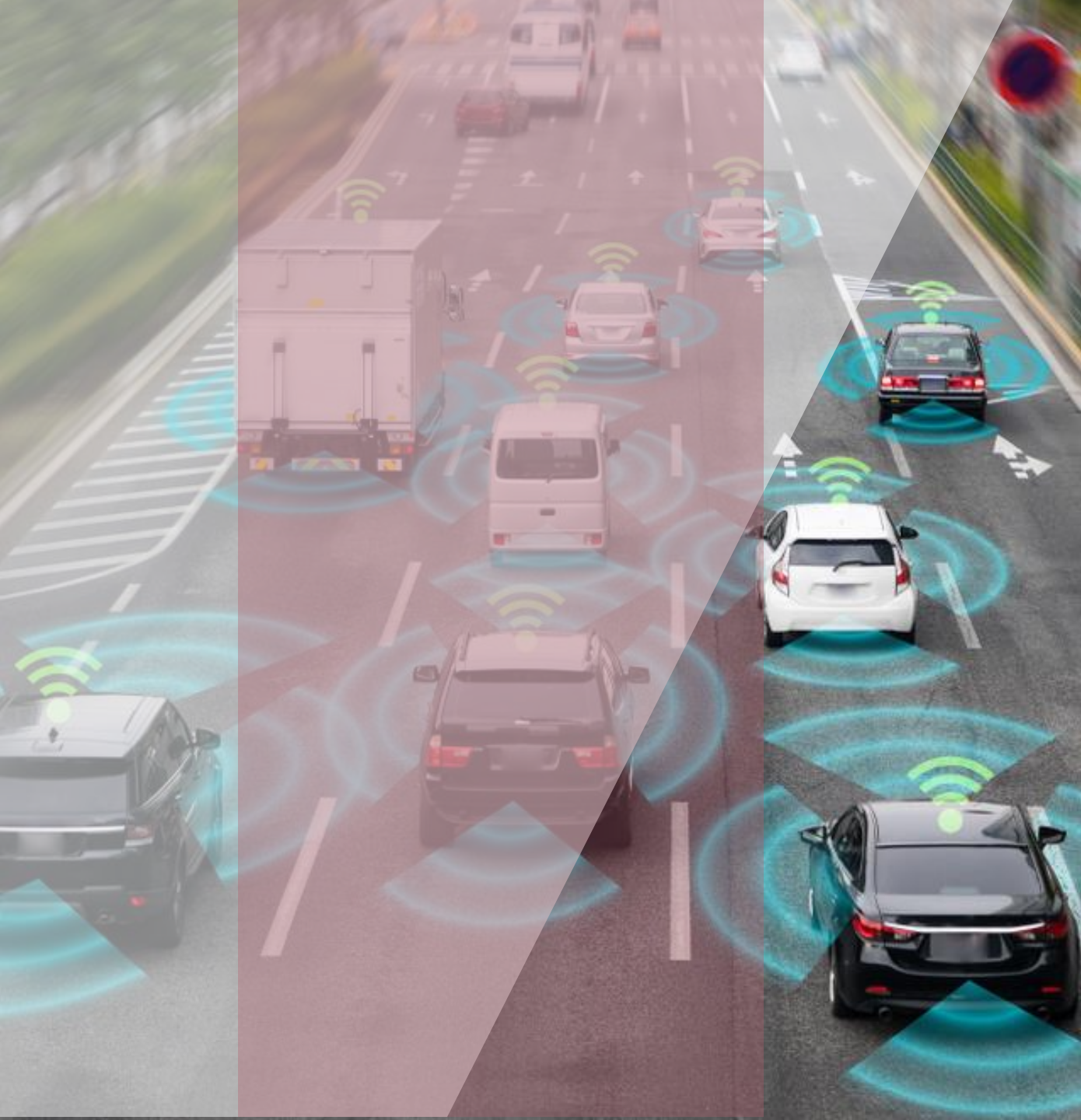


Revolutionizing Transportation

“Unleashing the Power of IoT in Automated Vehicles with Intelligent Obstacle Avoidance”



Electronics and Communication
Engineering



Project : **UROP**
Mentor : **Dr. Satish Kumar Tiwari**
Group : **13**

SUBMITTED BY :

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Abstract



- Road accidents are pervasive and prove to be fatal.
- This deals with the construction and working of a device for obstacle detection.
- Obstacle detection is a mechanism used for the identification of any obstruction that may hinder the way of the vehicle.
- It can improve mobility as well as safety of people who drives on roads.
- The proposed system automatically turns left and right on detecting obstacles using ultrasonic sensors and commands to turn right or left using voice sensor which is connected to the IoT.
- The primary focus is to make the vehicle secure and to ensure the safety of the driver and passengers.



