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Technology in Design Aspect of DRO-CO Bot Robot

Vignesh T
Assistant Professor/Mechatronics,
Sri Krishna college of Engineering and Technology,Coimbatore, India

Shibin Thomas S
UG Scholar/ Mechatronics
Sri Krishna college of Engineering and Technology,Coimbatore, India

Vibunesh N T
UG Scholar/ Mechatronics
Sri Krishna college of Engineering and Technology,Coimbatore, India

Saktheeswaran G
UG Scholar/ Mechatronics
Sri Krishna college of Engineering and Technology, Coimbatore, India

Theerthana T
UG Scholar/ Mechatronics
Sri Krishna college of Engineering and Technology, Coimbatore, India

Abstract—It's been almost three years since the covid started ruling our lives. However, human peculiarize themselves to survive along with the virus and its variant. As per the Government Norms, it is crucial to follow efficacious protocols which includes simple public health measures like wearing masks, social distancing and sanitizing to protect each and everyone in the environment. When it comes to large scale circumstances its quite difficult to follow certain rules which leads to cause devastated. Here comes our robot to evade the ineluctable situation and endeavor to bear a hand for people in every zone. The Robot which we designed are integrated with mask detection and face recognition-based attendance system, dyad with contactless temperature sensor. This Bot Provides personal assistance using Artificial Intelligence integrated with Wiki-Powered, Open Weather, Wolfram Alpha and many more features. Therefore, the revolution of our robot is to safeguard the people and to help the industry.

Keywords—Government Norms, spreading, recognition, sanitizing, robot, industrial.

I. INTRODUCTION

Our journey was being ceased due to the adverse covid rife conditions. As per the today's scenario, the intense purpose of the virus is decreased but spreading causes everywhere. A huge impact of the covid takes place on the workspace. Everyone in and around the world trying to conclude this worst situation. To self-mastery the state of affairs the government has set precise rules, policies, strategies and the pastoral care is being taken by all the ministry department to protect the public. Severe consequences caused by the outmaneuvering covid crisis affect the industry in the short, Medium and Long-term. In this hectic situation to avoid the interruption of the quotidian grind life, The Described Bot lend a hand for hospitals, industry, public places. The bot follows Standard Operating Procedures in accordance with Government instruction works according to it to flatten the covid curve. In this pandemic situation, the organization optimized certain facts from manual to automatic system. First and foremost, procedure starts with mask detection and temperature sensing takes place via contactless. It detects the face and append the attendance through WhatsApp database It acts like personal assistance with reliable attributes to make the process very comfortable.

II. LITERATUREREVIEW

[1] Because the projection operation defines an individual face as a weighted sum of the eigenface traits, all that is required to recognize a specific face is a comparison of these weights to those of known people. Our technique has several advantages, including the capacity to learn and recognize new faces in an unsupervised way, as well as the ease with which it can be implemented using a neural network design.

[2] An eigenfeature layer with prominent characteristics such as the eyes, nose, and mouth is employed in a modular eigenspace description approach. This modular representation results in greater identification rates and a more robust face recognition system.

[3] In comparison to PCA and DCT, the suggested face recognition system showed the greatest recognition rate using the LMBP neural network in all of the studies..

[4] Enlarging the number of DCT coefficients is not significant to increase the accuracy of recognition. A good configuration of the variation of training data gives a more significant improvement up to 100%. All images in the database must be equally normalized. Fourthly with good configuration of training data, the system also can determine whether an object is in database or not

[5] System Discrete Cosine Transform and Radial Basis Function Network allow the system to recognize 100% of face input data. However, if the facial data is not acquired from the facial image database, such as from a direct camera.

[6] some work can still be done. When compared to an ASIC or a bespoke IC implementation, attaining high timing/area performance on these FPGAs is far more difficult. This is due to two factors. The first is a set of look-up tables with a defined

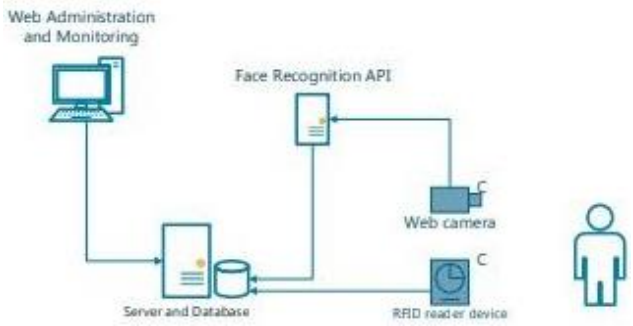
size. As a result, the gadget is underutilized. The second reason is that as device use rises, pre-fabricated routing resources become scarce.

