3D SCANNER

INTRODUCTION

In today's digital era, 3D scanning technology offers immense potential for creators, innovators, and hobbyists. Our mission is to make this technology accessible to all by providing a step-by-step guide to building your own 3D scanner using affordable materials and tools. Throughout this presentation, We'll cover the principles of 3D scanning, the construction process, software setup, calibration, and potential applications. Join us as we explore the exciting world of DIY 3D scanning and unleash your creativity!

PROBLEM

Despite the incredible potential and versatility of 3D scanning technology, accessibility remains a significant barrier for many individuals and small businesses. Traditional 3D scanners often come with hefty price tags, complex setups, and proprietary software, limiting their reach and usability

Moreover, the lack of customization options and flexibility inherent in commercial solutions stifles innovation and creative expression. As a result, many aspiring creators, educators, and entrepreneurs find themselves restricted in their ability to explore the vast possibilities offered by 3D scanning technology.

GOAL

- Accessibility: The primary goal is to make 3D scanning technology accessible to a wider audience by providing DIY solutions that are affordable, easy to build, and require minimal technical expertise. This includes ensuring that the necessary components are readily available and that the assembly process is straightforward and well-documented.
- Affordability: Another key objective is to significantly reduce the cost barrier associated with 3D scanning technology. By utilizing off-the-shelf components and open-source software, the goal is to create DIY 3D scanners that are significantly more affordable than their commercial counterparts, thereby enabling individuals and small businesses with limited resources to access this technology.

COMPONENTS

·ARDUINO UNO R3

·NEMA17 4.2 Kg-cm Stepper Motor (4)