AIM | MOTIVATION | OUTCOME



AIM

- To avoid obstacles in the path.
- To reach the final pre-defined destination and follow the pre-defined commands.



MOTIVATION

- Road accidents are pervasive and prove to be fatal.
- So, to develop a kind of thing which deals with the construction and working of a device for obstacle detection.



OUTCOME

- Avoiding Obstacles in the real time for vehicles.
- To develop programming skills and get familiarized with Arduino UNO.
- Gaining knowledge on particular sensors we use.

Components Required



- Arduino UNO Board



- Ultrasonic Sensor

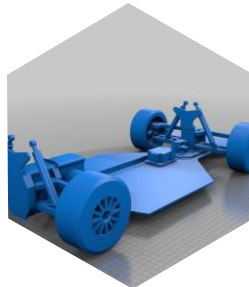


- Servo Motor

- Gear Motor



- 18650 Li-ion Battery



- Motor Drive

- Chassis:
body part,
wheels, etc.,





Arduino UNO Board

- Arduino UNO is a microcontroller board based on the ATmega328P.
 - It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button.
 - It connects to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.
 - Power Supply: 5V
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Motor Drive

- A motor drive controls the speed, torque, direction, and resulting horsepower of a motor.
- A motor is the mechanical or electrical device that generates the rotational or linear force used to power a machine.



Ultrasonic Sensor

- We are using HC – SR04 device.
 - This sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm.
 - It includes ultrasonic transmitter, a receiver and a control circuit.
 - There are only four pins for HC-SR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground).
-



Servo Motor

- This device consists of three parts
 - a) Controlled Device
 - b) Output Sensor
 - c) Feedback System

Components (Budget in detail) :

S.NO	Components used	Quantity	Cost
[1]	Arduino UNO R3 Board	1	Rs. 400
[2]	Ultrasonic sensor, Voice sensor	1, 1	Rs. 600
[3]	Motor drive	1	Rs. 250
[4]	Servo motor	1	Rs. 200
[5]	Wheels	4	Rs. 200
[6]	Gear motor	4	Rs. 200
[7]	18650 Li-ion Battery	2	Rs. 400

