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Advance door lock with face mask detection using Arduino motion detector by PIR sensor and YOLO-LITE

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ABSTRACT

This project is primarily for the security of any department, it may be the doors of ordinary houses, or it may be of any other type of department. But it is better for the standard doors of the house as some types of doors have many higher locks and better for that purpose. But house locks are very simple and very basic to be open today, which is that burglary and theft are on the rise this way, so as a solution it can help us protect our home. During the violence of COVID-19 the mask played a key role in preventing the spread of this deadly disease. We know that this deadly disease is spread by air polluted by droplets and tiny particles of air that contain germs. Therefore, the mask played an important role as it suppressed the transmission. Used as a barrier. We are focused on preventing the rapid spread of COVID-19 in public places such as shopping malls, hospitals, ATMs where people do not wear masks and spread or become infected. It is hard work when we use human power to monitor individuals in the community and high costs. Therefore, we provide a solution using YOLO-lite architecture to determine if the person standing in front of the door is wearing a face mask.

Keywords: *Increasing Security for Standard House Doors, Pir Sensor, YOLO Lite, Face Mask Detection and Arduino*

1. PURPOSE

The purpose of this study was to determine whether the person standing in front of the door was wearing a face mask or not. The aim of our first project was to increase the security of common house doors, especially in India where door locks are much easier to open.

2. INTRODUCTION

The door locks in India are very basic like ordinary key locks and almost the wall locks are also unlocked using standard keys which are very easy for thieves and robbers to open in these modern times when everyone is technically updated. And this is a great time to think and act that is needed to solve this problem in this situation.

Here, with the help of this technology we want to see whether people enter shopping malls, movie theaters, hospitals or any other public place, wearing masks or not. In simple words, if a person wears a mask, he will be allowed to enter through the system (department), otherwise he will not be allowed to enter. In the following program we used:

YOLO-Lite - YOLO-Lite is used for real-time real-time purposes. It is widely used to obtain items (here a facemask), whether the dignitary wears a face mask or not.

Anaconda - We used Spyder IDE, an Integrated Development Area to code the proposed project.

