LIBRARY CONVEYOR BELT

A report submitted in partial fulfillment of the Academic requirements for the award of the degree of
Bachelor of Technology

Submitted by

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UNDER THE COURSE
SOCIAL INNOVATION IN PRACTICE

CENTRE FOR ENGINEERING EDUCATION RESEARCH

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
(NAAC Accredited with 'A+' Grade & NBA Accredited)
(Approved by AICTE, Permanently Affiliated to JNTU Hyderabad)
KANDLAKOYA, MEDCHAL ROAD HYDERABAD-501401
2022-2023

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CERTIFICATE

This is to certify that the report entitled "**LIBRARY CONVEYOR BELT**" is bonafide work done by **A.NIKHILA(21H51A6202), P.ADITYA(21H51A6216), P.ROHAN RAJ (21H51A6230), D.VARSHINI(21H51A6244), ANIK NATH(21H51A6258)** of II B.TECH II Semester in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology, submitted to Center for Engineering Education Research, CMR College of Engineering & Technology , Hyderabad during the Academic Year of 2022-23.

Names of the Project Coordinators

1.B.Suresh Ram (HOD-CEER)   (**B.Suresh Ram**)
2.K.Ravi Kiran(Assistant Professor)   **HOD CEER**
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DECLARATION

We, the students of II B. Tech I Semester of **Centre for Engineering Education Research** , **CMR COLLEGE OF ENGINEERING & TECHNOLOGY**, Kandlakoya, Hyderabad, hereby declare,that under the supervision of our course coordinators, we have independently carried out the project titled "**LIBRARY CONVEYOR BELT**" and submitted the report in partial fulfillment of the requirement for the award of Bachelor of Technology in by the **Jawaharlal Nehru Technological University, Hyderabad (JNTUH)** during the academic year 2022-2023.

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We would like to thank the Principal of **CMRCET, MAJOR Dr.V.A.Narayana**, for his support in thecourse of this project work.

Finally, we thank all our faculty members and Lab Assistants for their valid support.

We own all our success to our beloved parents, whose vision, love and inspiration has made us reach out for these glories.

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ABSTRACT

Many students after reading the books in library they just leave the book on the table .So after, the library staff should take the responsibility to set the books in their proper racks .This is a really a big burden to the staff members and even sometimes there is a chance of misplacing the books in library.
Once the books get misplaced it becomes complicated to set them properly.

In order to overcome this problem we came up with the solution of LCD which means library conveyor belt. This project has done in such a way that there is scanner which scans each and every book and after placing the book on the conveyor belt it starts moving and place the book in the box which is placed at each and every end he book shelves.

By this application we can easily sort the books in library, which reduces the burden to the staff members and also it is easy to maintain and run. With this project there is no chance of misplacing the books.

The one after reading the book should scan the book and place it on the conveyor belt and the conveyor belt starts doing its job. Then after the staff member should go to each rack and place them in their rack .

CHAPTER 1
INTRODUCTION

Library conveyor belt is an automated system that helps to sort and move library materials.

It is an efficient and cost-effective way of handling large volumes of library items .The conveyor belt system is designed to reduce staff workload and improve overall library operations. Conduct a thorough needs assessment to determine the best type of conveyor belt system for your library . Involve library staff in the planning and implementation process to ensure their buy-in and support. Provide adequate training and support for library staff to ensure they can effectively use and maintain the system. Several libraries around the world have successfully implemented conveyor belt systems, including the Seattle Public Library .These libraries have reported increased efficiency, accuracy, and customer satisfaction as a result of the system's implementation .The system has also helped to reduce staff workload, allowing them to focus on other important tasks.

CHAPTER 2
LITERATURE REVIEW

The conveyor belt system is designed to reduce staff workload and improve overall library operations. Conduct a thorough needs assessment to determine the best type of conveyor belt system for your library. Involve library staff in the planning and implementation process to ensure their buy-in and support. Provide adequate training and support for library staff to ensure they can effectively use and maintain the system. Several libraries around the world have successfully implemented conveyor belt systems, including the Seattle Public Library. These libraries have reported increased efficiency, accuracy, and customer satisfaction as a result of the system's implementation. The system has also helped to reduce staff workload, allowing them to focus on other important tasks.