LITERATURE SURVEY

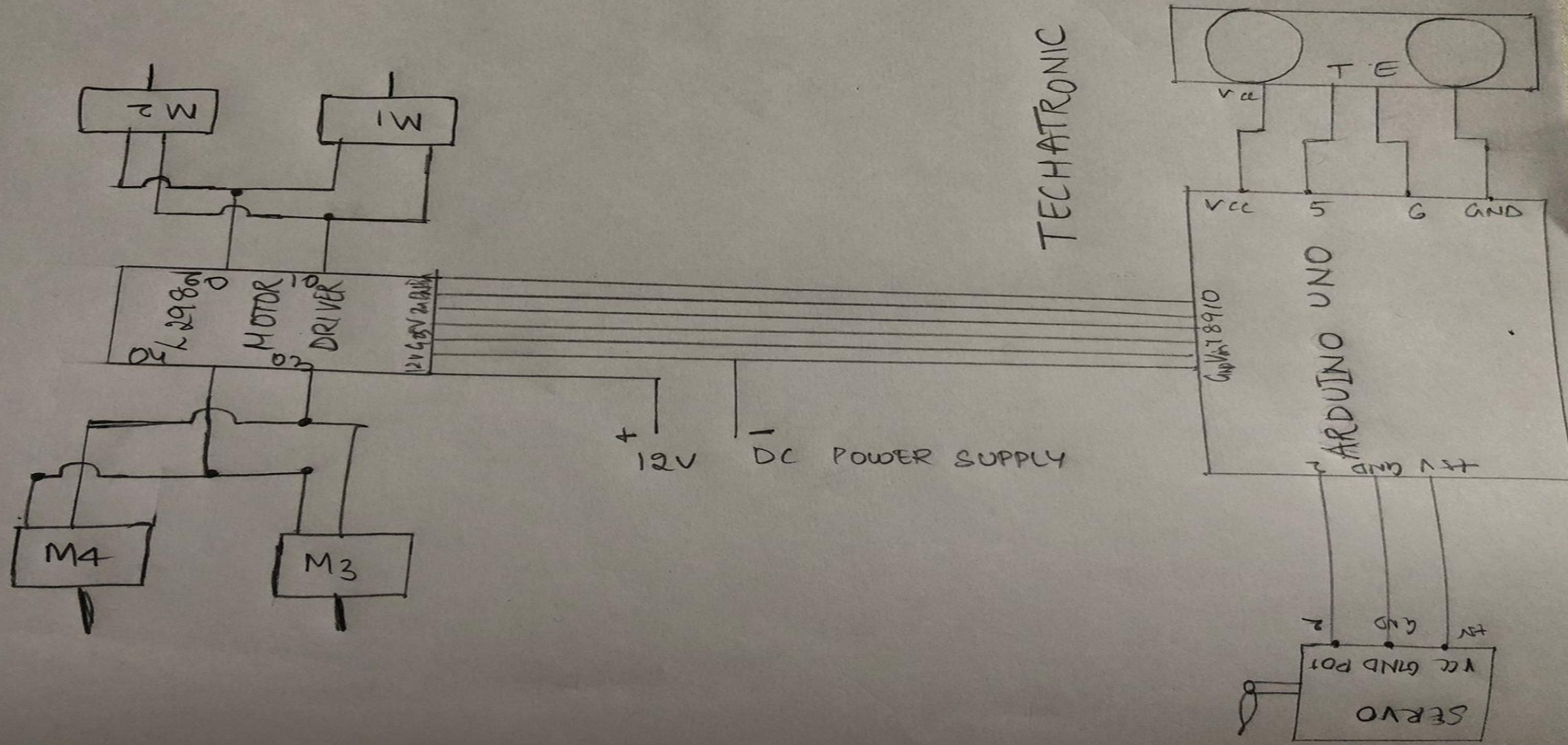
Reference number	Publication /patent title	Advantages	Disadvantages
[1]	Sensors for obstacle Detection in traffic scene situation	Got an idea about combined use of different types of sensors.	No algorithms are designed to reliably detect and warn for any obstacle that can appear in front of the car.
[2]	A Review of Vision-Based On-Board Obstacle Detection and Distance Estimation in Railways	Clarity about the three aspects rail track extraction, detection of obstacles and estimation of distances	No proper discussion of the distance estimation in railways.
[3]	Obstacle detection using ultrasonic sensor for a moving robot	Learned about the different applications when designing moving robot.	There is no clarity on implementation for a moving robot.

Work Contributions



1. The first contribution of this project is to avoid the road accidents by capturing an obstacle distance in front of the vehicle.
2. One more implication of this contribution is to attach a voice sensor to the vehicle which stops the vehicle with driver commands.
3. IoT-based vehicles can be equipped with a variety of sensors.
4. Sensor Integration
5. Accordingly, the second contribution of this research is to put forward a “logic” that is robust enough to advance the state of knowledge related to the stop the car with an accurate direction.

Block Diagram



New Implementation can be done

IOT ENABLED STRUCTURAL HEALTH MONITORING ROADS





- This Project talks about Pothole Identification Methods that have been created and proposes a practical answer for distinguish the Potholes on streets and roads and give the Information to the Road Management System (Government).
- It Provides the Information where the Potholes are present.
- We can Implement the Project with Accelerometer Sensor, Arduino UNO Board.
- The Detected Information will be collected and it will show the graphs based on potholes height and width and stores the data.
- Also, An android applications can be Implemented for safety of drivers so they be careful to avoid mishaps.

