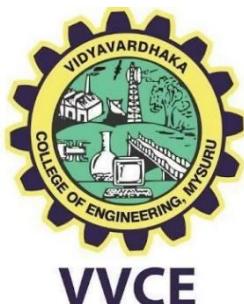


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A Project Report on

**“FABRICATION OF PILOT PROTOTYPE FOR SEMI-AUTOMATED MATERIAL
SORTING TABLE SYSTEM USING ARDUINO UNO R3”**

Submitted by:

Student name:	USN:
1. Amith A	4VV20CS008
2. Aishwarya K B	4VV20CS006
3. Akshatha L M	4VV20CS007
4. Amruta Sindhu	4VV20CS009
5. Aniruddha Bagal	4VV20CS010
6. Anirudha D	4VV20CS011

Under the guidance of

Guide Name: SNEHA SHETTY R

Designation: ASSISTANT PROFESSOR

**Department: INFORMATION SCIENCE AND
ENGINEERING**



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ABSTRACT

Sortation is the process of identifying items on a conveyor system and diverting them to specific destinations using a variety of devices controlled by task-specific software. Sorters are applied to different applications depending upon the product type and required rate. Sortation systems are often employed when high quantities of products need to flow to different destinations for further processing. Sortation conveyor systems generally receive mixed units loads and discharge them to designated locations. The automatic material sorting machine has been developed to sort different kind of materials based on 'shape' and 'size' which will be detected through IR sensors.



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INTRODUCTION

Automation is a technology that refers to the use of hands-on less in the production process. In the process, the industry is increasingly innovative in production automation. One of them is the use of high-tech automation machines in sorting objects with great attention to accuracy and improving efficiency. This work is based on design of a transport line table for sorting and arranging products based on their dimensions using IR sensors for detecting the object. This project is locally controlled by the use of Arduino based embedded system. The automatic sorting and arranging machine are used to sort the different types of products based on their size. This automation significantly reduces the time required for manual sorting in the production line of small/medium scale industries and hence it also decreases the percentage of human error during sorting/arranging. The products are placed on the transport line conveyor system and as it moves on, it is scanned by the IR sensor, depending on the height of the product these will be sorted automatically.

BASIC COMPONENTS

COMPONENTS	SPECIFICATION
Arduino UNO R3 board	<p>Microcontroller: ATmega328p Operating Voltage: 5V Input Voltage (recommended): 7-12V Input Voltage (limits): 6-20V Digital I/O Pins: 14 (of which 6 provide PWM output) Analog Input Pins: 6 DC Current per I/O Pin: 40 mA DC Current for 3.3V Pin: 50 mA Flash Memory: 32 KB (ATmega328) EEPROM: 1 KB (ATmega328) Clock Speed: 16 MHz</p> 
IR sensor	<p>9VDC Operating voltage. I/O pins are 5V and 3.3V compliant. Range: Up to 20cm. Adjustable Sensing range. Built-in Ambient Light Sensor. 20mA supply current.</p> 
Battery	Lithium ion/9V
Shut metal	G24 GI Shut
Wooden board	1'',12''

Micro servo motor

9V DC/20mm



Jumper wires

Single core

METHODOLOGY

The conveyor used in this project needs to smoothly transport products from one place to the other and hence paper belt is used which can easily carry out this operation. For sensing the product moving on conveyor, IR sensors(9v-DC) are used as they require very low power, there is no need of contact for detection, they are not affected by oxidation or corrosion.

Arduino UNO R3 is used for local control as they are user friendly and are easily programmable. Firstly, the conveyor framework is fabricated along with the assembly of motor and belt. The IR sensor which is used to sense is connected to the Arduino board. After collection of resources and assembling of the parts, the prototype of model is developed using Arduino IDE software.

The programming required for sensing the object with the help of IR sensors is needed to be installed into the Arduino UNO microcontroller along with the programme using the Arduino Platform software. After complete programming, the correct connections between the IR sensor, Arduino are made.

