EMPOWER 2023,
IIT MADRAS

Detecto

Eyes for all:
See Trust,Not Fake

Team invizion

Problem Statement

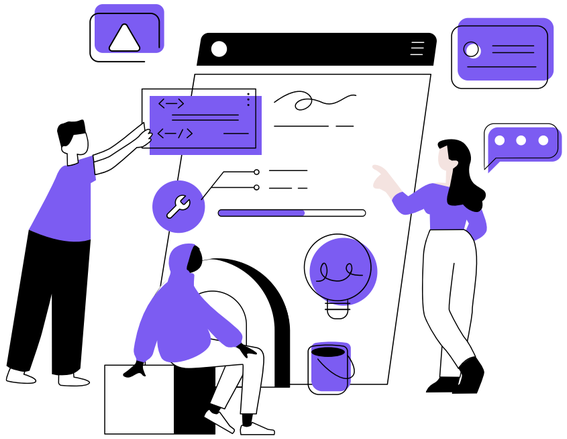
DEVICE TO CHECK THE AUTHENTICITY OF CURRENCY NOTES FOR PEOPLE WITH VISUAL IMPAIRMENT

Visually impaired

Limited ability to inspect notes

Risk of Financial loss

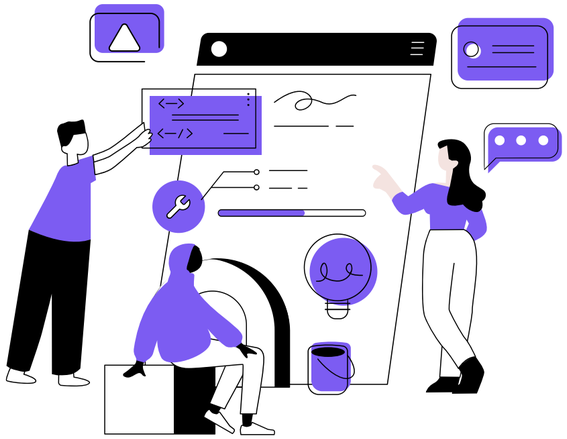
HOW WE DO IT



THE CHALLENGE

- Segregation of fake and real notes
- Complex Note Features
- Tactile Identification

HOW WE DO IT



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HOW DETECTO WORKS

- Dedicated slit for currency
- UV Light, color sensor, and UV sensor analysis
- Audio and Braille Roller Feedback

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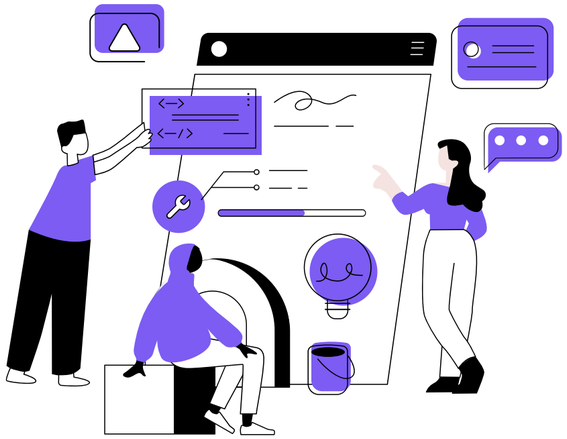