·Micro SD card Reader Module: 1.0

·A4988 Stepper Motor Driver Module : 2.0

·VL53L0X Laser Range Finder Distance Sensor Module: 1.0

·GT2 20 Teeth Aluminium Timing pulley 5mm bore for nema17 motor : 1.0

·GT2 Open loop Timing Belt 6mm : 1.0

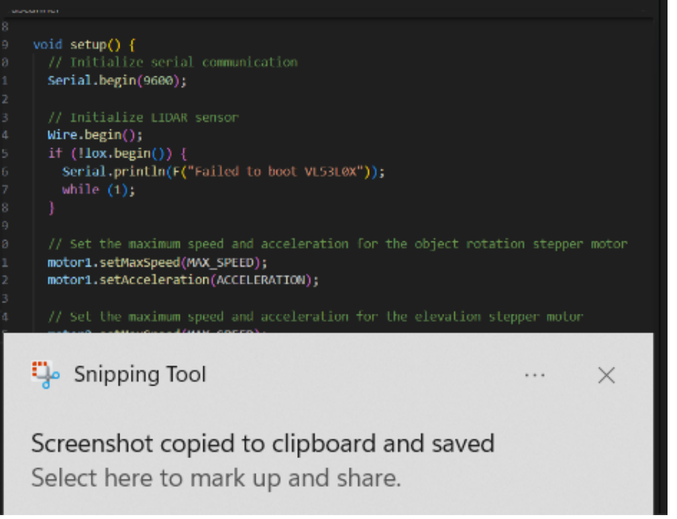
·Radial Ball Bearing 4mm Dia : 1.0

THE CODE

3dscanner

```ino
#include <Wire.h>
#include <Adafruit_VL53L0X.h>
#include <AccelStepper.h>
#include <Arduino.h>
#include <math.h>

// Define the pins for the stepper motors
#define MOTOR1_IN1_PIN 8
#define MOTOR1_IN2_PIN 9
#define MOTOR1_IN3_PIN 10
#define MOTOR1_IN4_PIN 11

#define MOTOR2_IN1_PIN 2
#define MOTOR2_IN2_PIN 3
#define MOTOR2_IN3_PIN 4
#define MOTOR2_IN4_PIN 5

// Define the steps per revolution for the stepper motors
#define STEPS_PER_REV 2048 // 28BYJ-48 has 2048 steps for one revolution

// Define the maximum speed and acceleration for the stepper motors
#define MAX_SPEED 500.0
#define ACCELERATION 1000.0

// Create instances for the stepper motors
AccelStepper motor1(AccelStepper::FULL4WIRE, MOTOR1_IN1_PIN, MOTOR1_IN3_PIN, MOTOR1_IN2_PIN, MOTOR1_IN4_PIN);
AccelStepper motor2(AccelStepper::FULL4WIRE, MOTOR2_IN1_PIN, MOTOR2_IN3_PIN, MOTOR2_IN2_PIN, MOTOR2_IN4_PIN);

// Create instance for LIDAR sensor
Adafruit_VL53L0X lox;

// Global variables
float currentAngle = 0; // Current angle of rotation
float currentZ = 0;     // Current Z-coordinate
unsigned long previousMillisObject = 0;
unsigned long previousMillisLidar = 0;
float ANGLE_INCREMENT = 3; // Angle increment for each iteration
```

```ino
void setup() {
  // Initialize serial communication
  Serial.begin(9600);

  // Initialize LIDAR sensor
  Wire.begin();
  if (!lox.begin()) {
    Serial.println(F("Failed to boot VL53L0X"));
    while (1);
  }

  // Set the maximum speed and acceleration for the object rotation stepper motor
  motor1.setMaxSpeed(MAX_SPEED);
  motor1.setAcceleration(ACCELERATION);

  // Set the maximum speed and acceleration for the elevation stepper motor
  motor2.setMaxSpeed(MAX_SPEED);
  motor2.setAcceleration(ACCELERATION);
}

void loop() {
  unsigned long currentMillis = millis();
  float elapsedTime = (currentMillis - previousMillisObject) / 1000.0; // Elapsed time in seconds

  // Rotate object motor continuously
  motor1.moveTo(STEPS_PER_REV);
  while (motor1.distanceToGo() != 0) {
    motor1.run();
  }

  // Delay 10ms
  delay(10);

  // Rotate elevation motor for 9.5 degrees
  motor2.moveTo(STEPS_PER_REV / 18); // Move by 9.5 degrees
  while (motor2.distanceToGo() != 0) {
```