PROPOSED OUTCOMES TO BE PLANED

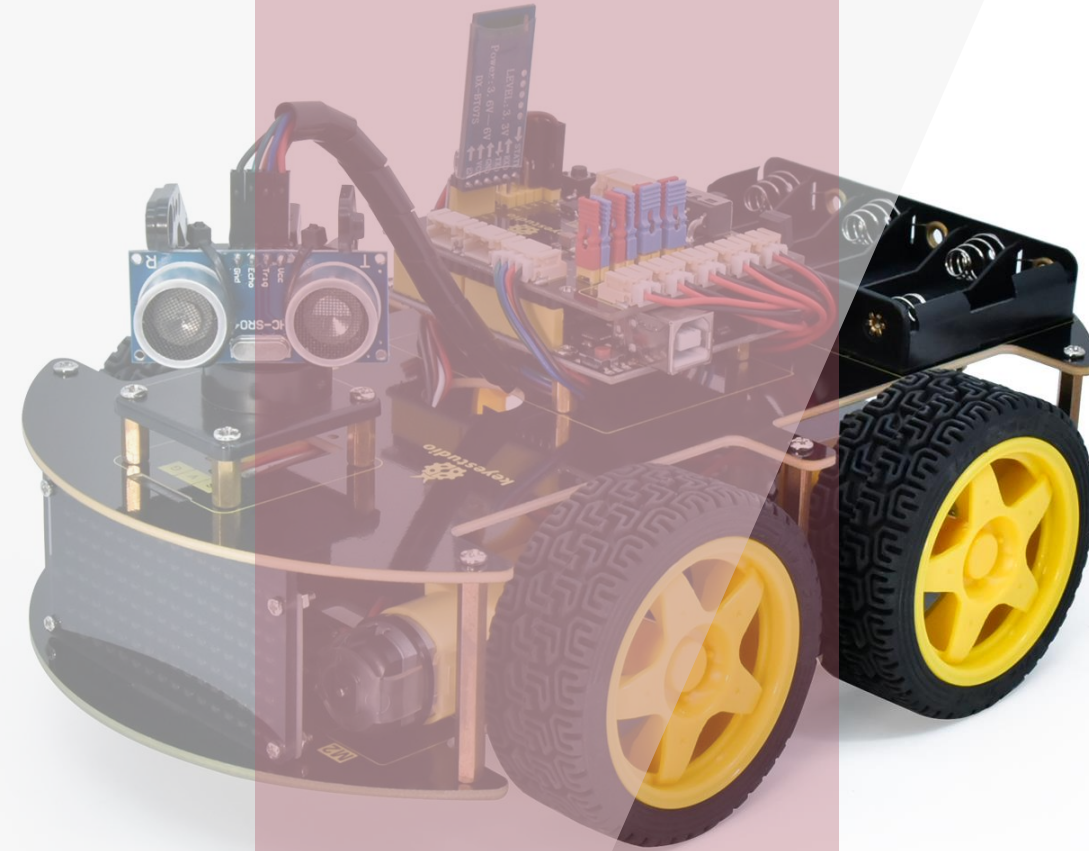
- A vehicle that can move automatically in different directions with the help of an ultrasonic sensor.
- It can measure the distance from the obstacle and send the signals to the Arduino.
- To provide smooth and safe road infrastructure to road users

Future Outcomes



Structural Health Monitoring of Road Surface using Sensors

- To detect road surface anomalies, such as potholes, cracks, and bumps, which affect driving
- comfort and on-road safety.
- To analyze the mobile phone sensors data during road journey.
- To optimize road management process.
- To monitor structure health.
- To increase passengers lifespan.
- To provide smooth and safe road infrastructure to road users.

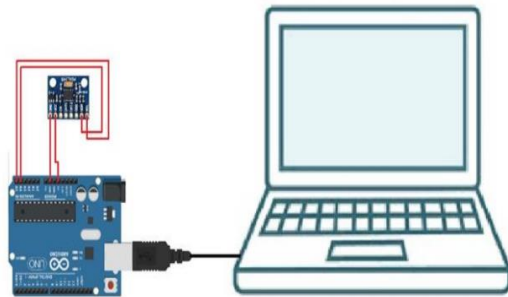


Implementation



Structural Health Monitoring of Road Surface using Sensors

- By using Arduino UNO Board and ADXL – 345 Sensor we can implement this and observe the graphs.
- Accelerometer gives the reading of acceleration of three axis in 13 bit, but Arduino can process 8 bit data that's why we send the data in two goes.
- We print the output of the data given by ADXL345 in the format of x, y, z. whose 1 unit reading is equivalent to 1g(9.81m/ss)



CONNECTIONS:-	
ADXL-345	ARDUINO UNO
VCC	5V
GND	GND
SDA	A4
SCL	A5



References

- [1] J. Borenstein, "Real-time obstacle avoidance for fast mobile robots", IEEE Trans. Syst. Man Cybern., vol. 19, pp. 1179-1187, Sept./Oct. 1989.
- [2] A. Kosaka and A. Kak, "Fast vision-guided mobile robot navigation using model-based reasoning and prediction of uncertainties", CVGIP Image Understanding, vol. 56, no. 3, pp. 271-329, Nov. 1992.
- [3] J. Neira, J. Horn, J. D. Tardo's and G. Schmidt, "Multisensor mobile robot localization", Proc. IEEE Int. Conf. Robot. Automat., pp. 673-679, Apr. 1996.
- [4] K. Sugihara, "Some location problems for robot navigation using a single camera", Comput. Vision Graph. Image Process., vol. 42, no. 1, pp. 112-129, Apr. 1988.

THANK YOU



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