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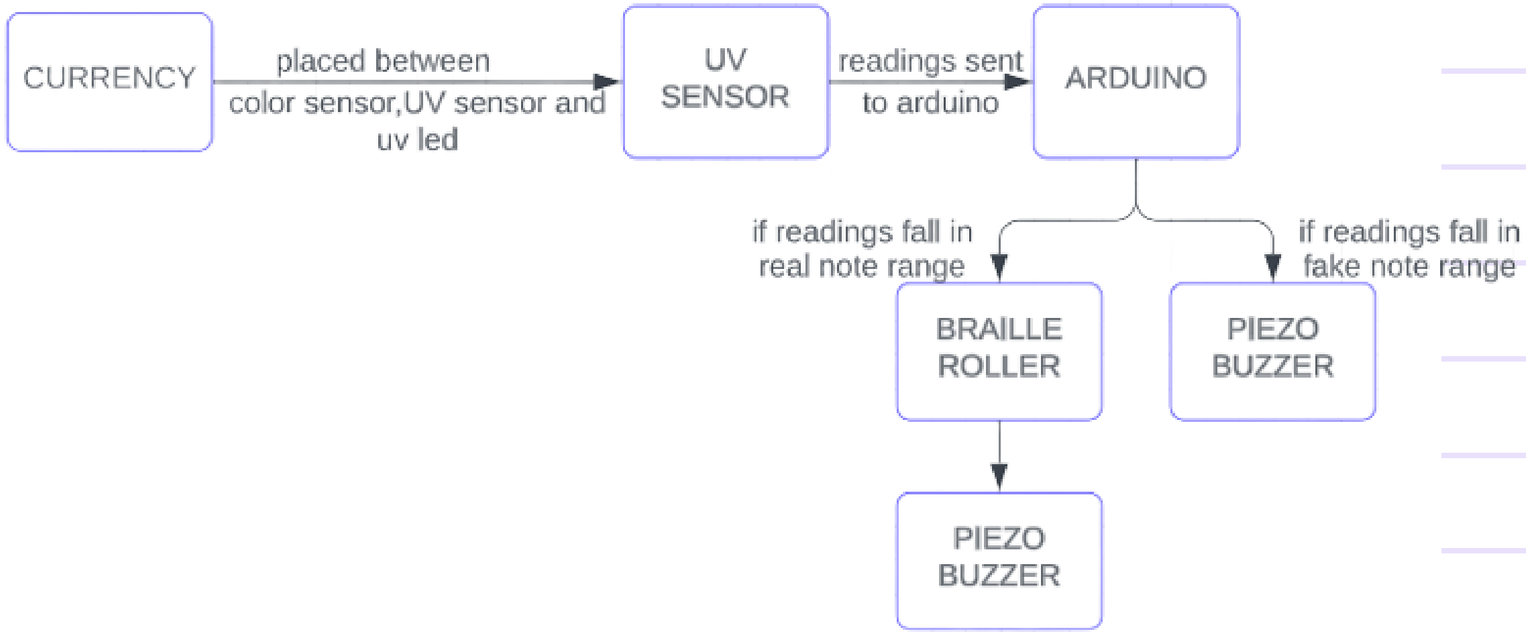
FEATURES OF DETECTO

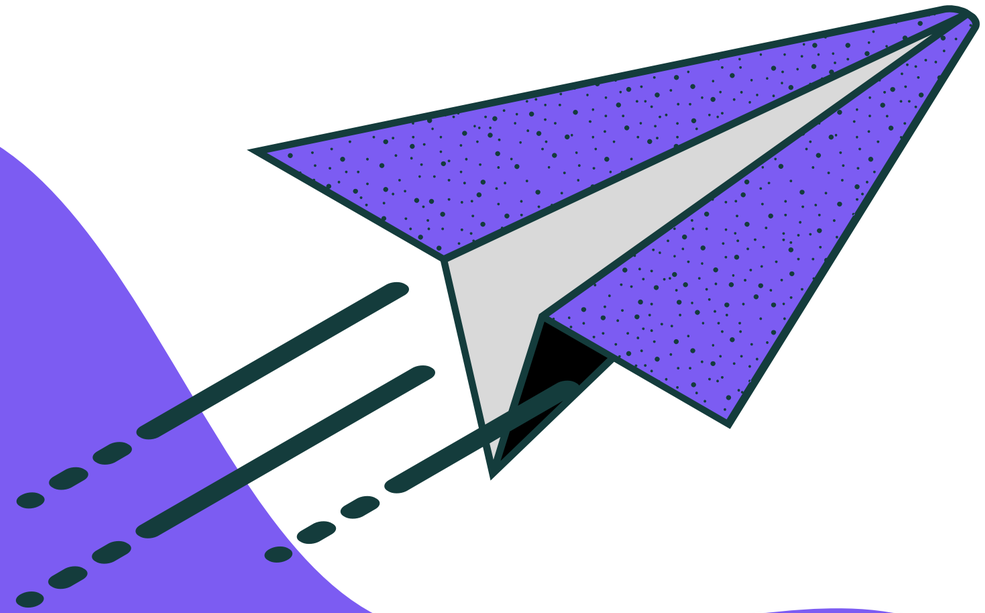
- Empowering Independence
- Portable
- Proper Feedback Mechanism