[7] After Mallet presented the multi-resolution representation of signals based on wavelet decomposition, the Discrete Wavelet Transform (DWT) became a remarkably useful signal processing tool. Wavelets enable for simultaneous temporal and frequency analysis of signals. because wavelets' energy is concentrated in time and retains their wave-like characteristics.

III. WORKING PRINCIPLE

A Humanoid bot controlled by a Machine Learning algorithm and Deep Learning Model has been built for Workplace Assistance. Speech recognition, Intelligence support, meteorology, a Talking Bot, and a Wiki-enabled Bot are just a few of the robot's vital features. It operates by tracking how many people visit a room while also checking their temperature and sending out appropriate notifications to the employee and the organization. To produce an accurate result, multiple sensor nodes collaborate. This chapter outlines the system's overall theme.

This robot, a low-cost IoT system, supports organizations and people in complying with COVID-19 legislation and regulatory standards, as well as achieving their goals, which include



- Assist from Artificial Intelligence
- Recognise Speech
- Recognizes Person
- Assistant Bot
- Detect changing Objects
- Checking Human temperature
- Monitor Weather
  - Wikipedia assistant

A Humanoid Robot controlled by a Neural Network has been built for workplace Assistance. Speech recognition, AI assistance, weather forecasting, a Talking Dro-Co, and a Wiki-powered Dro-Co are just a few of the Dro-Co Bot's vital features. It works by tracking how many people enter a location and measuring their temperature at the same time, as well as sending out appropriate notifications to both the person and the organization. To produce an accurate result, several sensor nodes collaborate. This chapter outlines the system's overall idea. Figure 1 depicts the Dro-Co Bot's system design architecture

IV. COMPONENTS

- Raspberry Pi 4 with 4GB RAM (4 GB)
- 16 x 2 LCD Display with I2C
- SmartElex 15D Dual Channel DC Motor Driver
- Uno R3 Board with Cable compatible with Arduino
- TowerPro MG996R Digital High Torque Servo Motor
- Ultrasonic Distance Sensor Module
- Raspberry Pi 5MP Camera Module with Cable
- MLX90614 Contactless Temperature Sensor
- Robot Wheel
- Clamp for motor

- 12 Volts DC Motor – 500 RPM
- JBL GO Portable Wireless Bluetooth Speaker with Mic
- Jumper Wire
- 7805 Voltage Regulator IC
- Lithium polymer battery (LiPo)
- Clamp for Fixture
- Screw M4x10, NUT, D/WASER
- Hylam Sheet (1mm, 2mm,3mm)

- ***a) RASPBERRY PI***

Raspberry Pi is used mostly for Machine learning and Artificial intelligence part of the project. It is used in Finding the Face from the Input and then it is used to recognize the face of the person from a list of images which are registered prior by the User and the program takes up to sixty inputs from the frame to find the person and the maximum input is given as the output of particular person. We use this method for face recognition to get precise Attendance system. The next part is the Object detection which is as well as done in by the Raspberry Pi, in this part current camera input from the raspberry pi camera is taken along with the input from the previous input and difference between both inputs is taken to find the Change in objects which is boxed and shown this is the algorithm taken place in the Raspberry Pi.

b) ***MLX90614 CONTACTLESS TEMPERATURE SENSOR***

MLX90614 is a temperature sensor which measures the temperature of a person without being in contact with the person which is very much mandatory in this covid times. This type of sensor contains 17-bit analog-to-digital converter, low noise amplifier and a powerful Digital Signal Processing Unit through which high accuracy can be obtained through an accuracy of 0.02°C.

c) ULTRASONIC SENSOR

The ultrasonic sensor used is the HC-SR04 which works on the principle of SONAR waves in which it sends an array of SONAR waves and the time taken by the SONAR waves to return from the sent point is calculated through which the distance of the object from the Robot can be obtained. The major advantage of this sensor is that the SONAR waves sent are not affected by the external factors like black materials nor sunlight and the results are accurate.

d) ARDUINO UNO

The Arduino Uno is the microcontroller used in all the control and movement aspects on all parts of the bot which is ATmega328P based and contains input and output pins of about 14 and analog pins up to 6 and a resistor made of ceramic of 16MHz. This is the part where the Hand up lift and bend down takes place and also the Front and back movement of full robot body takes place.

e) LCD DISPLAY

The robot consists of a 2x16 centimeters LCD screen with Inter-Integrated Circuit Interface which can display characters on 2 lines which is more than sufficient for most of the tasks displayed by the robot in a blue background which is highlighted by white texts. All the details like informing the name of the particular person after recognizing using face recognition algorithm, commands given to the robot, alert of any object detected and the speech recognized parted everything is displayed on the screen.

