IOT BASED AUTONOMOUS UNMANNED DELIVERY VEHICLE

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ABSTRACT:

Unmanned vehicles, also known as autonomous vehicles or drones, have gained popularity in recent years due to their ability to operate without human intervention. These vehicles are equipped with advanced technologies such as sensors, GPS, and computer vision, which allow them to navigate and interact with their environment without the need for a human driver or operator.

Unmanned vehicles have a wide range of applications, from military reconnaissance and surveillance to package delivery and search and rescue operations. They can operate on land, in the air, or in water, depending on their design and purpose. For example, unmanned aerial vehicles (UAVs) have been used to monitor wildfires, inspect power lines and pipelines, and provide emergency medical services, while unmanned ground vehicles (UGVs) have been used for bomb disposal and mine clearance.

One of the main advantages of unmanned vehicles is their ability to perform tasks in hazardous or inaccessible environments, where human safety would be at risk. They can also operate more efficiently and cost-effectively than human-operated vehicles, as they can work around the clock without the need for breaks or rest.

KEYWORDS:

ARDUINO BOARD, MOTOR DRIVER, DC MOTORS , SENSORS, ACTUATORS, POWER SOURCE, COMMUNICATION MODULE.

INTRODUCTION

OVERVIEW:

Autonomous vehicles, also known as self-driving cars, are an emerging technology that has gained widespread attention in recent years. These vehicles are equipped with advanced sensors, software, and communication systems that allow them to operate without human intervention. The promise of autonomous vehicles includes safer roads, reduced traffic.

Congestion and increased mobility for people who cannot drive due to age, disability, or other reasons. In this journal report, we will explore the current state of autonomous vehicles, the challenges they face, and the potential impact they may have on society.

CURRENT STATE OF AUTONOMOUS VEHICLES:

Autonomous vehicles have come a long way since their inception, with major strides made in the development of the technology. Several companies, including Tesla, Waymo, and Uber, are actively testing autonomous vehicles on public roads, while others such as General Motors and Ford have announced plans to launch their own autonomous vehicles in the near future. However, there are still challenges to be overcome before these vehicles can be deployed at scale. One of the main challenges is the development of reliable sensors and software that can accurately perceive and interpret the environment around the vehicle. Another challenge is ensuring the safety of autonomous vehicles, especially in complex urban environments where pedestrians and other vehicles are present.

CHALLENGES AND RISKS:

One of the main challenges facing autonomous vehicles is ensuring their safety. Even with advanced sensors and software, accidents can still occur. This was demonstrated in 2018 when an autonomous Uber vehicle struck and killed a pedestrian in Arizona. The incident highlighted the need for increased safety standards and regulations for autonomous vehicles. In addition, there are concerns about the impact of autonomous vehicles on employment, as many jobs in the transportation industry could become obsolete if autonomous vehicles become the norm. There are also concerns about the privacy and security of the data collected by autonomous vehicles, as they are equipped with a variety of sensors that can capture sensitive information about their surroundings and passengers.

POTENTIAL IMPACT:

Despite the challenges and risks, the potential impact of autonomous vehicles is significant. They have the potential to reduce traffic congestion, improve road safety, and increase mobility for people who cannot drive. In addition, they could significantly reduce carbon emissions, as they can be programmed to drive more efficiently than human drivers. The deployment of autonomous vehicles could also lead to the creation of new industries and job opportunities, such as the development of new software and hardware technologies.

MATERIALS AND METHODS

Autonomous vehicles rely on a variety of sensors, software, and communication systems to operate. The specific methods and materials used in autonomous vehicles can vary depending on the manufacturer and the specific application of the vehicle, but some common components are:

Autonomous vehicles are equipped with a range of sensors, such as cameras, lidar, radar, and ultrasonic sensors, that provide information about the vehicle's surroundings. These sensors

1. Sensors: Autonomous vehicles are equipped with a range of sensors, such as cameras, lidar, radar, and ultrasonic sensors, that provide information about the vehicle's surroundings. These sensorsare used to detect obstacles, pedestrians, and other vehicles, as well as to determine the vehicle's position and speed.

2. Mapping and Localization: Autonomous vehicles rely on high-precision maps to navigate the environment. These maps contain detailed information about the road network, including lane markings, traffic signals, and other features. Localization techniques are used to determine the vehicle's position relative to these maps.

