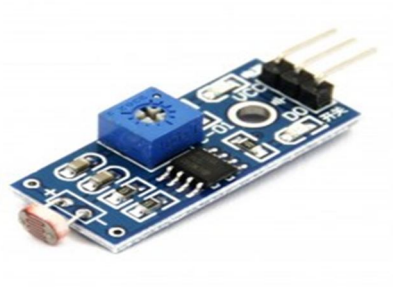
D. Ultrasonic Sensor

1) This ultrasonic sensor module can be used for measuring distance, object sensor, motion sensors etc. High sensitive module can be used with microcontroller to integrate with motion circuits to make robotic projects and other distance, position & motion sensitive products.



2) The module sends eight 40Khz square wave pulses and automatically detects whether it receives the returning signal. If there is a signal returning, a high level pulse is sent on the echo pin. The length of this pulse is the time it took the signal from first triggering to the return echo.

E. LDR Sensor

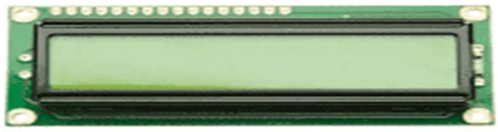


1) It Can detect ambient brightness and LASER intensity
2) Adjustable sensitivity (via blue digital potentiometer adjustment)
3) Operating voltage 3.3V-5V
4) Digital switching outputs (0 and 1) -D0

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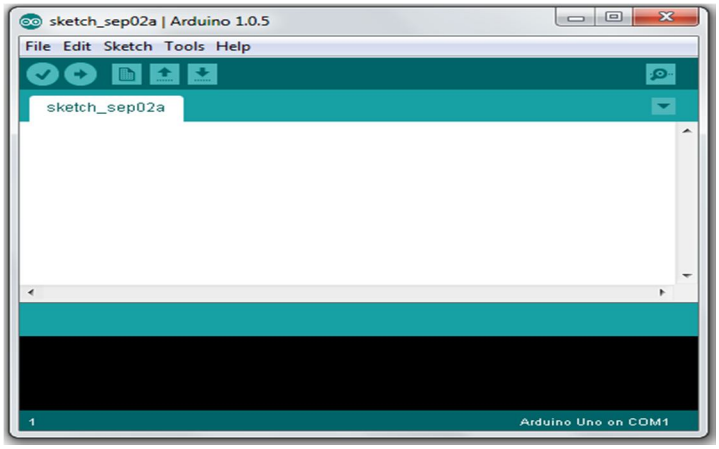
F. LCD



1) Display Mode: STN, BLUB
2) Display Formate: 16 Character x 2 Line
3) Viewing Direction: 6 O'Clock
4) Input Data: 4-Bits or 8-Bits interface available
5) Display Font : 5 x 8 Dots
6) Power Supply : Single Power Supply (5V±10%)
7) Driving Scheme : 1/16Duty,1/5Bias
8) Backlight（Side）：LED（Yellow）

V. SOFTWARE USE

A. Arduino Compiler to program ESP12 module
B. Language: Embedded C for Arduino



VI. CIRCUIT PIN CONNECTION

A. Arduino (pin 4) → Relay 1
B. Arduino (A0) → LDR sensor
C. Arduino (pin 8,9) → Ultrasonic sensor
D. Arduino (pin A4, A5) → LCD
E. 12V Battery connected to DC geared motor for conveyor via Relay
F. 12V +ve → Relay 1 Common pin
G. Motor +ve → Relay 1 Normally open pin

VII. RESULT

The object are counted with respect to the previously stored value in program and stored objects are displayed on LCD display. The use of automation in counting object process become simple because of this counting process reduces manual effort and manual error. Which leads to improve product quality as well as save time and cost.