Working



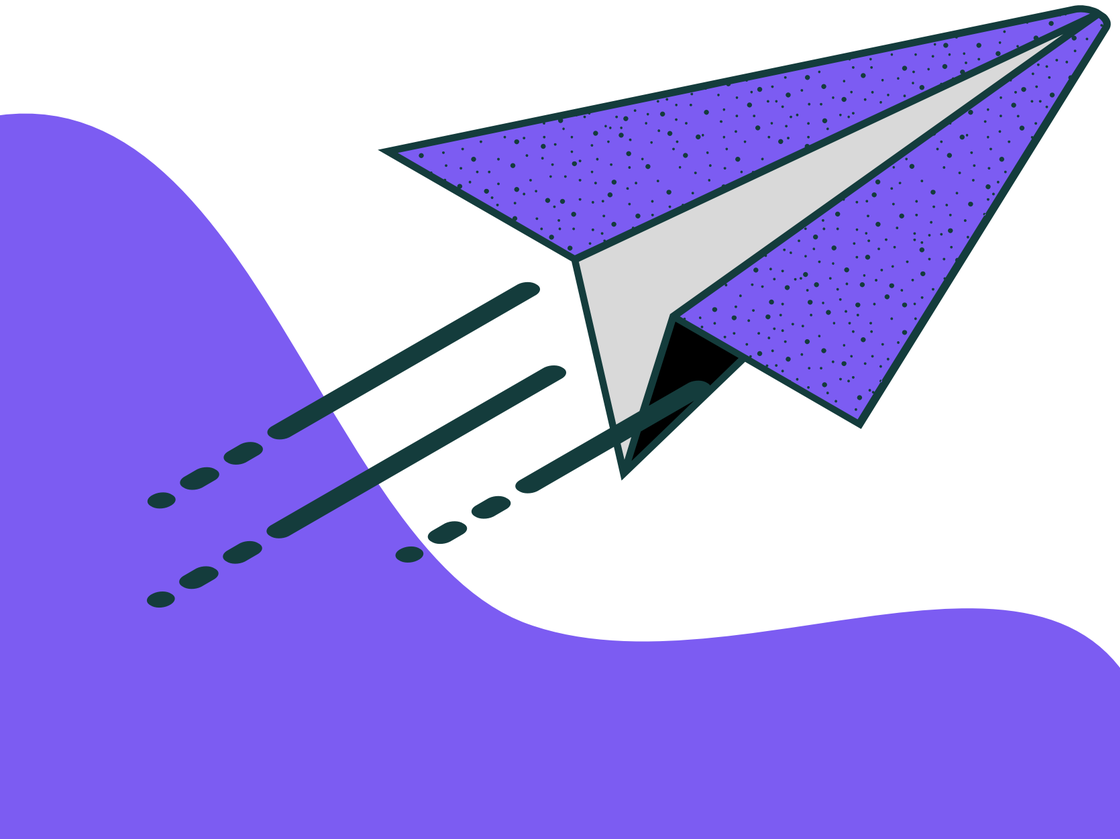
1. Currency is kept in the slit
2. UV Sensor detects instensity of UV light passing from note
3. Reading of UV Sensor is sent to arduino for comparison
4. If readings fall in fake note range then it alerts with the help of piezo buzzer
5. Else the braille roller rotates to tell the user about the value of note