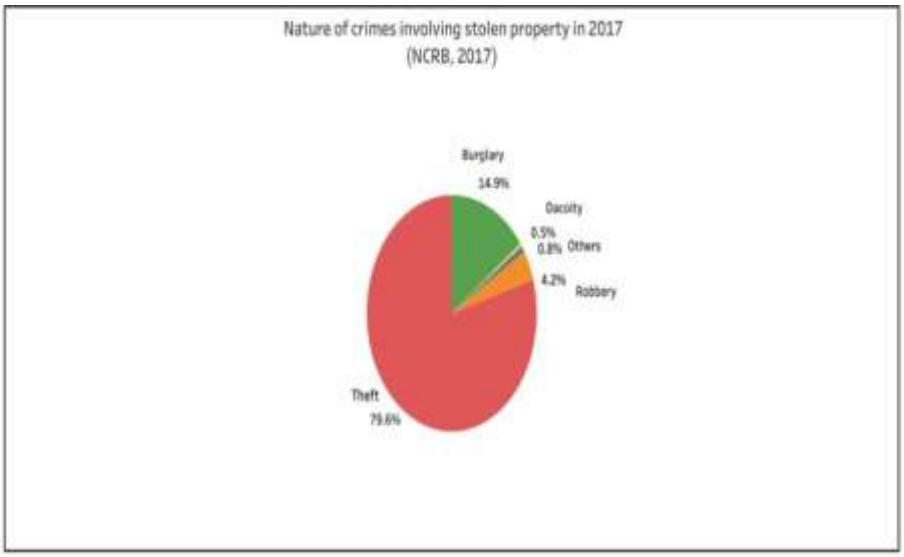

Fig 1 Statistics of theft and robbery in India

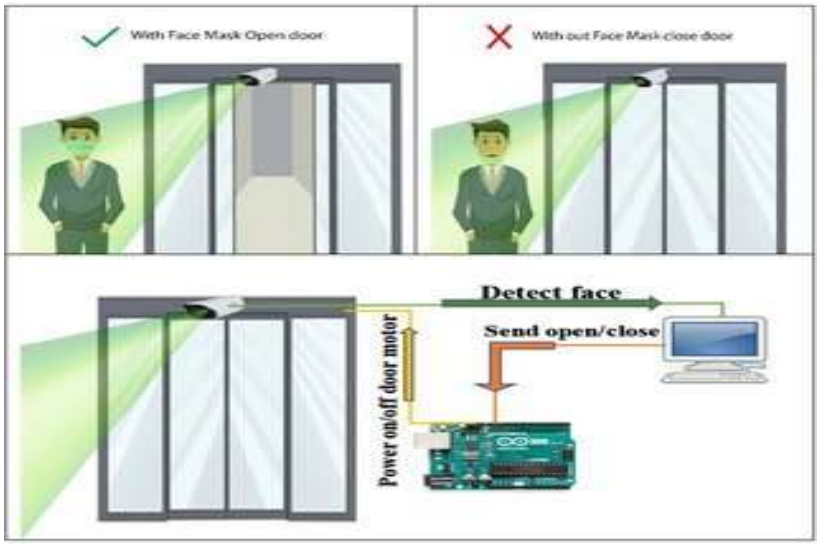

Fig 2 face mask was obtained using a smart door key with YOLO-lite

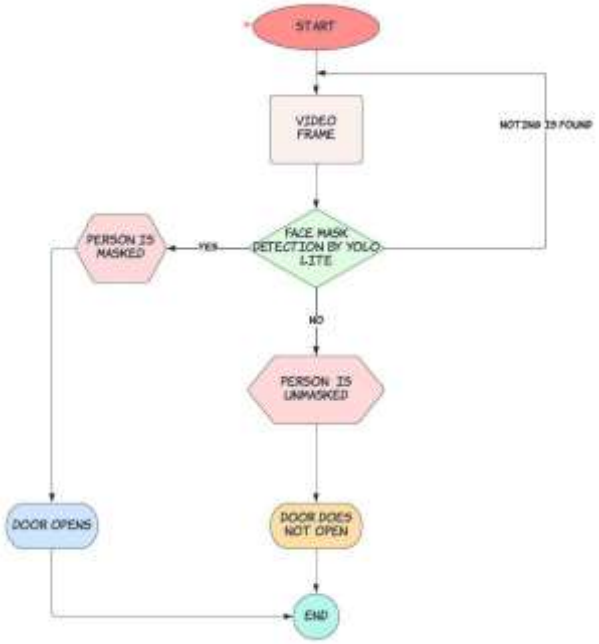

Fig 3- New Circuit Model Block diagram Flow chart

2.1 Proposed Procedure

Automatic Door Opener System is a simple project based on PIR Sensor and Arduino, where the door opens and closes automatically after finding a person or object.

More or less, we have all seen Automatic Door Opener Systems in supermarkets, cinemas, hospitals etc. there, as soon as one approaches the door, the door opens its slides. And after a few seconds, the door slides backwards. Such automatic door systems are very useful as there is minimal wastage of air conditioning. Therefore, to understand the power of this concept, we have used the simple method Automatic Door Opener System uses Arduino and PIR Sensor.

Face detection - also called face detection - is a computer-based artificial intelligence (AI) technology used to identify people's faces in digital images. Visual aids can be used in a variety of fields - including security, biometrics, law, entertainment and personal security - to provide real-time surveillance and tracking.