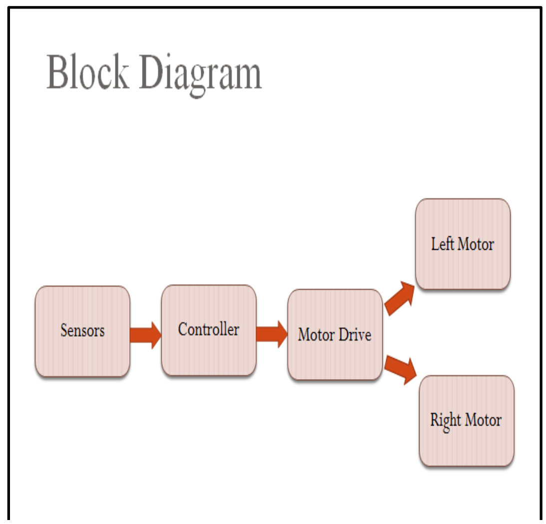
3. Control Systems: Autonomous vehicles use control systems to operate the vehicle's steering, acceleration, and braking. These systems are typically based on advanced algorithms that take into account the vehicle's current position, speed, and direction, as well as data from the sensors and mapping systems.

4. Communication Systems: Autonomous vehicles rely on communication systems to exchange data with other vehicles and infrastructure. This includes vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication systems, which allow vehicles to share information about their surroundings and to coordinate their movements.

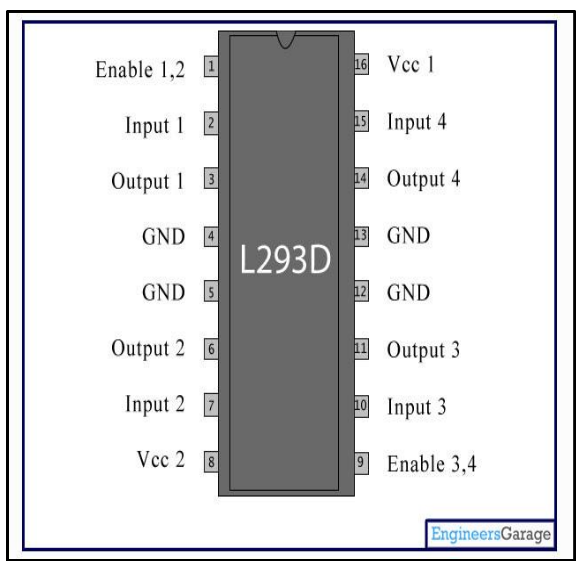
5. Computer Hardware and Software: Autonomous vehicles require advanced computer hardware and software to process the vast amounts of data generated by the sensors and mapping systems. This includes powerful processors, memory, and storage devices, as well as software algorithms that are able to process and interpret the data in real-time.

Overall, the development of autonomous vehicles requires a wide range of technologies and expertise, from sensor and mapping technology to control systems and software engineering. As this technology continues to evolve, it is likely that new materials and methods will be developed to further improve the safety and reliability of autonomous vehicles.

BLOCK DIAGRAM



MOTOR DRIVER



ABOUT:

The L293D is a popular motor driver IC (integrated circuit) that is commonly used to control DC motors and stepper motors. It is a dual H-bridge motor driver, which means it can control two DC motors or one stepper motor. The L293D is designed to work with a wide range of input voltages and can drive motors with a voltage range of 4.5 to 36 volts.

The L293D has a total of four input pins and four output pins. The input pins are used to control the direction and speed of the motor, while the output pins are connected to the motor. The L293D also includes a built-in protection diode, which prevents damage to the IC due to back EMF (electromotive force) generated by the motor.

The L293D can be controlled using a microcontroller or other digital logic circuit. The direction and speed of the motor can be controlled by applying appropriate logic levels to the input pins. The L293D can also be used to control the speed of a motor using pulse-width modulation (PWM).

