**Hand Gesture Recognition for Controlling Robot Car Movement**

**Abstract**

This project describes the implementation of movement control for robotic car using hand gesture recognition which uses deep learning algorithm. Therefore, proposed technique is hassle free as control is not based on joysticks or switches. There are six conditions considered for robot car movement control as ‘Backword’, ‘Forward’, ‘Left’, ‘No-Motion’, ‘Right’ and ‘Stop’ using different hand gestures. There are many researchers worked on this area using different sensors, machine learning algorithms and deep learning algorithms. Limitations of the state of art techniques are studied in this paper and designed a new modified convolutional neural network (CNN) for gesture recognition which controls movement of robot car. Dataset is created which generates 1000 Gray scale images for each type of gesture. Training modified CNN model gives prediction accuracy of 98.4024 % while random forest machine learning classifier gives prediction accuracy of 69%. It is observed that proposed model gives better accuracy compared to state of art technique for controlling movement of robot car using hand gesture. Obtained hand gesture class can be send to robot using Arduino controller for controlling movement.

***Keywords:*** Robot Car Movement, Gesture Recognition, Random Forest, Deep Learning, CNN, layer modification, Arduino-Uno Controller.

**Objectives**

1. Create the hand gestures (1000 gray scale image/gesture)
2. Train CNN model
3. Test CNN model for different hand gestures using webcam
4. Deploy code to python GUI

**Existing techniques**

1. Different switches and Joysticks are used
2. Machine Learning (Random Forest) , accuracy is 69% .

**Limitations**

1. Accuracy is less
2. Complexity
3. It cant work on huge data

**Proposed Model**

Proposed method includes 3 major steps as,

1. Generate Hand Gestures
2. Hand gesture Recognition (CNN)
3. Robot Car Movement based on recognised hand gesture

Dataset Preparation

Background Removal

Training Modified CNN

Prediction Performance

Dataset Preprocessing

Prediction on Webcam data

Robot Car Motion/ Audio Output

Fig. proposed Method Block Diagram

Proposed method uses deep learning techniques which includes custom CNN (Convolutional Neural Network) for gesture classification and recognition.