

AUTOMATIC SORTING MACHINE BASED ON BARCODE

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Abstract -: The Automatic Sorting Machine is used to sort different types of products or commodities based on the barcode provided on them. This gives a provision to reduce the manual effort and hence human error by replacing the conventional methods of sorting in areas involving hectic sorting. The system comes into play in airports and other industrial distribution centres where the products or commodities have to be sorted into batches in order to take them to their respective destination. The products are put on a conveyer system where they are scanned for the particular barcode provided on them. Depending on the barcode, they are placed on the respective carriers automatically where these carriers dispatch them to the corresponding destinations.

Keywords: Arduino uno, Sorting, Barcode, Barcode Scanner, Sensor

1. INTRODUCTION

In the present world, there are plenty of scientific innovations and sophisticated technologies that has simplified human life and raised the standard of living. Scientists are busy with the research and development works. Day-by-day scientists come up with better ideas that make the life of common man more automated. As an attempt to develop an automated set-up in whatever area possible which would further simplify human life and make it easier, we ended up with the very relevant area of concern – sorting.

2. EXISTING SYSTEM

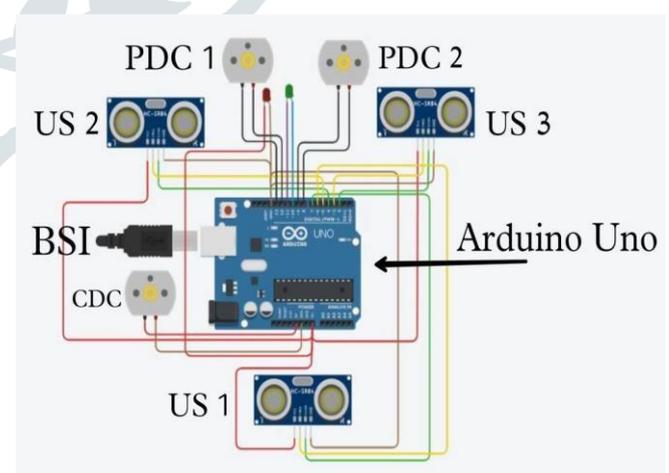
The Existing Method has been into practice from a couple of decades now. The sorting facilities have traditionally been aligned to handling documents, parcels and small packages. The existing sorting process is carried out by people manually either on the floor area or on conveyor belts at particular locations. The entire parcel sorting process does not have Standard Operating Procedure (SOP) which drastically reduces the efficiency. The existing method face a lot obstacles like labour availability, limited working hours, financial inefficiencies which may result in limited benefits for the organization.

3. LITERATURE SURVEY

Multiple research papers, articles and webpages were thoroughly scrutinized for executing this project work.

Since our objective was to automate the existing sorting process, the knowhow of electronic components like sensors, DC motors, Arduino Uno, Barcode Scanning Sensor were of utmost importance to us which was studied using the research paper "DESIGN AND IMPLEMENTATION OF AUTOMATED PARCEL SORTING MECHANISM USING ARDUINO". In order to ensure proper scanning of Barcode a paper named "Adaptive Binarization of QR Code Images for Fast Automatic Sorting in Warehouse Systems" was studied which helped us to scan the barcode with efficiency and swiftly under proper illumination of light". Also, a research paper named "Design and Construction of Colour Sensor Based Optical Sorting Machine" and "Design and Development of a PLC Based Automatic Object Sorting" addressed us to new design and electronic components. Books were also referred while learning about the Arduino and its programming. The books were "Programming Arduino: Second Edition", "Arduino Cookbook, 2nd Edition", "Arduino Workshop: A Hands-On Introduction to 65 Projects" etc. Using all the resources mentioned above our project work was executed.

4. SYSTEM ARCHITECTURE



The system consists of many functional units such as barcode scanner, ultrasonic sensor, dc motor, arduino uno as shown in figure1. Here arduino uno plays vital role i.e. it is heart of this proposed system. The arduino uno is burnt with program that is necessary to control the barcode scanner, motors, sensors, and conveyors interfaced to it. The interfaced units are controlled by the arduino uno in an efficient and faster manner, thus providing the system to be reliable than the existing ones.

5. DESCRIPTION OF PROPOSED SYSTEM

In many industries sorting the materials of different sizes is difficult. For this purpose we need more human efficiency to sort the materials, so we are using the automated process which is used to sort the materials which are of different sizes and shapes... After completion of manufacturing the product they automatically move on the conveyor belts. Here we are using sensors at different places which detect and sense the materials. They get sorted at different places based upon their Barcode which is provided on it and they are placed in their respected containers or boxes. For sensing the material we are using ultrasonic sensors which are so sensitive. The Proposed System block diagram is shown in Figure.1.