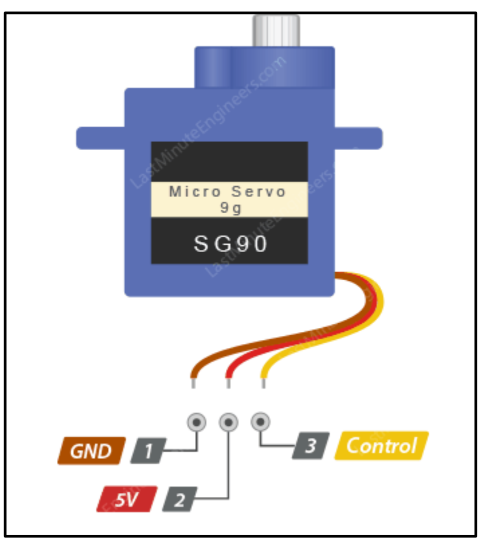
One of the main advantages of the L293D is its ease of use. It is available in a standard 16-pin DIP (dual in-line package) and can be easily integrated into a wide range of motor control applications. Additionally, the L293D is a low-cost solution for motor control and is widely available from electronics suppliers.

Overall, the L293D is a versatile and popular motor driver that is commonly used in hobbyist and DIY projects, as well as in commercial and industrial applications. Its ease of use, low cost, and wide availability make it a popular choice for controlling DC motors and stepper motors.

SERVO MOTORS

A servo motor is an electromechanical device that is used to control the position, speed, and acceleration of a mechanism. It is commonly used in robotics, automation, and manufacturing industries. The servo motor consists of a rotor, a stator, and a control circuit.

The rotor is a permanent magnet that is attached to the output shaft of the motor. The stator consists of a series of coils that are wound around a stationary core. The control circuit regulates the current flowing through the coils, which creates a magnetic field that interacts with the rotor and causes it to rotate.



The control circuit of a servo motor uses feedback from a sensor, such as a potentiometer or an encoder, to continuously monitor the position of the rotor and adjust the current flowing through the coils to maintain the desired position.

One of the key advantages of servo motors is their high precision and accuracy. They are capable of very precise movements, which makes them ideal for applications that require high precision, such as robotics and manufacturing.

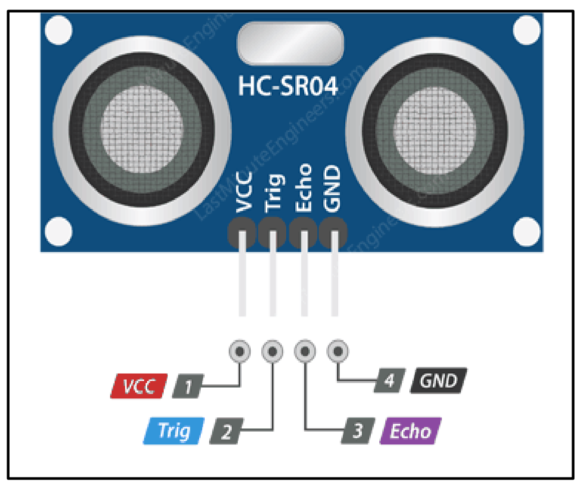
Servo motors are also used in applications where speed and acceleration need to be controlled. For example, they are commonly used in the control systems of aircraft, where they are used to control the position of control surfaces such as the rudder, elevator, and ailerons.

Another use of servo motors is in the field of automation, where they are used to control the position and speed of robotic arms and other mechanical devices. They are also used in CNC machines to control the movement of the cutting tool and produce highly precise and accurate cuts.

In summary, servo motors are an important component of many electromechanical systems and are commonly used in robotics, automation, manufacturing, and aerospace industries due to their high precision, accuracy, and controllability.

ULTRASONIC SENSOR

An ultrasonic sensor is an electronic device that is used to measure distance by emitting high frequency sound waves and then detecting the echo reflected from a target object. The sensor works on the principle of echolocation, similar to the way that bats navigate and locate objects in the dark.



The ultrasonic sensor typically consists of a transmitter and a receiver. The transmitter emits a high frequency sound wave, typically in the range of 20 to 200 kHz, which is then reflected off a target object. The reflected sound wave is detected by the receiver and the time taken for the sound wave to travel from the transmitter to the target and back to the receiver is measured. Using the speed of sound in air, the distance to the target object can be calculated.

Ultrasonic sensors are commonly used in a variety of applications, including robotics, automation, and distance measurement. They are often used to detect the presence or absence of objects, as well as to measure the distance between the sensor and a target object.