Code



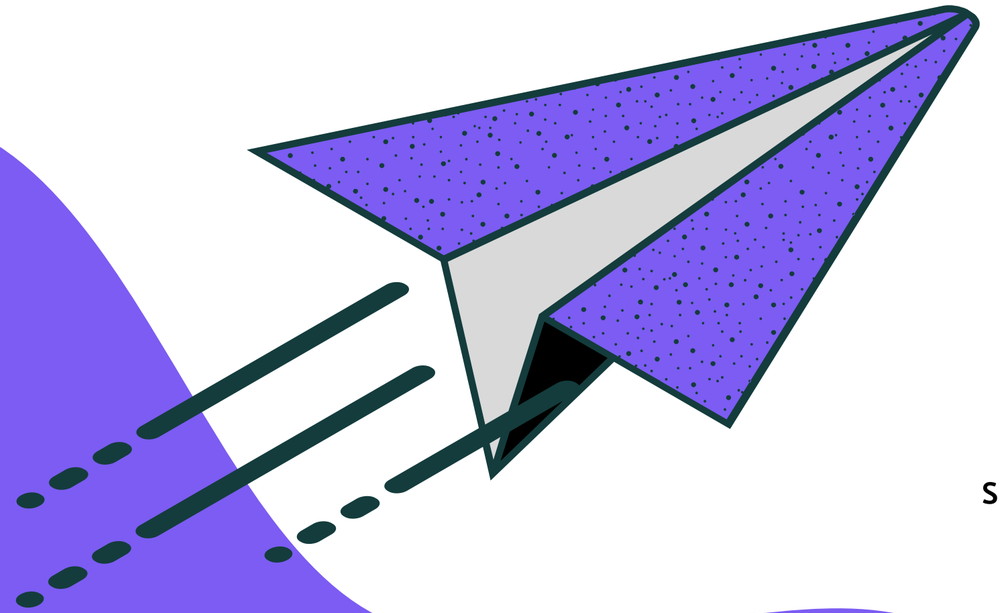
```
#include <Wire.h>
#include "Adafruit_TCS34725.h"
#include <Stepper.h>
#define BUZZER_PIN 6
#define STEPS 100
int led = 5; // Corrected the assignment here
int g_sum, r_sum, b_sum, c_sum;
Adafruit_TCS34725 tcs =
Adafruit_TCS34725(TCS34725_INTEGRATIONTIME_
50MS, TCS34725_GAIN_4X);
Stepper stepper(STEPS,8, 9, 10, 11);
const int stepsFor90Degrees = 500;
const int stepsFor180Degrees = 1000;
const int stepsFor270Degrees = 1500;
const int stepsFor_90Degrees = -500;
const int stepsFor_180Degrees = -1000;
const int stepsFor_270Degrees = -1500;
void setup() {
  pinMode(led, OUTPUT);
  Serial.begin(9600);
  pinMode(BUZZER_PIN, OUTPUT);
  if (tcs.begin()) {
    Serial.println("Found sensor");
  } else {
    Serial.println("Not Found");
  }
```