Arranging books by library staff:

The books are arranged properly on the shelves to save the time of readers as well as the staff. The shelf arrangement is a very important activity in a library and if it is not done timely and properly, then the whole objective of the library will get lost. Generally, books in any library are arranged in the classified order. Books are also arranged according to different collections/sequences to meet the needs of the users efficiently and effectively.so it is difficult arrange books in racks.

CHAPTER 3
PROBLEM DEFINITION

3.1 PROBLEM STATEMENT:

- When we visited library there we seen the library staff had big problem of arranging the books in the respected racks.Many of them are left the books on the table after the use so this makes the library staff to take more time to arrange the books in the respective racks.

- Then we come up with a solution of library conveyor belt to make library staff work easy.

- Library conveyor belt is an automated system that helps to sort and move library materials.

- It is an efficient and cost-effective way of handling large volumes of library items.

- The conveyor belt system is designed to reduce staff workload and improve overall library operations.

3.2 OBJECTIVE

- Library conveyor belt systems help to reduce manual handling of library materials, which can be physically demanding and time-consuming.

- The system helps to improve the accuracy and speed of sorting and shelving library materials.

- Library staff can focus on providing better customer service and other important tasks while the conveyor belt system handles the sorting and movement of library materials.

3.3 REQUIREMENT ANALAYSIS:

The components required for the library conveyor belt are:

- Arduino UNO
- RFID reader EM 18
- LCD display
- 3 servo motors
- 1 dc motor
- Conveyor belt
- Power regulator

ARDUINO UNO:

Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP 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. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Fig no:1   Arduino uno

JUMPER WIRES:

Jumper wires typically come in three versions: male-to-male, male-to-female and female-to female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often. When connecting two ports on a breadboard, a male-to-male wire is what you'll need.

Fig no:2 jumper wires

500 RPM DC MOTOR:

A 500 RPM (revolutions per minute) DC motor is a type of electric motor that operates on direct current (DC) power. RPM refers to the number of rotations the motor's shaft makes in one minute. In this case, the motor is designed to achieve approximately 500 rotations per minute under its rated conditions.

Fig no:3 500 rpm dc motor

DC motors are commonly used in various applications due to their simplicity, efficiency, and controllability. The basic components of a DC motor include a stator (stationary part) and a rotor (rotating part). The stator typically consists of a set of stationary magnets, while the rotor comprises

one or more coils of wire, which carry the electric current. When a DC voltage is applied to the motor, it creates a magnetic field that interacts with the magnets in the stator, resulting in a rotational force on the rotor.

The speed and torque of a DC motor can often be controlled by adjusting the input voltage or by using electronic speed control (ESC) systems. It's important to note that the actual RPM of the motor may vary depending on the load and the voltage applied. The manufacturer's specifications and datasheets provide more detailed information about the motor's performance characteristics and limitations.

LCD MODULE (16*2)

An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates to a display 16 characters per line in 2 such lines.

Features of 16×2 LCD module

Fig no:4 LCD module

• Operating Voltage is 4.7V to 5.3V

• Current consumption is 1mA without backlight

• Alphanumeric LCD display module, meaning can display alphabets and numbers

• Consists of two rows and each row can print 16 characters.

• Each character is built by a 5×8-pixel box

• Can work on both 8-bit and 4-bit mode

• It can also display any custom generated characters

• Available in Green and Blue Backlight

SERVO MOTOR:

A **servo motor** is a type of motor that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision. If you want to rotate an object at some specific angles or distance, then you use a servo motor. It is just made up of a simple motor which runs through a **servo mechanism**. If motor is powered by a DC power supply then it is called DC servo motor, and if it is AC-powered motor then it is called AC servo motor. For this tutorial, we will be discussing only about the **DC servo motor working**. Apart from these major classifications, there are many other types of servo motors based on the type of gear arrangement and operating characteristics. A servo motor usually comes with a gear arrangement that allows us to get a very high torque servo motor in small and lightweight packages. Due to these features, they are being used in many applications like toy car, RC helicopters and planes, Robotics, etc.