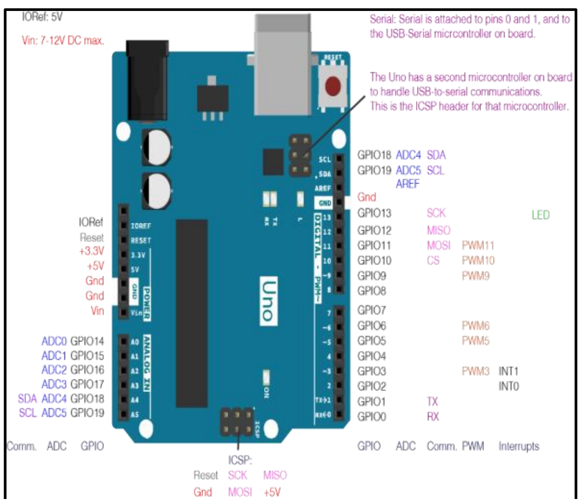
One of the main advantages of ultrasonic sensors is their ability to operate in a wide range of environments and conditions, including low light, dust, and smoke. They are also relatively inexpensive and easy to use, making them a popular choice for hobbyists and DIY projects.

Ultrasonic sensors are commonly used in robotics and automation applications for obstacle detection and avoidance. They can also be used in industrial applications for measuring distances and detecting the presence or absence of objects in production lines.

Overall, ultrasonic sensors are a versatile and reliable technology that is widely used in a variety of applications. Their ability to operate in challenging environments and conditions, as well as their low cost and ease of use, make them a popular choice for a wide range of applications.

ARDUINO UNO

Arduino Uno is an open-source microcontroller board based on the ATmega328P microcontroller. It has 14 digital input/output pins, 6 analog input pins, a 16 MHz quartz crystal, a USB connection, a power jack, and a reset button. The board is designed to be easy to use and can be programmed using the Arduino software.



SPECIFICATIONS OF THE ARDUINO UNO

- Microcontroller: ATmega328P

- Operating Voltage: 5V

- Input Voltage: 7-12V

- Digital I/O Pins: 14 (of which 6 provide PWM output)

- Analog Input Pins: 6

- DC Current per I/O Pin: 20 mA

- DC Current for 3.3V Pin: 50 mA

- Flash Memory: 32 KB (ATmega328P) of which 0.5 KB is used by the bootloader

- SRAM: 2 KB (ATmega328P)

- EEPROM: 1 KB (ATmega328P)

- Clock Speed: 16 MHz

The Arduino Uno board can be used for a wide range of projects, including robotics, home automation, and data logging. It is a popular choice for hobbyists, students, and professionals alike, due to its ease of use and versatility. The board can be programmed using the Arduino software, which is available for free download from the Arduino website. With the help of various shields and modules, the Arduino Uno can be extended to add additional functionality, such as wireless communication, sensors, and displays.

OVERALL CIRCUIT

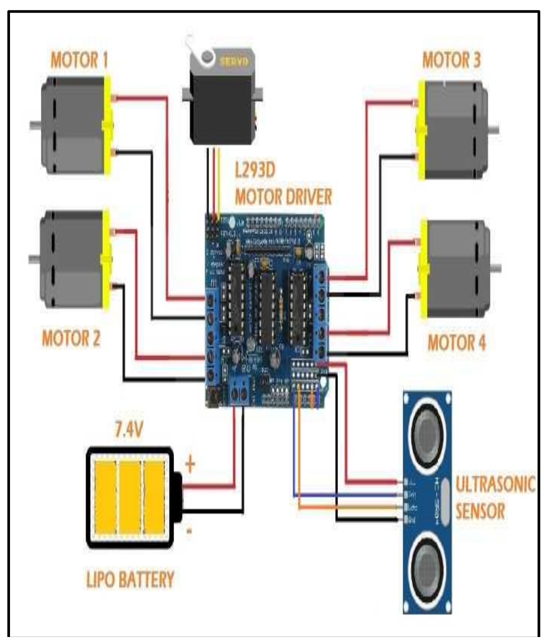
1. Identify the motor driver pins: There are typically 4 input pins on a motor driver that control the direction and speed of the motor. These pins are usually labelled IN1, IN2, IN3, and IN4.

2. Connect the motor driver power supply: The motor driver will require a separate power supply to power the motor. This power supply should be connected to the motor driver power pins, typically labelled VCC and GND.

3. Connect the motor to the motor driver: Connect the motor to the motor driver output pins, typically labelled OUT1, OUT2, OUT3, and OUT4.

4. Connect the motor driver to the Arduino: Connect the IN1, IN2, IN3, and IN4 pins of the motor driver to any digital pins of the Arduino Uno using jumper wires. Connect the GND and VCC pins of the motor driver to the GND and 5V pins of the Arduino Uno, respectively.