Code



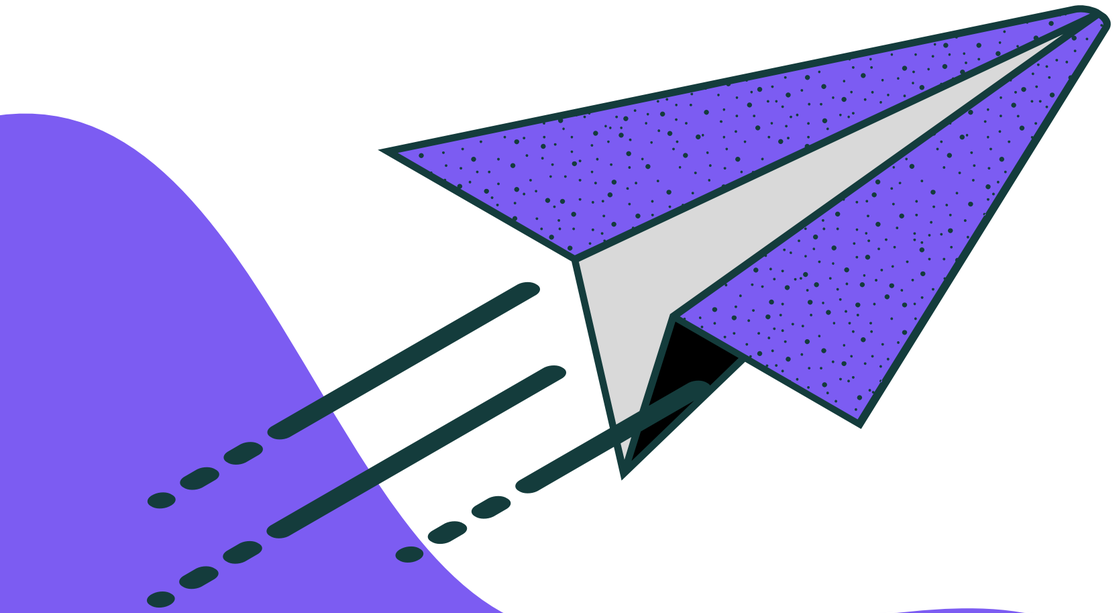
```
float sensorVoltage;
  float sensorValue;
  float sensor_sum;
  float sensor_vol;
  float sensor_vol_avg;
  float sensor_avg;
  for(int i=0;i<20;i++){
    sensorValue = analogRead(A0);
    sensorVoltage = sensorValue/1024*5.0;
    sensor_sum += sensorValue;
    sensor_vol += sensorVoltage;
  }
  sensor_vol_avg = sensor_vol/20;
  sensor_avg = sensor_sum/20;
  Serial.print("sensor reading = ");
  Serial.print(sensor_avg);
  Serial.print("       sensor voltage = ");
  Serial.print(sensor_vol_avg);
  Serial.println(" V");
  delay(1000);
  stepper.setSpeed(150);
  for (int i = 0; i < 10; i++) {
    uint16_t r, g, b, c;
    tcs.getRawData(&r, &g, &b, &c);
    delay(500);
```

Code



```
g_sum += g;
    r_sum += r;
    b_sum += b;
    c_sum += c;
    analogWrite(led, c);
  }
  int g_avg, r_avg, b_avg, c_avg;
  g_avg = g_sum / 10;
  r_avg = r_sum / 10;
  b_avg = b_sum / 10;
  c_avg = c_sum / 10;
  Serial.print("Red : "); Serial.print(r_avg, DEC);
  Serial.print(" ");
  Serial.print("BLUE : "); Serial.print(b_avg, DEC);
  Serial.print(" ");
  Serial.print("GREEN : "); Serial.print(g_avg, DEC);
  Serial.print(" ");
  Serial.print("Clear : "); Serial.print(c_avg, DEC);
  Serial.println();
  if((g_avg>=15 && r_avg<=20 && (sensor_avg>=0 &&
sensor_avg<=3 ) )){
    tone(BUZZER_PIN, 440);
    delay(200);
    noTone(BUZZER_PIN);
    delay(500);
    tone(BUZZER_PIN, 440);
    delay(200);
```