Servo motors are rated in kg/cm (kilogram per centimeter) most hobby servo motors are rated at 3kg/cm or 6kg/cm or 12kg/cm. This kg/cm tells you how much weight your servo motor can lift at a particular distance. For example: A 6kg/cm Servo motor should be able to lift 6kg if the load is suspended 1cm away from the motors shaft, the greater the distance the lesser the weight carrying capacity. The position of a servo motor is decided by electrical pulse and its circuitry is placed beside the motor.

Fig no:5 Servo motor

RFID READER:

RFID stands for Radio Frequency Identification. Each RFID card has a unique ID embedded in it and a RFID reader is used to read the RFID card no. EM-18 RFID reader operates at 125 KHz and it comes with an on-chip antenna and it can be powered with 5V power supply. It provides serial output along with weigand output. The range is around 8-12cm. serial communication parameters are 9600bps, 8 data bits, 1 stop bit. This wireless RF Identification is used in many systems like design
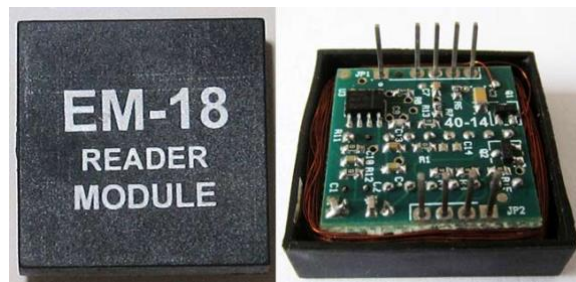

Fig no:6 RFID reader EM-18

CONVEYOR BELT:

A rubber conveyor belt is a type of continuous moving belt that transports materials or packages from one place to another. In other words, this is a solid band made of tough, long-lasting substances, upon which different materials are conveyed. They are made from a variety of materials, ranging from rubber compounds and leather to urethane and PVC to wire mesh composed of assorted metals, like stainless steel and carbon steel. Rubber conveyor belts are very popular and widely used in various industries to transport and process materials from one point to another. They are widely used in conveyor systems. Multiple belting are used to transfer or shift power from one rotating shaft to another on conveyor systems. They are available for a wide range of applications and media transportation. Production, mining and shipping companies all make use of conveyor belts to manage materials more efficiently and reduce labor costs.

Conveyor belts are also used in food and beverage companies, automotive and tire assemblies, electronics, pharmaceutical and medical, printing, mail sorting, tobacco and packaging.

Fig no:67 Conveyor belt

3.4 METHODOLOGY:

Some libraries have upgraded their services by including digital tools and devices to be more appealing to potential visitors and satisfy the returning visitors. Examples of digital devices and tools that are include at these libraries are e-books, e-readers, computers, tablets, and Wi-fi. All of which were a crucial step to becoming more modern and allowing easy access to digital information.
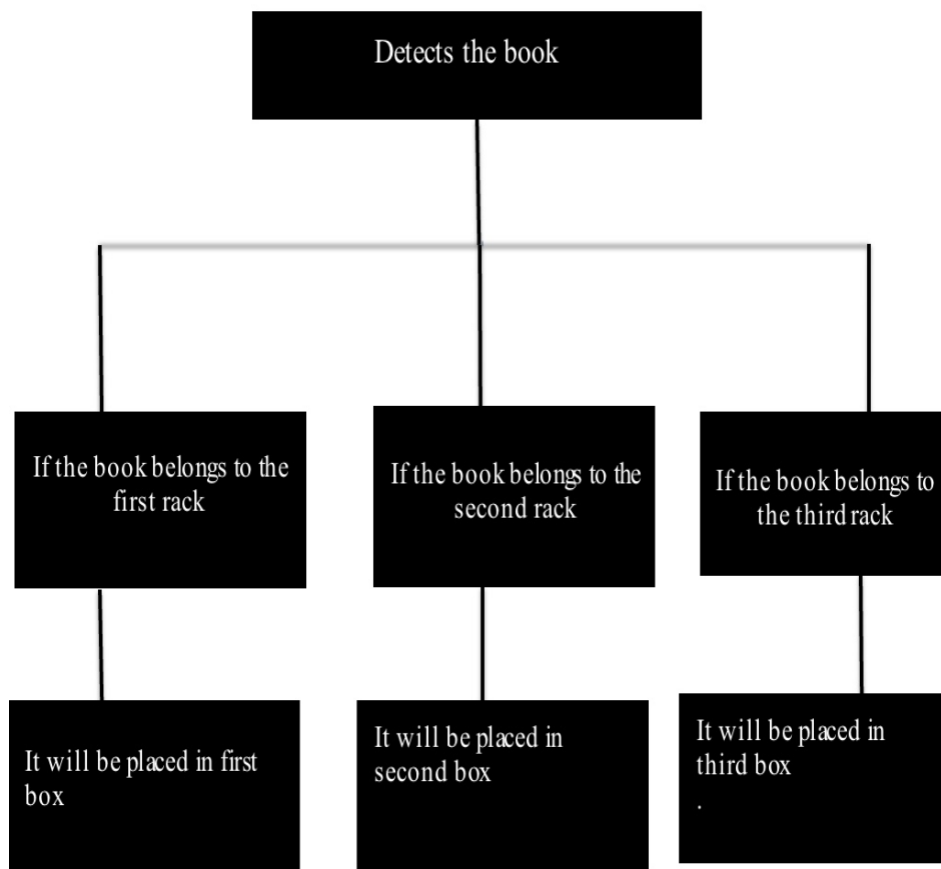
Furthermore, libraries are universal centre that provide access to information to anyone, and everyone. Equal access to everyone is a core value of libraries; thus, it includes helping individuals from all different backgrounds and equal opportunity for self-education or personal development.