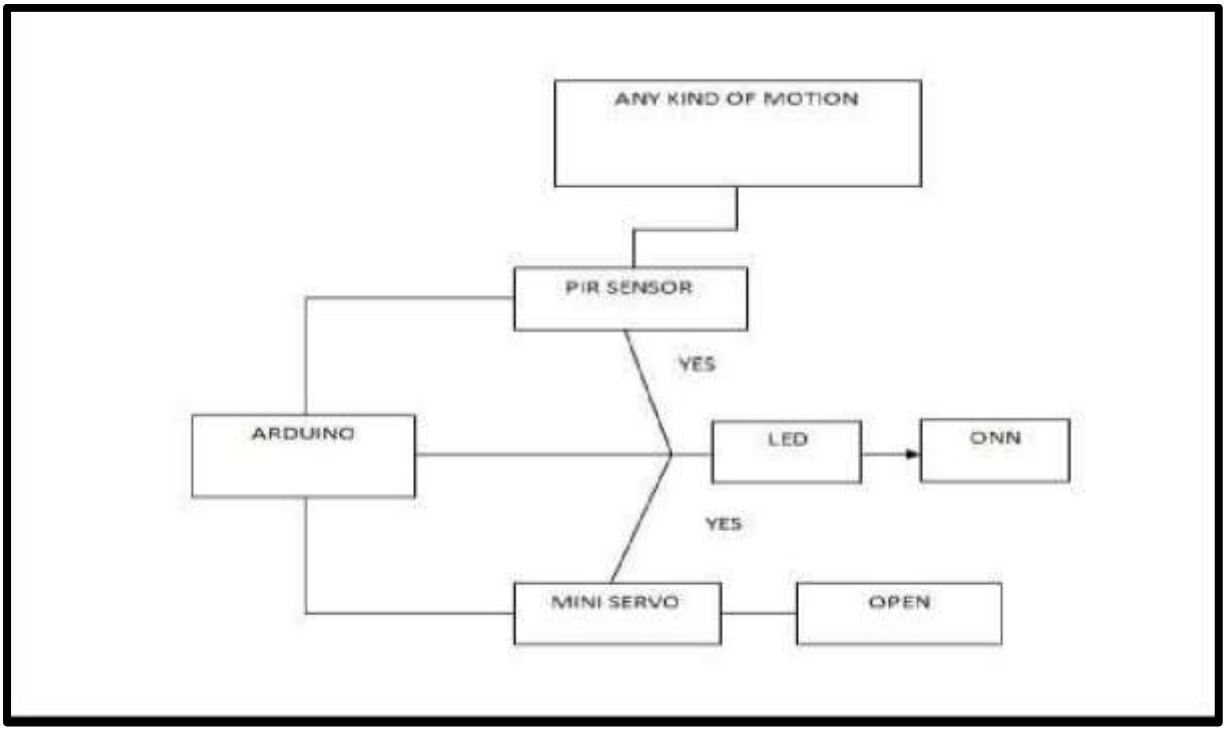

Figure 2.1-Preliminary Drawing of the Proposed System Block

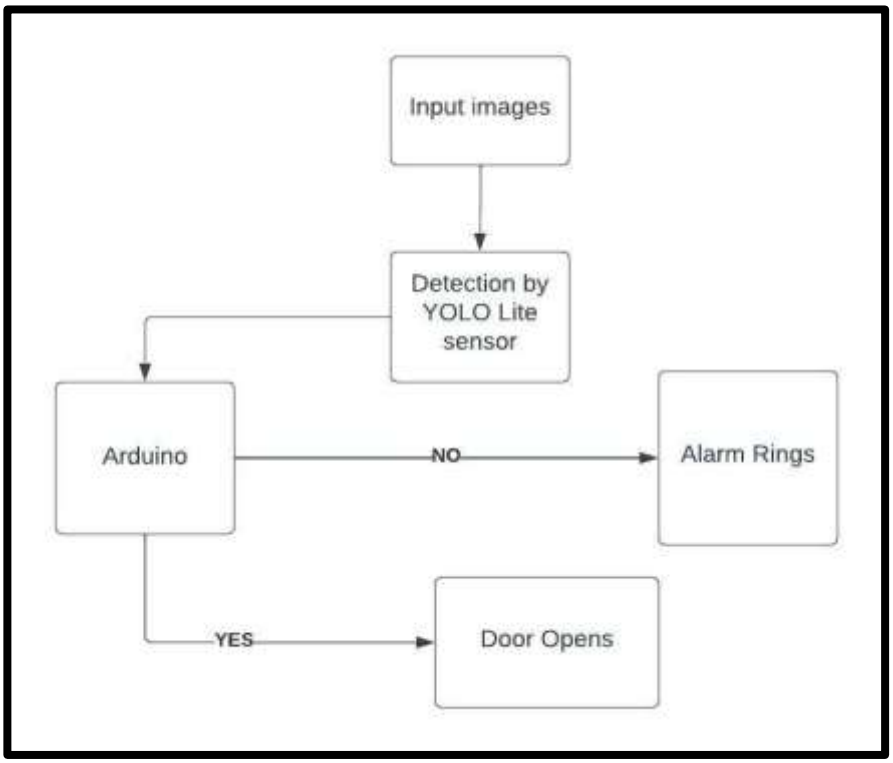

Figure 2.2-The new block is a diagram of the proposed plan

2.1.1 Requirements for the previous project

- Arduino.
- Bread board.
- Service.
- PIR sensor.
- Led.
- The opponent.