The prototype will be run in the required conditions and will be tested accordingly.

```
#include <Servo.h>

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Servo tap_servo;

int sensor_pin = 4;
int tap_servo_pin =5;
int val;

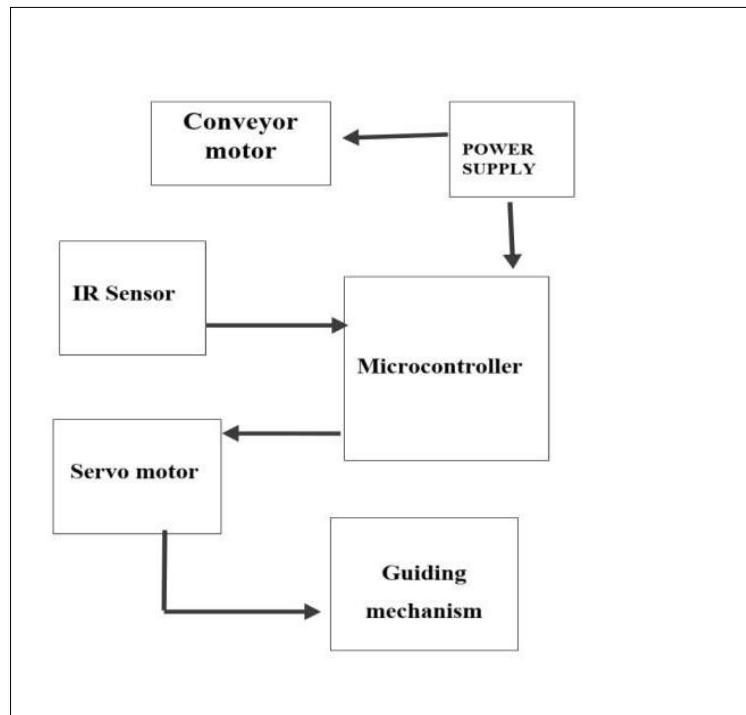
void setup(){
    pinMode(sensor_pin,INPUT);
    tap_servo.attach(tap_servo_pin);
}

void loop(){
    val = digitalRead(sensor_pin);

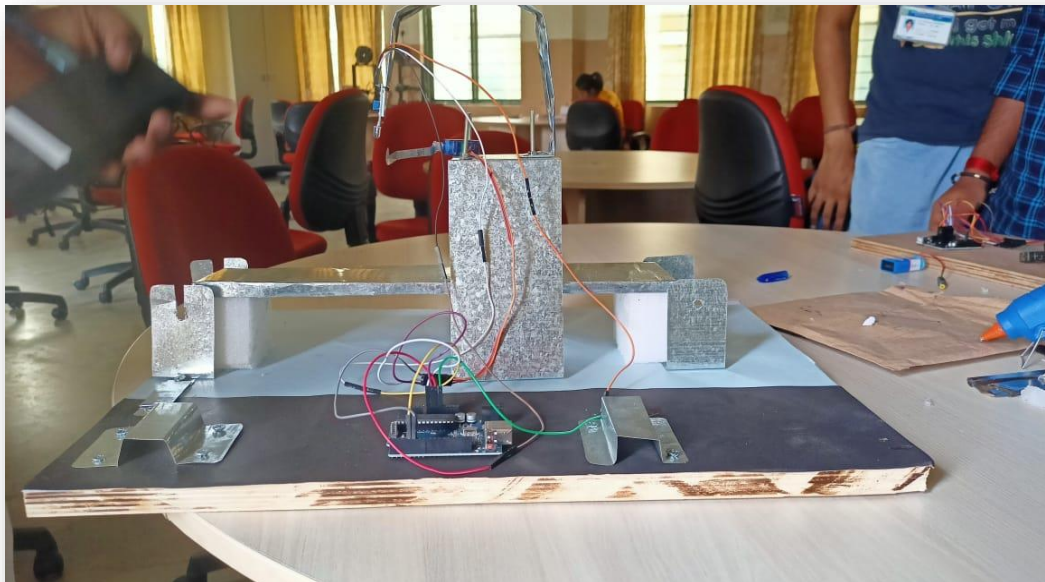
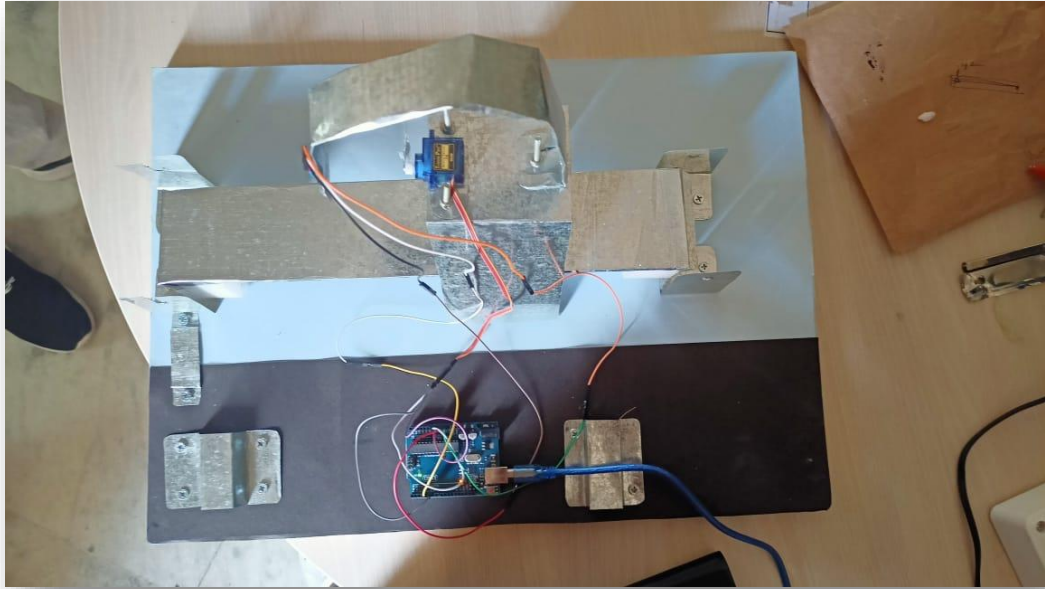
    if (val==0)
    {tap_servo.write(0);
    }
    if (val==1)
    {tap_servo.write(180);
    }
}
```