Libraries can specifically help communities and individuals in need. The ability to offer visitors access to the internet and devices such as public computers helps both individuals and communities to expand their knowledge and improve their skill sets

CHAPTER 4

4.1 CONCEPTUAL DESIGN

When a person places a book on the conveyor belt, the belt starts. The belt will stop when the particular rack of the book arrives. The belt will stop in front the rack and the push arm which is connected to servo motor activates and pushes the book and then the book will fall into the rack box.

```
                    ┌─────────────────────┐
                    │   Detects the book   │
                    └─────────────────────┘
```

If the book belongs to the first rack	If the book belongs to the second rack	If the book belongs to the third rack
It will be placed in first box	It will be placed in second box	It will be placed in third box

4.2 DESIGN DESCRIPTION:

The library conveyor belt consists of 2 DC motors which is responsible for the conveyor belt to rotate. DC motor is connected to a power regulator because DC motor needs more power to rotate. Arduino is connected with rfid reader, power regulator, servo motor and lcd display. So when a book is placed on conveyor belt rfid is used to detect the book and the information of book will be displayed in the lcd display. A conveyor belt is attached to dc motor after information gets displayed the belt will start rotating. Lastly the book is pushed by push arms which are connected to servo motors
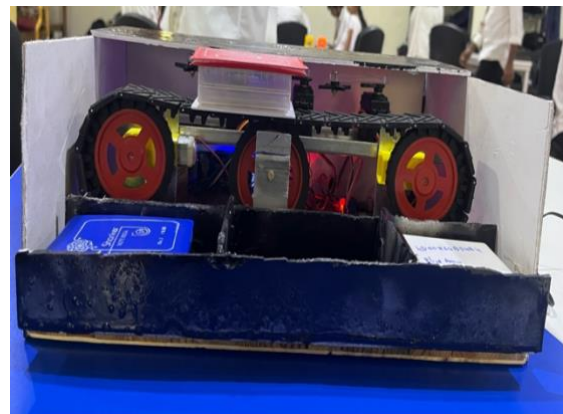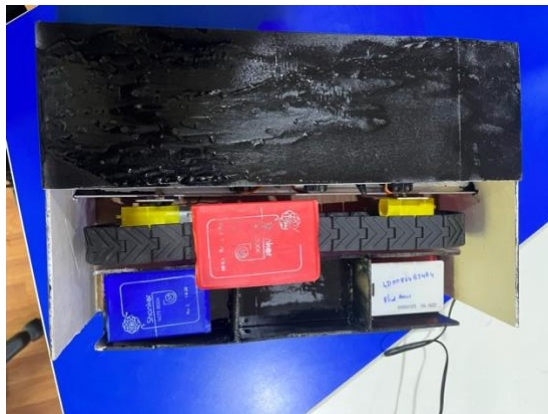
CHAPTER 5
BLOCK DIAGRAM