2.1.2 Requirements for a New Project

- Camera
- Electric door lock
- Buzzer
- Transistors
- Cables and connectors
- Diodes
- The opponent
- Capacitors
- PCBs and Breadboards
- LED
- Transformer / Adapter
- Press Buttons
- IC
- IC Shockets
- Change

2.2 Required field in the software component: In this research project, we used Python as a programming language and used Spyder IDE (Integrated Development Area) to code the proposed project.

2.3 Conduct of Work

Operating the Automatic Door Opener System using Arduino and PIR Sensor is very easy. This project can be considered as an extension of the Arduino PIR Sensor Tutorial and the Arduino L298N DC Motor Control Tutorial.

If the PIR sensor detects any human movement, its data output pin will be HIGH. Since this PIN is connected to the Arduino, it will detect this HIGH signal and understand that someone is approaching the door.

Arduino then quickly opened the L298N Motor Driver module to unlock the door. After some time (about 2 to 5 seconds on this project), Arduino will reopen the Motor Drive to close the door.

First, we will need to build a neural network model with TensorFlow and train it in the database of both people wearing a face mask and people who do not use it.

Here, you will create a face recognition algorithm that will be able to detect masks on people's faces using a trained model in the previous step.

Finally, we will need to add a simple Serial Command to the algorithm to find a facemask that will order Arduino to turn on or off the LED based on the acquisition mode.

3. CODING

We have written the following code for our proposed project.

Code that performs locking:

```
private async Task LockDoor()
{
  MultiPinConfig multiPinConfig = new MultiPinConfig();




MultiPinConfig.AddPinState(DigitalPins.D0, DigitalStates.High); //Lock Signal
   multiPinConfig.AddPinState(DigitalPins.D3, DigitalStates.Low); //Unlock Signal

   await myBolt.DigitalMultiWrite(multiPinConfig);

   multiPinConfig = new MultiPinConfig();
   multiPinConfig.AddPinState(DigitalPins.D0, DigitalStates.Low); //Lock Signal
```



```
  multiPinConfig.AddPinState(DigitalPins.D3, DigitalStates.Low); //Unlock Signal

  await myBolt.DigitalMultiWrite(multiPinConfig);
}
```

Code that performs unlocking:

```
private async Task UnlockDoor()
{
  MultiPinConfig multiPinConfig = new MultiPinConfig();
  multiPinConfig.AddPinState(DigitalPins.D0, DigitalStates.Low); //Lock Signal
  multiPinConfig.AddPinState(DigitalPins.D3, DigitalStates.High); //Unlock Signal

  await myBolt.DigitalMultiWrite(multiPinConfig);

  multiPinConfig = new MultiPinConfig();
  multiPinConfig.AddPinState(DigitalPins.D0, DigitalStates.Low); //Lock Signal
  multiPinConfig.AddPinState(DigitalPins.D3, DigitalStates.Low); //Unlock Signal

  await myBolt.DigitalMultiWrite(multiPinConfig);
}
```

Code that adds and saves the face information:

```
//Converting image to base64 string and adding it to the list.
ImageDataList.Add(ImageToBase64((Image)PreviewBox.Image.Clone()));
//Adding name of the face to the list
NameList.Add(FaceNameTextBox.Text.Trim());

//Saves the face image data as a base encoded string, along with its name
Properties.Settings.Default.Base64ImageData = ImageDataList;
Properties.Settings.Default.FaceNames = NameList;
Properties.Settings.Default.Save();
```

Code that removes a face information:

```
//Removing face information at specified position in the list
NameList.RemoveAt(e.RowIndex);

ImageDataList.RemoveAt(e.RowIndex);

//Saving the the list after removal of a face
Properties.Settings.Default.FaceNames = NameList;
Properties.Settings.Default.Base64ImageData = ImageDataList;
Properties.Settings.Default.Save();
```

The code that does this comparison looks something like this:

```
WebClient client = new WebClient();

byte[] response = client.UploadValues("https://api-us.faceplusplus.com/facepp/v3/compare", new NameValueCollection()
{
   { "api_key", FPP_API_KEY },
   { "api_secret", FPP_API_SECRET },
   { "image_base64_1", face1Base64},
   { "image_base64_2", face2Base64}
   });
});

string confidence = JObject.Parse(System.Text.Encoding.UTF8.GetString(response))["confidence"].ToString();
```