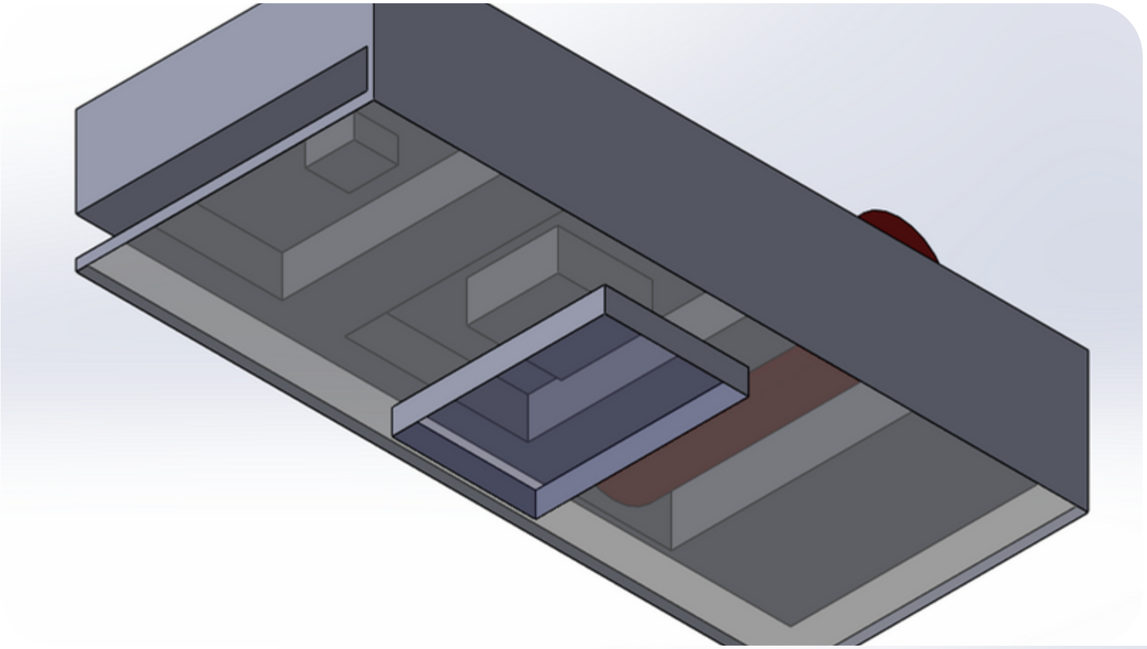
Code

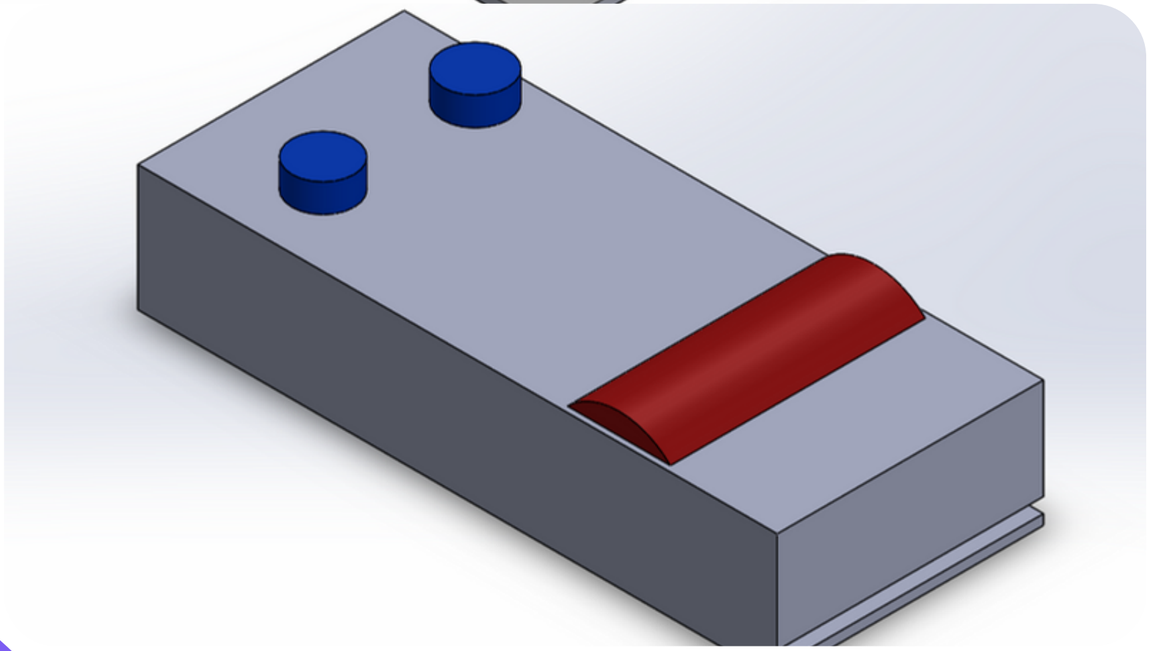


```
noTone(BUZZER_PIN);
    delay(500);
    tone(BUZZER_PIN, 440);
    delay(200);
    noTone(BUZZER_PIN);
    delay(500);
   tone(BUZZER_PIN, 440);
    delay(200);
    noTone(BUZZER_PIN);
    delay(500);
    tone(BUZZER_PIN, 440);
    delay(200);
    noTone(BUZZER_PIN);
    stepper.step(stepsFor90Degrees);
    delay(10000);
    stepper.step(stepsFor_270Degrees);
  }
  else if( b_avg>=40  && (sensor_avg>=40 && sensor_avg<=55)){
    tone(BUZZER_PIN, 440);
    delay(200);
    noTone(BUZZER_PIN);
    delay(500);
    tone(BUZZER_PIN, 440);
    delay(200);
    noTone(BUZZER_PIN);
    stepper.step(stepsFor180Degrees);
    delay(10000);
    stepper.step(stepsFor_180Degrees);
  }
  else{
    tone(BUZZER_PIN, 440);
    delay(3000);
    noTone(BUZZER_PIN);
  }
```

