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RoboCar

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Abstract:- In these unprecedented times, the world is facing a new challenge each day, be it economically, socially, culturally or financially. COVID-19 has affected several nations and millions of people across the globe have succumbed to this lethal virus. The growing need for safety measures to sustain life on earth brings all kinds of minds together to collaboratively work on solutions that could increase the safety and reduce the need for manpower to fight this virus. This thesis gives an insight into how IOT and Computer Vision and automation will reduce the dire need of manpower to constantly monitor people coming in and out of public places.

Keywords:- *COVID-19, Computer Vision, IOT.*

I. INTRODUCTION

This chapter presents the introduction to the topic of this project and explains why a RoboCar with surveillance camera is a necessity. The basic approach for implementing the IOT Based Remote Controlled Robot has been introduced in this chapter which also includes the motivation behind this thesis report.

We have designed a RoboCar that will be controlled in a remote fashion and be available via web. As statistics continue to see an exponential rise in the COVID-19 cases, Nature India (an online news channel) has remarked that Healthline workers are feeling burnt out due to unprecedented workload, uncertainty and anxiety. This could lead to fall in recovery if patients if the workers aren't able to combat unbearable exhaustion. With the help of RoboCar this workload would be effectively reduced to a major extent, there by improving overall morale and efficiency.

The objective of this work is as follows:
1) Develop a product that eases the workload on manpower and keeps everyone safe.2)An application that allows us to communicate with the robot in a remote fashion.3)To study the recommendation techniques and identify their limitations that may help to suggest a hybrid approach which may overcomes the drawbacks existing methods.4)To identify evaluation metrics used for performance analysis of different recommendation systems. We intend to include a list of features to help frontline workers perform their duties in an effective and remote fashion. We would like to provide state-of- the art facilities to the clients without compromising on efficiency.

The initial investment is on the higher side but the chances of returns is quite high as a relaxed employee works faster, better and more masterfully. The major part of the project is the Raspberry pi that controls all the features of the RoboCar. The main motivation for this project is to do our bit in helping the world by breaking off the transmission. The most important point would be that everything in this project is contactless which makes it very reliable. The IOT based approach is utilized due to its potential to allow objects to connect with one another through the internet. In this chapter, an introduction is given to the current scenario of the pandemic which has affected millions of people worldwide.

II. WORKING

We intend to include a list of features to help frontline workers perform their duties in an effective and remote fashion. We would like to provide state-of- the art facilities to the clients without compromising on efficiency.