f) RASPBERRY PI 5MP CAMERA

A Raspberry Pi Camera or shorts for Pi cam is 5-megapixel camera which can be conned and accessed to the raspberry pi directly with the help of the interface protocol called the MIPI camera. This is one of the important devices and the main purpose of this is to get the input seamless manner without dropping frames so raspberry pi can process the data and perform other computational tasks to give output.

g) HYLAM SHEET

Overall design of the robot is made using solid works and then it is fabricated using the electric graded hylam sheet to reduce cost and to increase the efficiency of the robot. Few parts which need high precision and accuracy are 3d printed and fabricated into the robot.

h) SERVO MOTOR

A servo-motor is a motor that permits unique manipulate of movement thru electric impulses. The servo makes use of remarks to govern a DC-motor the usage of PWM. The remarks adjust the output with the aid of using measuring the distinction among the preferred and final role to gain excessive accuracy. In greater technical detail, the motor receives powered till the output shaft is at its asked role. It then stops, if the modern-day role isn't always correct, then the motor maintains to transport withinside the proper direction. One of the blessings granted is likewise that it's miles very energy-green for its small size. Therefore, it's miles very beneficial for a small size arm. A fashionable servo-motor for small programs includes the subsequent elements: • DC-motor • Gearbox • Potentiometer • Control circuit Due to having a manipulate circuit protected withinside the servo it turns into simpler to govern as compared to a DC-motor alone. The manipulate circuit sends the PWM sign and controlling the servo the usage of an Arduino turns into as trivial as sending the attitude data.

- **DESIGN CALCULATION**

According to Euler-Lagrange's equation

1. TORQUE CALCULATION

- $\tau_1 = \frac{1}{2}m_1 l_1^2 + \frac{1}{4}\, m_2\ l_2^2 cos\Theta_2^2 + \frac{1}{4}\, m_3\, l_3^2\ cos\ cos\ (\Theta_2 + \Theta_3)^2 + m_3 l_2^2\ cos\ cos\ \Theta_2^2 + m_2 l_2 l_3\ cos\ cos\ \Theta_2 . cos\ cos\ (\Theta_2 + \Theta_3)\ddot{\Theta}_1 + (-\frac{1}{4}m_2 l_2^2 \Theta_2) - m_3 l_2^2\ sin\ sin\ (2\Theta_2) - m_3 l_2 l_3\ sin\ sin\ (2\Theta_2 + \Theta_3) - m_3 l^2\ cos\ cos\ \Theta_2\ \ sin\ sin\ (2(\Theta_2 + \Theta_3))\dot{\Theta}_1\ \ \dot{\Theta}_2 + (-m_2 l_2 l_3\ cos\ cos\ \Theta_2 \Theta_2 + \Theta_3) - m_3 l^2\ cos\ cos\ \Theta_3\ sin\ sin\ (2(\Theta_2 + \Theta_3))\dot{\Theta}_1 \dot{\Theta}_2$
- $\tau_2 = [\frac{1}{4}m_2 l_2^2 + m_3(l_2^2 + l^2 cos\Theta_3 + l_2 l_3 cos\Theta_3)]\ddot{\Theta}_2 - [m_2 l_2 l_3\ sin\ sin\ \Theta_3]\dot{\Theta}_2\dot{\Theta}_3 + [m_3 l_2 l\ cos\ cos\ \Theta_3 m_3\ sin\ sin\ (2\Theta_2 + \Theta_3)\ + \frac{1}{2}\ l^2\ cos\ cos\ \Theta_3 sin 2(\Theta_2 + \Theta_3)]\dot{\Theta}_1^2 + [l_1 cos\Theta_2 m_2 cos\Theta_2 + l_2 m_3 + l_1 cos\Theta_3 m_2 cos(\Theta_2 + \Theta_3)]g$
- $\tau_3 = \frac{1}{3}m_3 l_3^2\ddot{\Theta}_3 - m_3(l_2 l_3 cos\Theta_3 + l_3^2 cos\Theta_3)\ddot{\Theta}_2 + m_3 l cos\Theta_3\ sin\ sin\ (\Theta_2 + \Theta_3)\ (l_2 c_2 cos\Theta_3\ cos\ cos\ (\Theta_2 + \Theta_3)\ \dot{\Theta}_2^2 + m_3(l_2 l_3\ cos\ cos\ \Theta_3\ sin\ sin\ (\dot{\Theta}_2\ + \dot{\Theta}_3) + gl\ cos\ cos\ \Theta_3 cos(\Theta_2 + \Theta_3)$