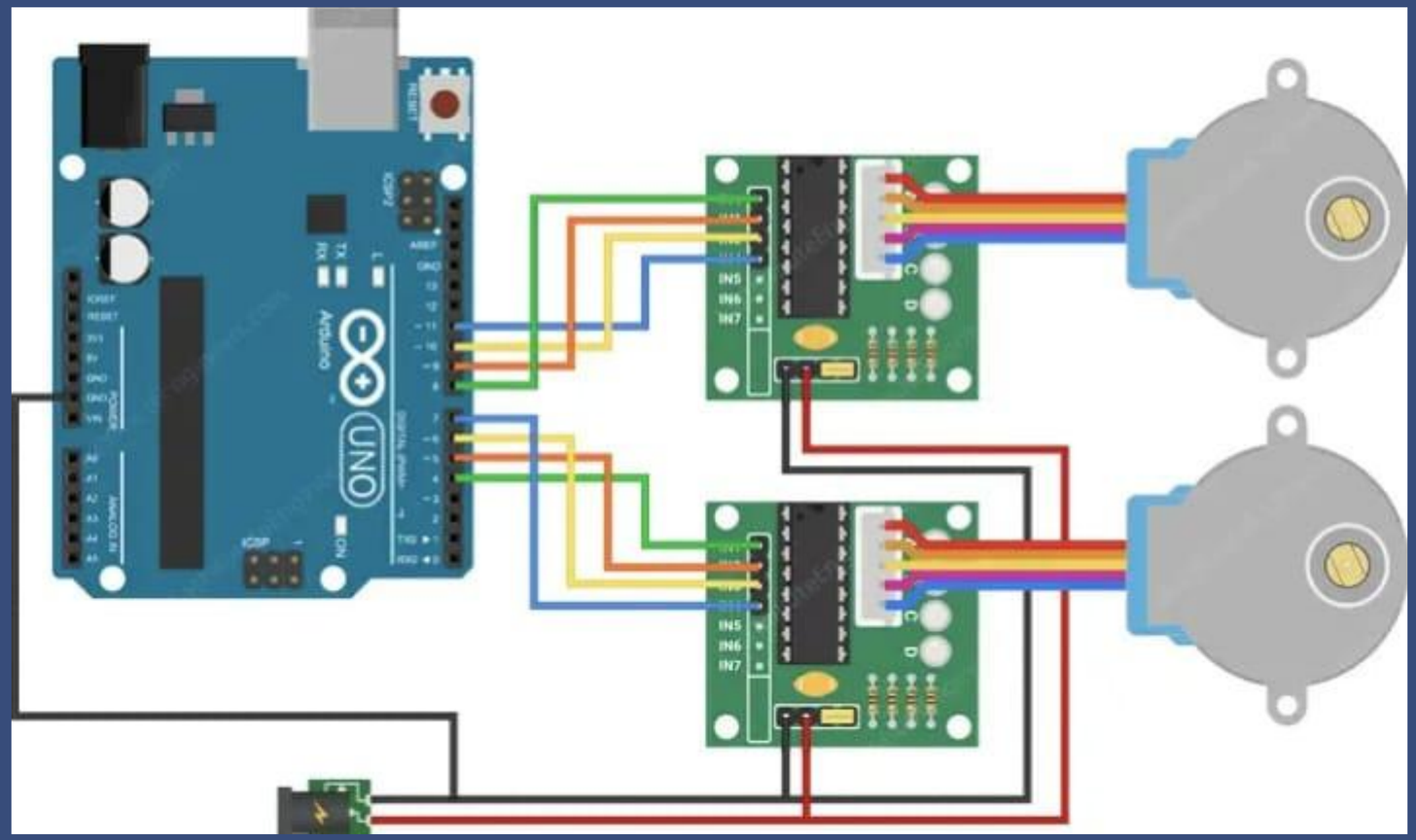


Snipping Tool

Screenshot copied to clipboard and saved
Select here to mark up and share.

```
  }

  // Wait until elevation motor completes its rotation
\Users\sansk\OneDrive\Documents\C++\file.cpp != 0) {
    motor2.run();
  }

  // Delay 10ms before repeating the process
  delay(10);

   // COLLECT DATA AND INREMENT ANGLE FOR EVERY 35ms
  if (currentMillis - previousMillisLidar >= 35) {
    previousMillisLidar = currentMillis;
    currentAngle += ANGLE_INCREMENT; // Increment angle
    collectAndPrintCoordinates();
  }
}

// Function to collect LIDAR data and print Cartesian coordinates
void collectAndPrintCoordinates() {
  // Collect LIDAR data (distance)
  VL53L0X_RangingMeasurementData_t measure;
  lox.rangingTest(&measure, false);
  float distance_mm = measure.RangeMilliMeter;

  // Check if distance measured is 150mm
  if (distance_mm <= 105) {
    // Calculate coordinates
    float x = (105 - distance_mm) * sin(currentAngle * PI / 180.0);
    float y = (105 - distance_mm) * cos(currentAngle * PI / 180.0);

    // Print coordinates
    Serial.print("X (mm): ");
    Serial.print(x);
    Serial.print(", Y (mm): ");
```

THE CIRCUIT



CHALLENGES FACED

1) Writing the code was not easy, we surfed online sought help from seniors to get the required code.

2) Working with LIDAR was new to us

3)Connections and Circuit

WHAT DO WE GET?

•FUNCTIONAL DIY 3D SCANNER:

•Successfullu constructed a functional 3D scanner usina readilu available materials and tools.

•Demonstrated the feasibilitu of buildina a DIY 3D scanner with affordable components. empowerina individuals to access 3D scannina technoloau.

CONCLUSION

Through our exploration, we have highlighted the transformative potential of DIY 3D scanning in unlocking new possibilities for creators, educators, entrepreneurs, and hobbyists alike. From empowering individuals with the tools to turn their imagination into reality to fostering collaboration and community-driven innovation, DIY 3D scanning projects stand as a testament to the ingenuity and resourcefulness of the maker movement.

As we look to the future, the goals we have outlined - accessibility, affordability, customizability, usability, functionality, and community building - serve as guiding principles for continued progress and innovation in the realm of DIY 3D scanning. By staying true to these principles and embracing the spirit of open collaboration and shared knowledge, we can collectively shape a future where technology is not just accessible to the few, but truly belongs to the many.

Thank You