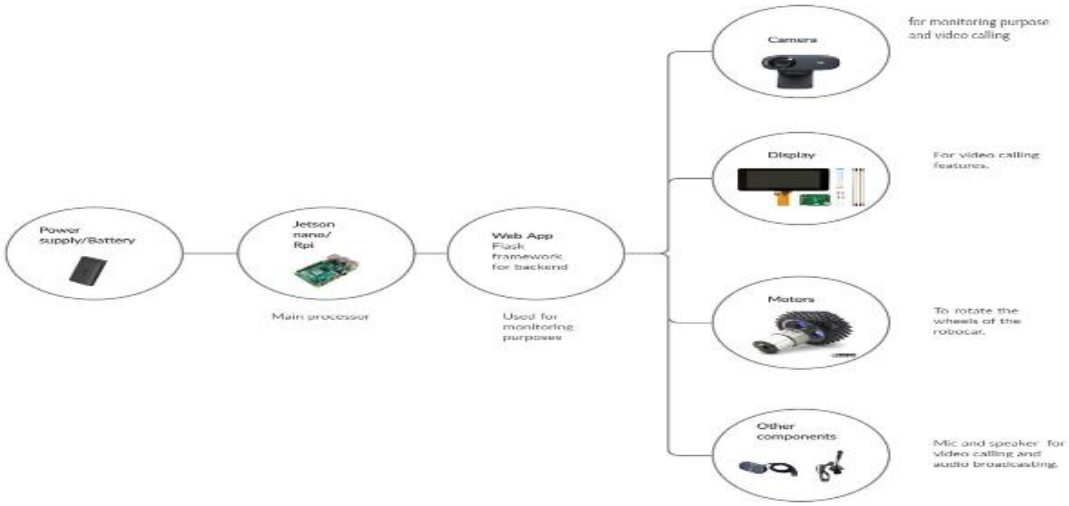

Fig 1: Block Diagram

1. WebRTC

We will be using WebRTC and WebSocket while working on video call feature. We aim to improve the functionality and user-experience, therefore, we have attached a microphone and an external speaker to the model. WebRTC is an HTML5 specification and it used to integrate media that is in real time along with a browser. The advantage of using WebRTC is that one does not need any plugin for the browser. However, to establish a session, you would need a signalling protocol. Moreover, WebSocket is a good choice for when we do not need to stream a media.

In addition, we are also adding an external speaker and a microphone in order to improve the functionality and user experience.

The body of the robot is controlled by a health care worker/admin and for that purpose we have designed a web application using Flask. This micro web framework is commonly used for all server side codes that are handled by python. The web page has four buttons – forward, rever, left and right. It also has a speaker button and a slider to control the movement of the servo motor. The left part of the window is reserved for streaming the live video feed captured by the camera.

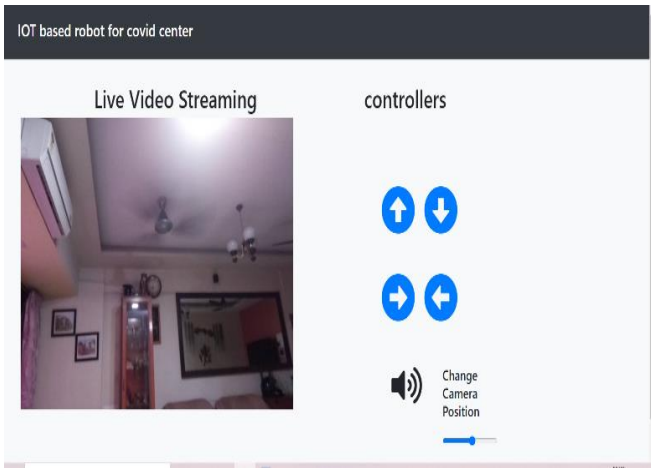

Fig 2: The web page as viewed by the admin/ healthcare professional

2. Servo Motor

The Picam is mounted on the servo motor which can be controlled through the web page. This function provides a peripheral view to the bot which makes the navigation process much easier. A Servo Motor is a simple device that consists of a DC Motor, Gears and a Feed Back based Position Control System. The main advantage of a Servo Motor is its ability to hold the angular position of its shaft. We use the theory of Pulse Width Modulation or PWM to control the servo motor. Picamera is connected in CSI port which is made for camera.

Fig 3: Servo motor

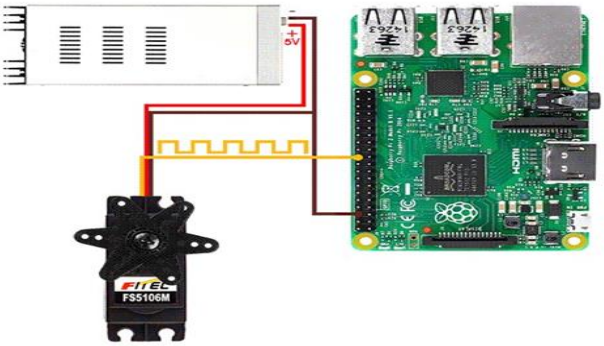

Fig 4: Connection diagram of servo motor with RPI

3. DC motor

We have connected 6 dc motors to 1 motor Driver and are giving it a 12v input. the wheels on the left side of the body are connected serially and the same goes for the wheels on the left side of the body. Therefore, we get two wires from the left and 2 wires from the right side of the body which are then connected to the H bridge driver. A 12 volt supply is provided to the driver which is also connected to the rpi 3b. The wheels move according to the signal received by the rpi through the web application.