SYSTEM ARCHITECTURE

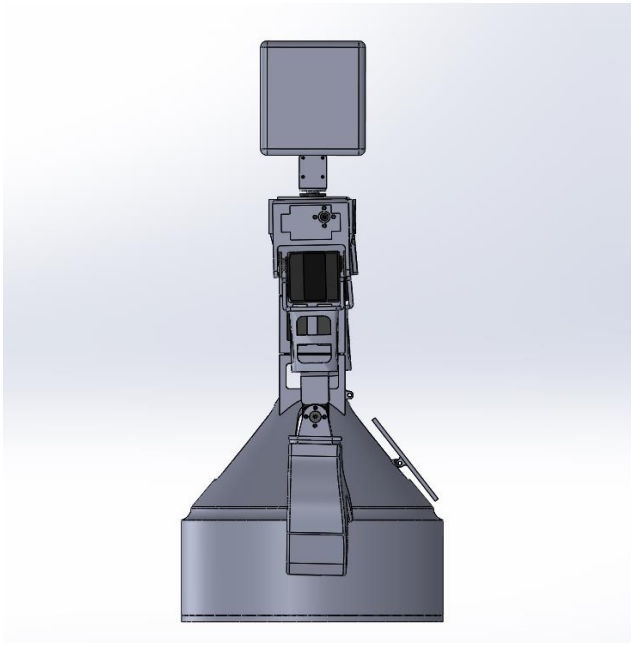
A. 3D MODEL OF THE SETUP

Fig 3. 3D Model of Dro-Co Bot

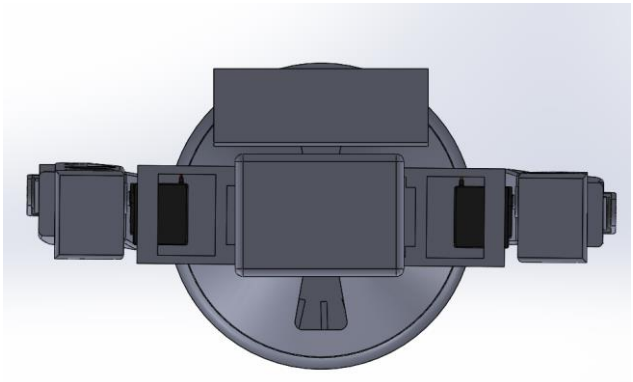
B. FRONT VIEW OF Dro-Co BOT

Fig 4. Front View of Dro-coBot

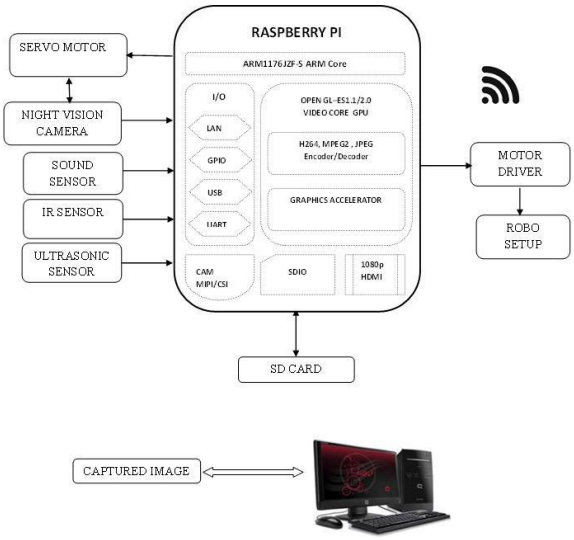
C. LEFT VIEW OF Dro-coBOT



D. TOP VIEW OF Dro-Co BOT



E. RASPBERRY PI CIRCUIT DIAGRAM



V. CONCLUSSION

Nowadays, numerous attendance and tracking gear areutilized in exercise in the industry. Regardless of the reality that these answers are more often than not computerized, they're nonetheless vulnerable to errors.

A truly unique deep learning-based completely face reputation attendance machine is suggested in this study. The entire process of generating a face reputation issue using a combination of cutting-edge tactics and improvements in deep learning is detailed. It has been determined that a high level of accuracy can be attained using a lesser number of face photographs and the suggested augmentation strategy, with an overall accuracy of 94.87 percent.

These effects enable more research for the purpose of obtaining even higher accuracy on fewer datasets, which is critical for making this solution production-ready. Exploring novel augmentation methods and leveraging freshly collected images in runtime for computerised retraining of the embedding CNN should be part of the destiny paintings. The examination of additional answers for identifying facial embedding vectors is one of the study's undiscovered areas. Developing a specialised classification solution for this topic might lead to higher accuracy on a smaller dataset. This deep studying-based fully solution isn't reliant on GPU in runtime. As a result, it can be important in a variety of structures as a significant or minor issue that runs on less expensive and low-potential technology, as well as a general-purpose Internet of Things (IoT) device.

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