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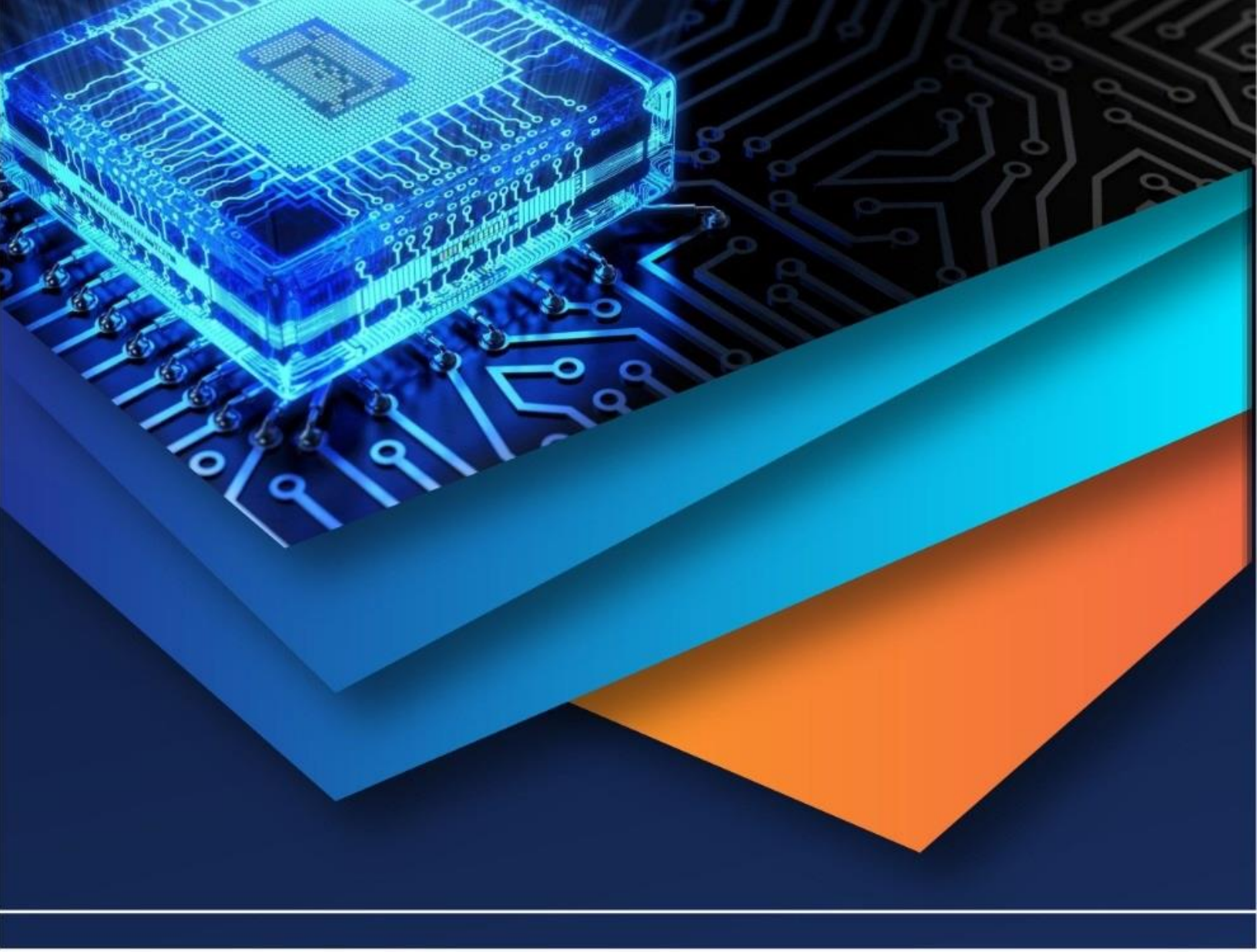
VIII. CONCLUSION.

Everywhere in manufacturing industries automation is developing drastically. The management of the integrity of supply the product from raw material to finish product. Quality of product is much more important and in industries counting of object is large process. So this fruit counting and packing project is the excellence because of this simplicity and working. Applying this project idea the industry can easily count the required product accordingly.

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