The robot can move in 4 directions:

a) Forward - to move the bot in the forward direction, all the 6 wheels (left and right) are given input HIGH.

b) Backward - to move the bot in the backward direction, all the 6 wheels (left and right) are given input HIGH.

c) Left - To move the body left, the left wheels are LOW while the right wheels are given input HIGH. This makes the body turn in the left direction.

d) Right - To move the body right, the right wheels are LOW while the left wheels are given input HIGH. This makes the body turn in the right direction.

4. Double H-Bridge L298N

This driver module is a high power motor driver that can be used along with DC and Stepper Motors. It can control the directional and speed of the motors. There are eleven pins in the driver that aids the working of the motor wheels and propels it in the direction that has been programmed. It has a 12V input (DC power source and 5V pin that supplies power responsible for switching the logic inside the IC. The maximum supply voltage and current of the module is 46V and 2A respectively.

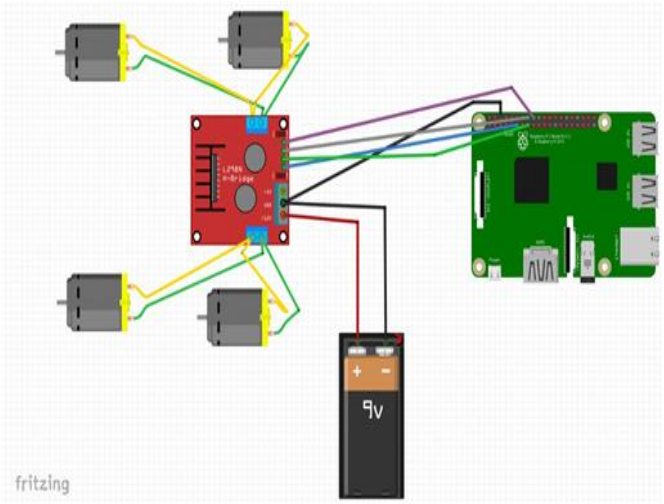

Fig 5: Connection of RPI, driver and motors

III. RELATED WORKS

Most smart cities across the world have developed COVID-19 bots to help the frontline workers tackle issues of sanitation and lack of personnels. When the virus spread across the globe, many scientists used Artificial intelligence and Machine Learning to try and predict the presence of the virus in an attempt to flatten the curve and bring the world back to normal.

Several hospitals across the globe employed small robots to ensure social distancing and provide patient care amidst the lockdown. The pandemic control model deployed by organizations were of huge relief and enabled the smooth faster treatment of patients. As the pandemic blew up, forcing several businesses to close, robots became quite popular as they are easy to maneuver, navigate and most importantly disinfect. Automatons were deployed with the aim of sanitizing hospitals and making deliveries. Furthermore, they were used to also monitor patients and help medical workers. The Droid Team and Lifeline Robotics developed automated bots that were of a huge relief to the team and a main source of inspiration to our project.

IV. PROPOSED WORK

The paper presents a model to battle and reduce the effects of the virus. The motive of the project is to aid the front-line workers and ensure that patient care remains in excellent condition. In the midst of this pandemic, the most important safety measures are social distancing along with proper sanitization. However, due to the lack of existing technological methods for monitoring these safety measures, human intervention became necessary; This indeed may have led to the situation getting even worse.