5. Write the code: Use the Arduino software to write a program that controls the motor using the motor driver and the digital pins of the Arduino Uno. The program should send signals to the IN1, IN2, IN3, and IN4 pins of the motor driver to control the direction and speed of the motor.



EXAMPLE CODE:

Controlling a DC motor using Arduino Uno and L293D motor driver:

```
// Define the motor driver pins
int in1 = 2;
int in2 = 3;
int in3 = 4;
int in4 = 5;
// Define the motor speed
int speed = 200;
void setup() {
// Set the motor driver pins as output
pin Mode(in1, OUTPUT);
pin Mode(in2, OUTPUT);
pin Mode(in3, OUTPUT);
pin Mode(in4, OUTPUT);
}
void loop() {
// Move the motor forward
digital Write(in1, HIGH);
digital Write(in2, LOW);
digital Write(in3, HIGH);
digital Write(in4, LOW);
// Set the motor speed
analogWrite(speed);
// Wait for 2 seconds
delay(2000);
// Stop the motor
digital Write(in1, LOW);
digital Write(in2, LOW);
digital Write(in3, LOW);
digital Write(in4, LOW);
// Wait for 1 second
delay(1000);
}
```

NOTE: THIS IS JUST AN EXAMPLE CODE, AND THE ACTUAL CODE MAY VARY DEPENDING ON THE MOTOR DRIVER AND MOTOR BEING USED.

RESULT:

The results of autonomous vehicles are still being studied and evaluated as the technology is still in development and has not been fully deployed on a large scale. However, there have been several promising results from testing and research, including:

1. Improved Safety: One of the main promises of autonomous vehicles is increased safety on the roads. According to some studies, autonomous vehicles have the potential to significantly reduce accidents caused by human error, such as distracted driving and driving under the influence of drugs or alcohol. However, there have also been some high-profile accidents involving autonomous vehicles, which have highlighted the need for continued testing and refinement of the technology.

2. Increased Mobility: Autonomous vehicles have the potential to increase mobility for people who are unable to drive, such as the elderly, disabled, and those without a driver's license. This could lead to increased independence and improved quality of life for these individuals.

3. Reduced Traffic Congestion: Autonomous vehicles can be programmed to drive more efficiently and smoothly, which has the potential to reduce traffic congestion and improve traffic flow on the roads.

4. Environmental Benefits: Autonomous vehicles could significantly reduce carbon emissions and improve air quality, as they can be programmed to drive more efficiently and to use alternative fuels.

5. Economic Benefits: Autonomous vehicles could lead to the creation of new industries and job opportunities, such as the development of new software and hardware technologies. However, there are also concerns about the potential impact on employment in the transportation industry.

DISCUSSION

The development of autonomous vehicles is a topic of great interest and discussion among experts and the general public alike. While there are many potential benefits to the technology, there are also significant challenges and risks that need to be addressed.

Autonomous vehicles have the potential to significantly reduce accidents caused by human error, which account for the vast majority of traffic accidents. This could save thousands of lives each year and reduce the economic costs associated with accidents.

In addition to safety, autonomous vehicles could also lead to increased mobility and improved quality of life for people who are unable to drive, such as the elderly, disabled, and those without a driver's license. Autonomous vehicles could also lead to reduced traffic congestion and improved traffic flow, which could save time and reduce frustration for drivers.

However, there are also significant challenges and risks associated with the development of autonomous vehicles. One of the main challenges is the need for continued testing and refinement of the technology to ensure safety and reliability. This is especially important given the high-profile accidents involving autonomous vehicles that have occurred in recent years.

Another challenge is the potential impact on employment in the transportation industry. While autonomous vehicles could lead to the creation of new jobs and industries, there are also concerns about the potential displacement of workers in industries such as trucking and delivery.

There are also legal and ethical issues that need to be addressed. For example, who is responsible in the event of an accident involving an autonomous vehicle? Should the vehicle prioritize the safety of its passengers over pedestrians or other drivers? These are complex issues that will require careful consideration and discussion.

In conclusion, the development of autonomous vehicles has the potential to bring significant benefits to society, including increased safety, mobility, and efficiency. However, there are also significant challenges and risks that need to be addressed before the technology can be fully deployed on a large scale. Continued research, testing, and discussion will be necessary to ensure that autonomous vehicles are safe, reliable, and beneficial for everyone.

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