BASIC BLOCK DIAGRAM OF LIBRARY CONVEYER BELT
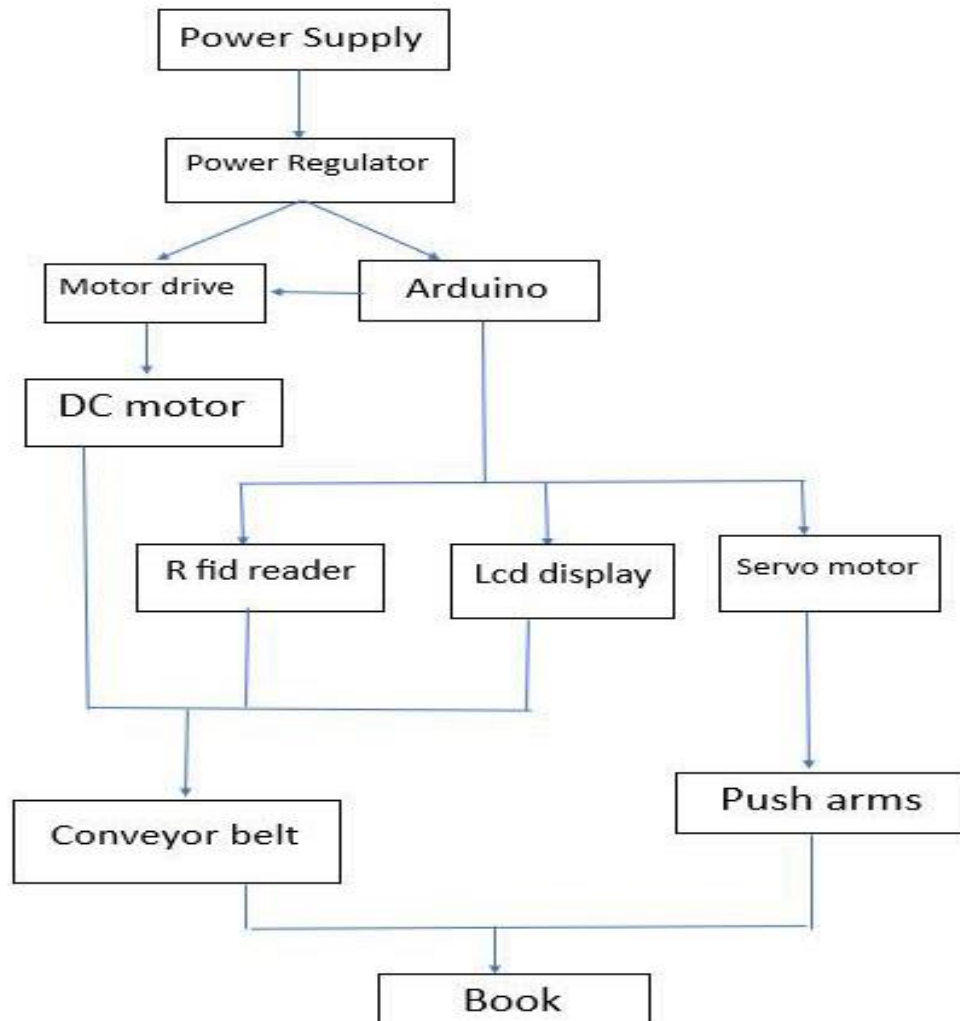
CHAPTER 6

6.1 CIRCUIT DIAGRAM
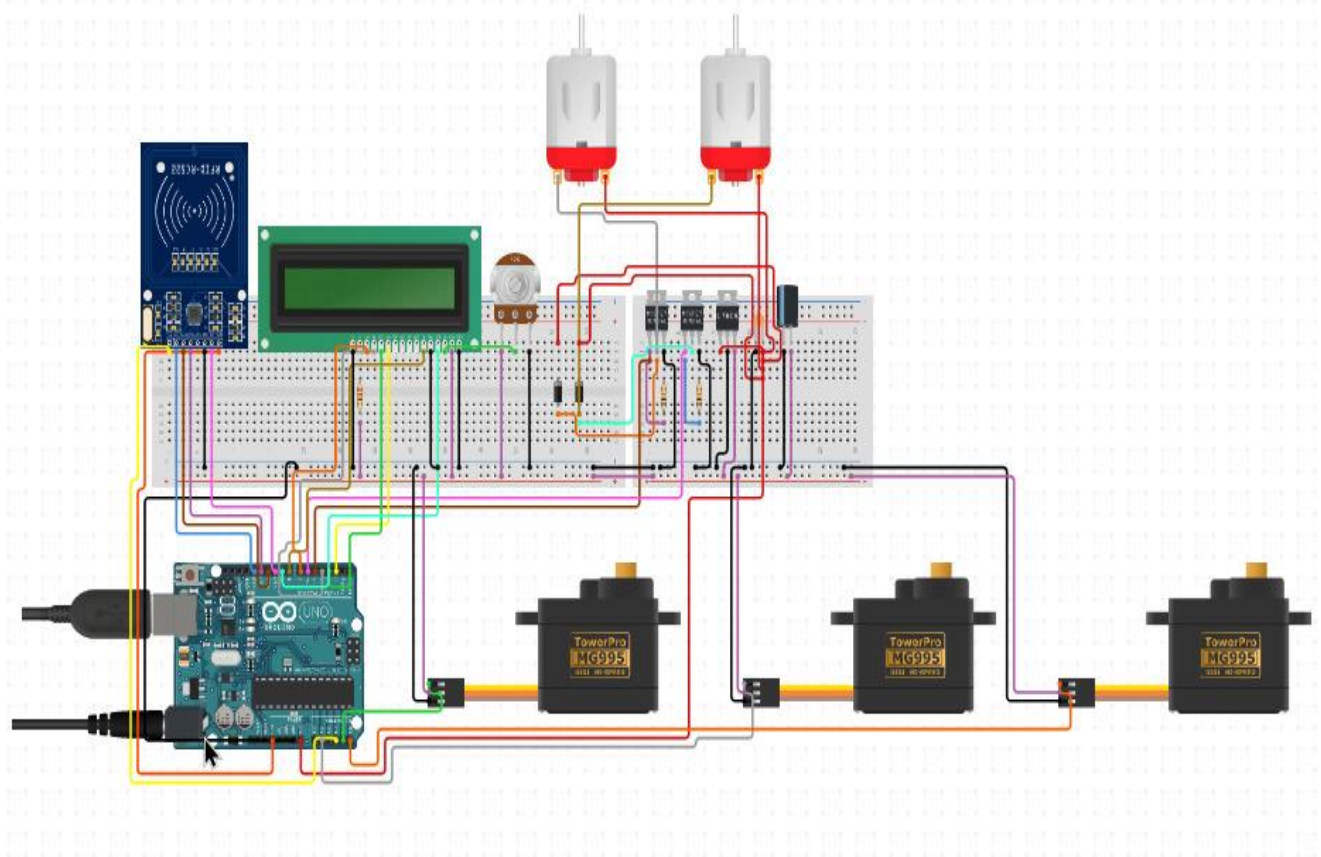
6.2 SOURCE CODE

```
#include<SoftwareSerial.h>
SoftwareSerial RFID =  SoftwareSerial(2, 3); //CONNECT TX OF RFID TO 2 of Arduino//
String IncomingData;
#include <Servo.h>
#include <LiquidCrystal.h>
LiquidCrystal lcd(A5,A4,A3,A2,A1,A0);
Servo servo1;
Servo servo2;
Servo servo3;
#define motor 6

//------------------------------------//
void setup() {
 servo1.attach(11);
 servo2.attach(9);
 servo3.attach(10);
 pinMode(motor,OUTPUT);
 digitalWrite(motor,HIGH);
 RFID.begin(9600);
 Serial.begin(9600);
 Serial.println("rebooted");
 servo1.write(00);
 servo2.write(00);
 servo3.write(00);
 lcd.begin(16, 2);
 lcd.setCursor(0,0);
 lcd.print("RFID BASED LIB");
 lcd.setCursor(0,1);
 lcd.print("MANGMNT SYSTEM");
```

```
delay(5000);
 lcd.clear();
}


void loop() {
if(RFID.available()){
   IncomingData = RFID.readString();
   Serial.println(IncomingData.substring(0,12));
   if(IncomingData.substring(0,12) == "350064DB008A"){
      lcd.setCursor(0,0); lcd.print("PHYSICS BOOK");
      lcd.setCursor(0,1); lcd.print("RETURNED");