WORKING

The products with suitable height when passes the IR sensor triggers and reflects its emitted infrared beam which is received by the receiver of the IR sensor and hence the IR sensor detects the product. This signal is sent directly to the Arduino Uno microcontroller which reads the inputs of the sensor and convert it into output data which activates the servo motor of the guiding mechanism. The Arduino Uno is programmed to power the servo motor for a particular time interval and rotate it to a certain angle which in turn rotates the guiding plate. Thus, the product of more height will strike the guiding plate and will follow its path to the different bin. Hence the sorting of products based on height is accomplished using the guiding mechanism.



Working Block Diagram



Working Model

COST ESTIMATION

<i>Sl.no</i>	<i>Particulars</i>	<i>Specification/ Ratings</i>	<i>Quantity</i>	<i>Unit price (INR)</i>	<i>Total price (INR)</i>
1	Arduino UNO R3 board	Generic	1	500	500
2	IR sensor	9V DC/9g	1	70	70
3	Micro servo motor	9V DC/20mm	1	100	100
4	Battery	Lithium ion/9V	6	20	120
5	Self-tapering screws	M ₄	Lump sum	40	40
6	Jumper wires	Single core	Lump sum	80	80
7	HCHS nut	M ₄ *35	10	2	20
8	HCHS bolt	M ₄	10	2	20
9	Mufflers	Rubber	4	10	40
10	Shut metal	G24 GI Shut	Lump sum	80	80
11	Wooden board	1'',12''	1	100	100
12	Base sheet	A1	1	30	30
13	Sponges	-	Lump sum	40	40
14	E-connector	Battery to Arduino	1	30	30
15	Glue	Feviquick	1	20	20
16	Double sided tape	-	1	30	30
17	Insulation tape	-	1	20	20
Total=					1340

SCOPE FOR FUTURE WORK

Automation in the field of transport line table is of such importance now-a-days that it is impossible to imagine a world of transport without automation. In addition to explaining the basic concepts of automation of transport and sorting, this project links these two with the help of hardware and software and shows how this can be simply managed through microcontrollers and other components. Therefore, this system can be implemented using Arduino platform. Besides these the project also has some disadvantages that using the Arduino platform it can power and control small unit which would be suitable only for sorting products in the small-scale industries. The battery is also unreliable sometimes as the power delivered to the motor to drive the transport line conveyor may not be sufficient.

REFERENCES

- https://www.researchgate.net/publication/302593564_Model_design_and_simulation_of_automatic_sorting_machine_using_proximity_sensor
- http://www.ijritcc.org/download/conferences/ICIIME_2017/ICIIME_2017_Track/1499064108_03-07-2017.pdf