Here's the code that'll run continuously on the bell listening thread:

```
while (ListenForBell)
{
   Response R = await myBolt.DigitalRead(DigitalPins.D4);
   if (R.Value == "1")
   {
      RingBell_Click(null, null);
      Thread.Sleep(2000);
```



```
    }
    Thread.Sleep(2000);
}
```

Arduino Code:

```
#include <Servo.h>

#define ServoPin 4
#define LockSignalPin 2
#define UnLockSignalPin 3
#define BellButtonPin 5




#define LockButtonPin 8
#define RingBellSignalPin 6
#define BuzzerPin 7
#define GreenLedPin 9
#define RedLedPin 10

Servo myServo;




void setup()
{
   pinMode(LockSignalPin, INPUT);
   pinMode(UnLockSignalPin, INPUT);
   pinMode(BellButtonPin, INPUT);
   pinMode(LockButtonPin, INPUT);

   pinMode(BuzzerPin, OUTPUT);
   pinMode(RedLedPin, OUTPUT);
   pinMode(GreenLedPin, OUTPUT);
   pinMode(RingBellSignalPin, OUTPUT);

   digitalWrite(RedLedPin, LOW);
   digitalWrite(GreenLedPin, LOW);
   digitalWrite(RingBellSignalPin, LOW);

   myServo.attach(ServoPin);
   Serial.begin(9600);
}

void loop()
{
   int lockButton, lock, unlock, bell;
   char snum[5];

   lock = digitalRead(LockSignalPin);
   unlock = digitalRead(UnLockSignalPin);

   // Check if lock signal from Bolt is HIGH
   if(lock == HIGH)
   {
      // Turn motor to locked position
      myServo.write(120);
```



```
    // Set LED indications
    digitalWrite(GreenLedPin, LOW);
    digitalWrite(RedLedPin, HIGH);



  // Buzz locking sound
    digitalWrite(BuzzerPin, HIGH);
    delay(1000);
    digitalWrite(BuzzerPin, LOW);




delay(1000);
}
// Check if unlock signal from Bolt is HIGH
else if(unlock == HIGH)
{
    // Turn motor to unlocked position
    myServo.write(0);









 // Set LED indications
    digitalWrite(GreenLedPin, HIGH);
    digitalWrite(RedLedPin, LOW);
    delay(2000);
}

bell = digitalRead(BellButtonPin);
if(bell == HIGH) // User pressed bell ring betton
{
    // Signal Bolt that ring button was pressed
    digitalWrite(RingBellSignalPin, HIGH);

    // A calling bell sound pattern !
    digitalWrite(BuzzerPin, HIGH);
    delay(100);
    digitalWrite(BuzzerPin, LOW);
    delay(20);
    digitalWrite(BuzzerPin, HIGH);
    delay(200);
    digitalWrite(BuzzerPin, LOW);
    delay(100);
    digitalWrite(BuzzerPin, HIGH);
    delay(100);
    digitalWrite(BuzzerPin, LOW);
    delay(20);
    digitalWrite(BuzzerPin, HIGH);
    delay(200);
    digitalWrite(BuzzerPin, LOW);
    delay(1500);

    // Turn off the signal
    digitalWrite(RingBellSignalPin, LOW);
}

lockButton = digitalRead(LockButtonPin);
if(lockButton == HIGH) // User pressed lock betton
{
```



```
    // Turn motor to locked position
    myServo.write(120);




    // Set LED indications
    digitalWrite(GreenLedPin, LOW);
    digitalWrite(RedLedPin, HIGH);



    // Buzz locking sound
    digitalWrite(BuzzerPin, HIGH);
    delay(1000);
    digitalWrite(BuzzerPin, LOW);
  }
}
```

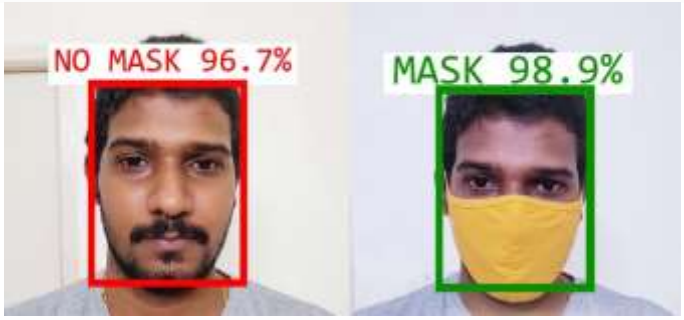

Fig 4. Output System: Face mask detection and effect and percentage of speculation.