In the proposed project, the raspberry pi is the main processor of the system. We are using a picamera and mounting it on the servo motor. This servo motor is controlled by the user through the web page so that they get a peripheral view of the surrounding environment of the robot. Python Flask Framework is used to access the camera and stream its contents on the web page for the user to view. We have an additional feature- Video call. Here, we are using Webrtc and WebSocket.io to ensure a better output. Webrtc is an HTML5 specification and it used to integrate media that is in real time along with a browser. The advantage of using webrtc is that one does not need any plugin for the browser. However, to establish a session, you would need a signalling protocol. Moreover, WebSocket is a good choice for when we do not need to stream a media. In addition, we are also adding an external speaker and a microphone in order to improve the functionality and user experience.

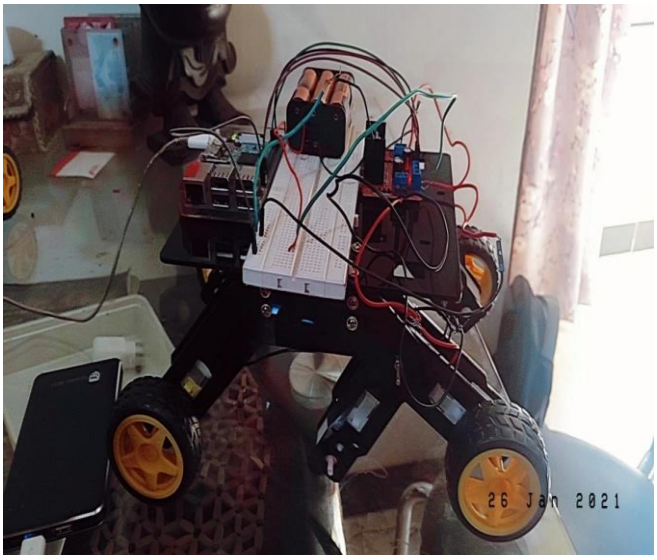

Fig: 6 RoboCar webpage

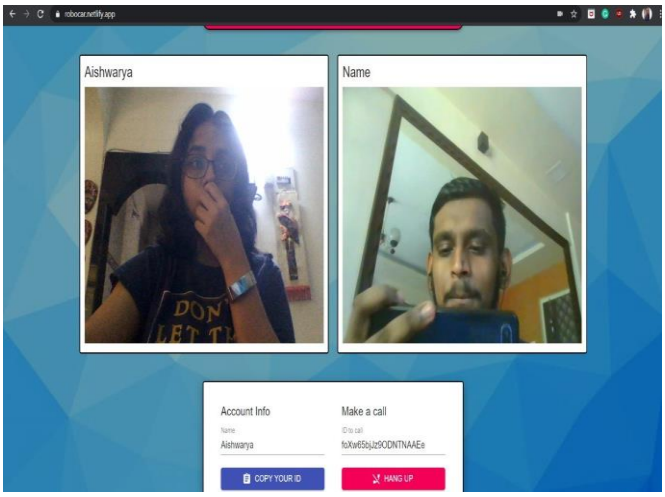

Fig 7:Video calling

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V. APPLICATION

1. Consult with doctors and the medical staff over video call.
2. Navigate the robot through a terrain/ environment where physical presence isn't possible.
3. Audio broadcast messages
4. Peripheral view of the camera

VI. FUTURE SCOPE

1. Monitor environments like offices and hospitals in a remote fashion
2. Relay important messages as per the owner's wish.
3. Interact with patients or employees while maintain social distancing.

VII. CONCLUSION

The paper presents a model to battle and reduce the effects of the virus. The motive of the project is to aid the front-line workers and ensure that patient care remains in excellent condition. In the midst of this pandemic, the most important safety measures are social distancing along with proper sanitization. However, due to the lack of existing technological methods for monitoring these safety measures, human intervention became necessary.

Figure 8:Completed project

VIII. ACKNOWLEDGEMENT

It is a great pleasure to present this paper on "RoboCar" based on web application and movement of bots. We had the opportunity to explore new domains and obtain fresh perspective while working and developing the project. We would like to express our sincere thanks to our project guide Professor Padmaja Bangde for her invaluable suggestions and constant support.

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