      delay(3000);
      lcd.clear();
      analogWrite(motor,150);
      delay(300);
      digitalWrite(motor,HIGH);
      delay(2000);
      servo1.write(90);
      delay(3000);
      servo1.write(0);
     }
    //-------------------------------------------------------//
   if(IncomingData.substring(0,12) == "350064D9CD45"){
      lcd.setCursor(0,0); lcd.print("PYTHON BOOK");
      lcd.setCursor(0,1); lcd.print("RETURNED");
      delay(3000);
      lcd.clear();
      analogWrite(motor,150);
      delay(800);
      digitalWrite(motor,HIGH);
```

```
 delay(1500);
    servo3.write(90);
    delay(3000);
    servo3.write(0);
   }
   //---------------------------------------------------//
  if(IncomingData.substring(0,12) == "4D00864B34B4"){
    lcd.setCursor(0,0); lcd.print("AUTO ENG BOOK");
    lcd.setCursor(0,1); lcd.print("RETURNED");
    delay(3000);
    lcd.clear();
    analogWrite(motor,150);
    delay(1200);
    digitalWrite(motor,HIGH);
    delay(2000);
    servo2.write(90);
    delay(3000);
    servo2.write(0);
   }

 }
 digitalWrite(motor,HIGH);


 lcd.setCursor(0,0); lcd.print("SCANNING...");
 delay(50);
 lcd.setCursor(0,0); lcd.print("           ");
}
```