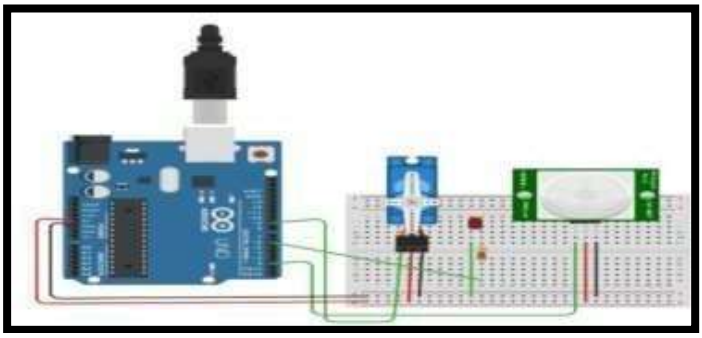

Fig 5. Earlier Circuit diagram

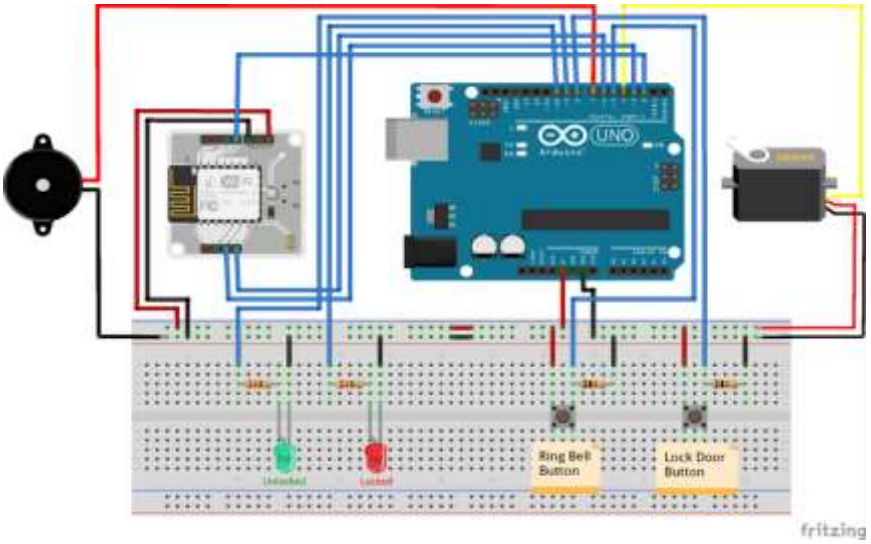

Fig 6. New circuit Diagram (for face mask detection)

4. APPLICATIONS

● Arduino based Automatic Door Opener System is a very useful project as it helps you understand the concept of these automatic door opening systems and how they work.

● These programs are now being used on many social networks, such as shopping malls, theaters, and hospitals.

● We can use this Arduino-based project in our home Garage Door Openers, technology centers, etc.

5. CONCLUSIONS

We have successfully used the whole circuit. It works, enough for me. It works during the day as it does at night. It detects when animals and humans are approaching and is not overly sensitive. The problem I am trying to solve has a solution .That does not mean it is the best solution. There is still room for improvement by adjusting some of the dynamics or even developing better algorithms that develop in this simple program. Why not see if you can improve the code yourself. I will be plugging in a transmitter so that I can do things like sound an alarm or even shoot a battery-powered water gun. I have in mind to build a tool to stop cats sleeping in my area. Check out this PCB speculation on the detection feature. Since all we need is the invention of mobile phones to teach robots due to the endless and cheap mobile availability, this is very likely. The level of complexity is very low so its operation is easy to use. The project may also be subject to suspension and thus have a good scope for the future.

6. FUTURE WORK

We continue our research project by re-introducing the YOLO-lite into various fields such as gender identity, health status, gender identity and surveillance objectives.

BIBLIOGRAPHY

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