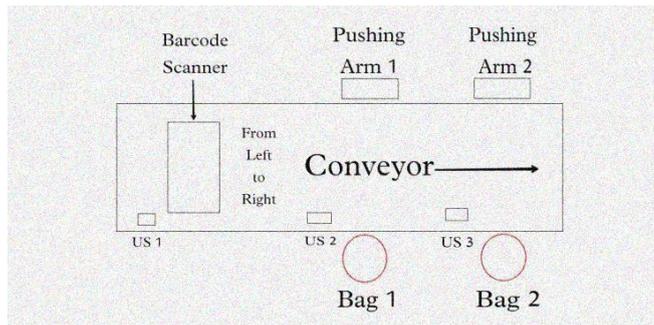


Figure.1 Block Diagram

All these process is controlled and handled by Arduino uno. Automating every sector of industry is an important step towards increasing efficiency and reducing human related errors. The entire process is controlled by the program dumped in Arduino uno.

6. HARDWARE DESCRIPTION

6.1. Conveyor Belt

Conveyor is used in many industries to transport goods and materials between stages of a process. Using conveyor systems is a good way to reduce the risks of musculoskeletal injury in tasks or processes that involve manual handling, as they reduce the need for repetitive lifting and carrying. Conveyors are a powerful material handling tool. Here instead of using multiple conveyor belts for different operation we are using a single conveyor belt which takes the objects to the barcode scanner where the sensing of the objects is done and according to data in barcode pushing arms get activated then sorting operation is done simultaneously. Conveyor belt is shown in figure.



6.2. Barcode Scanner

A barcode reader (or barcode scanner) is an electronic device that can read and output printed barcodes to a computer. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Additionally, nearly all barcode readers contain decoder circuitry analysing the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port.



Figure 3 barcode Scanner

It is an electronic device that can read the printed barcodes. It consists of a light source, a lens and a light sensor translating optical impulses into electrical pulses. In this paper, we are using Barcode scanner to read the printed PIN codes as barcodes which is shown in Figure.3

6.3. US Sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).



Figure 4 US Sensor

6.4. Arduino uno

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. Here we are using Arduino for processing and controlling inputs and outputs. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, which is shown in Figure.5



Figure 5 Arduino uno Board

7. HARDWARE SETUP

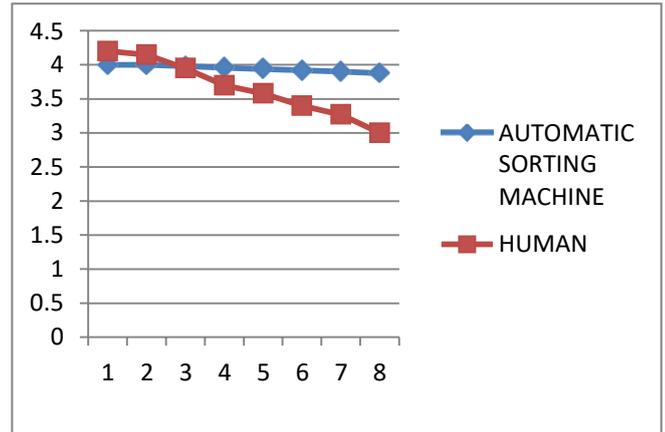
The overall hardware setup of proposed System is shown in Figure.7. In the sorting mechanism, all the gadgets are connected to arduino uno by jumper wire. When the pieces are sensed by the UV sensor. The arms get activated to push the parcels to the appropriate destination.



Figure 6 Hardware Setup of Proposed Mode

The Conveyor with DC Gear motor is used for the transportation.

8. RESULTS



X-axis = Productivity Y- axis = Time in hours

Expense	Machine (Price in Rs.)	Human (Price in Rs.)
Installation(one time)	10,000	00
Human Labour	00	12,000
Maintenance	500	00
Electricity	112	00
Canteen facility	00	600
Total (for month)	10,712	12,600
Total (For year)	18,856	1,32,344

9. CONCLUSION

The automatic sorting machine using conveyor belt is basically useful for sorting the products in the industry specifically large scale industries where mass production is carried out. We have proposed a system which would increase the production rate and accuracy of material handling system. The machine also reduces the efforts of the workers by reducing the time spent for material handling. The application area of this machine is very wide in industries where automation is built. Ultimately the machine sorts an additional 100 objects per day as compared to a normal human being with savings amounted to Rs. 1,32,344 per year in the same work hours.

10. FUTURE SCOPE

- Replacing DC motors by stepper motors to increase accuracy.
- Sensors can be replaced by cameras for digital processing which is done using “MATLAB”
- Robotic arm can be used instead of flippers and containers to place the object at desired locations, thus making the process of sorting more effective.

- Also we can use such system which would help to get information by various types of inspection such as holes diameter, Height, Thickness, Surface defect.
- Segregation based on size can be done by installation of sieves of various sizes.
- Some rubber grippers can be used. It increases surface resistance which helps to avoid slipping of conveyor belt.

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