6.3 IMPLENTATION:
RESULTS AND DISCUSSUIONS:

Working of this "LIBRARY CONVEYOR BELT" is very easy. The library management should aim to set the book in a proper and efficient way without manpower.so the book can easily arranged without much hard work.

FUTURE SCOPE

Some libraries have upgraded their services by including digital tools and devices to be more appealing to potential visitors and satisfy the returning visitors. Examples of digital devices and tools that are include at these libraries are e-books, e-readers, computers, tablets, and Wi-fi. All of which were a crucial step to becoming more modern and allowing easy access to digital information.

Furthermore, libraries are universal centre that provide access to information to anyone, and everyone. Equal access to everyone is a core value of libraries; thus, it includes helping individuals from all different backgrounds and equal opportunity for self-education or personal development.

Libraries can specifically help communities and individuals in need. The ability to offer visitors access to the internet and devices such as public computers helps both individuals and communities to expand their knowledge and improve their skill sets.

7.CONCLUSIONS:

- Library conveyor belt system is an efficient and cost-effective way of handling large volumes of library materials.
- The system helps to improve accuracy, speed, and customer service while reducing staff workload.
- Careful planning, training, and maintenance are essential for successful implementation and operation of the system.

REFERENCES:

- Seattle Public Library. (n.d.). Sorting System. Retrieved from https://www.spl.org/using-the-library/get-help/sorting-system
- University of Chicago Library. (n.d.). Automated Book Handling System (ABS). Retrieved from https://www.lib.uchicago.edu/about/news/automated-book-handling-system-abs/

ONE PAGE ABSTRACT:

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

ABSTRACT

LIBRARY CONVEYOR BELT

Many students after reading the books in library ,they just leave the book on the table .So after, the library staff should take the responsibility to set the books in their proper racks. This is a really a big burden to the staff members and even sometimes there is a chance of misplacing the books in library. Once the books get misplaced it becomes complicated to set them properly.

In order to overcome this problem we came up with the solution of " LCB*…which means library conveyor belt. This project has done in such a way that there is scanner which scans each and every book and after placing the book on the conveyor belt it starts moving and place the book in the box which is placed at each and every end of the book shelves.

By this application we can easily sort the books in library, which reduces the burden to the staff members and also it is easy to maintain and run. With this project there is no chance of misplacing the books.

The one after reading the book should scan the book and place it on the conveyor belt and the conveyor belt starts doing its job. Then after the staff member should go to each rack and place them in their rack

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