Design-Cad Model!

Detecto's CAD model showcases an efficient design with a speaker for feedback, a tactile roller, and a dedicated note insertion slit. This compact layout ensures practicality, accuracy, and user-friendliness.

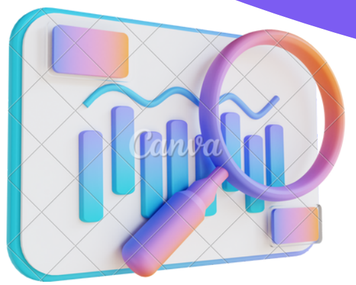




Demonstration

DETECTO

How are we different?

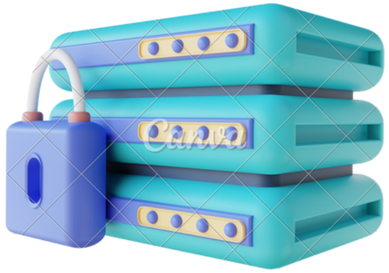


Easy to Use

Detecto features a dedicated note insertion slit and an easily accessible power button. Placing the currency note into the designated slot is as simple as it gets, and with just a press of the power button, the device initiates the authentication process.

Creative Solution

Detecto: Innovative and user-friendly, combining UV detection, color sensing, texture analysis, and braille roller for accurate currency authentication and inclusive usability.



Compatible

Detecto has universal compatibility, intuitive controls, a braille roller, and a compact design, ensuring accessible currency authentication.

Good Feedback mechanism

Detecto offers piezo buzzer and braille roller feedback, enabling swift and confident note authentication for all users

COST EFFECTIVENESS

• ARDUINO	350
• SENSORS AND LEDS	450
• HARDWARE	250
TOTAL	1050

DURABILITY

DESIGNED FOR DURABILITY:
DETECTO'S DESIGN PRIORITIZES DURABILITY

BUILT TO LAST:
DETECTO'S BLUEPRINT EMPHASIZES A STURDY BUILD, READY TO DEMONSTRATE RESILIENCE ONCE CONSTRUCTED AND TESTED FOR THE COMPETITION.

Marketing Analysis (S.W.O.T)

STRENGTHS

- INNOVATION AND ACCESSIBILITY
- MARKET NICHE
- SOCIAL IMPACT

WEAKNESSES

- TECHNICAL COMPLEXITY
- COST AND AFFORDABILITY
- LIMITED MARKET SIZE

OPPORTUNITIES

- PARTNERSHIPS WITH ADVOCACY GROUPS
- EXPAND ACCESSIBILITY SOLUTIONS
- GLOBAL MARKET POTENTIAL

THREATS

- REGULATORY COMPLIANCE
- COMPETITIVE LANDSCAPE
- RAPID TECHNOLOGICAL CHANGES

Future Improvements

- We could also attach camera between the slits to capture the watermarks visible when UV light is passed through Real note for better accuracy

- making it more compatible and easy to carry
- Making a more rigid structure

- Detection of Ripped note as well for the people who are visuallly imapaired

Meet Our Team

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GARVIT BHARTI
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ANUPAM MEHROTRA
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MEGHENDRA FULEY
IIT KHARAGPUR

Thank You

EMPOWER 2023,
STUDENT DESIGN CHALLENGE,
IIT MADRAS

Resource page