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Gesture Controlled Automobile in Disaster Management

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Abstract: A smart vehicle which employs MPU6050 six-axis attitude sensor and primarily based totally on RF control for gesture recognition is designed. The vehicle is hooked up with gas sensor. After the digital recognition, the applicable commands are transmitted to the Arduino smart vehicle through radio frequency, which realizes the remote control of the smart automobile via human gestures to finish the corresponding command actions. The experimental effects display that this layout realizes the feature of controlling the course of the smart automobile via gesture changes. The motion trajectory of the vehicle can higher comments the motion of the hand; on the identical time, it additionally suggests that the gadget operates stably and has a sturdy anti-interference ability. This vehicle may be hired for catastrophe management. It senses the presence of toxic fueloline withinside the regions wherein the rescue operators put together to go. It passes the alerts to the rescue operator for taking important precaution.

Keywords— Arduino Nano, 434MHz RF Transmitter \& Receiver, HT-12E Encoder IC, HT-12D Encoder IC, MPU6050 (Accelerometer / Gyroscope Sensor); MQ-9 gas sensor module.

1. INTRODUCTION (*Heading 1*)

Now a days, the world is facing lot of disasters and calamities. Earthquakes and cyclones are such natural disasters. Along with these, occurs some industrial disasters such as explosions or chemical leakages. In such cases, entry to human being is very dangerous and restricted. But in such situations, it is necessary to rescue those people who got trapped inside the building (Figure 1). Its very dangerous that humans enter in such places or buildings, even with safety precautions.

Figure 1: Rescue operators involved in disaster management.

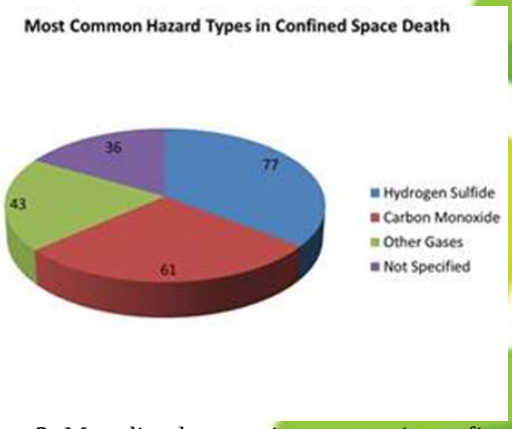

Figure 2: Mortality due to poisonous gas in confined space.

In many cases the increase in mortality rate in disaster struck areas is due to the confined space and poisonous gas in the area. Often the rescue team may also get trapped in such situations. The Fig 2 depicts the mortality rate due to hazardous gas in confined space. So the presence of such situation should be first identified for careful operation.

So, we designed an automobile system. This automobile will enter the restricted area or the area where disaster has occurred and check for the presence of any poisonous gas for rescue operations. It gives instructions accordingly, and thus we can plan operations accordingly. This automobile works as per our hand gesture.

The proposed car essentially carries circuits, car control circuit and a toxic gas detection circuit. In every circuit have a transmitter and a receiver circuit. In car control circuit, the hand gestures are transformed into electric alerts through the MPU6050 accelerometer sensor, and the Arduino Nano tactics the incoming alerts and sends it to the RF transmitter. In the receiving end, those alerts are acquired through the RF receiver and despatched to the Decoder for decoding. The Decoder, on receiving the alerts, actuates the cars through the motor driver. The gas sensor MQ-9 linked on Arduino Uno detects the offers of toxic gas and sends remarks to the rescue operators for fast action.

2. LITERATURE REVIEW

Zhexiang Zou et al [1] proposed a clever automobile that could perform stably by human movements, the usage of the advantages of data gloves . Xiaoyan Wang et al. [2] proposed The user's hand is detected using Adaboost algorithm with HOG features and tracked using condensation and partitioned sampling.] Stančić et al. [3] developed a powerful inertial-sensor-based system, worn by the user, alongside a microprocessor and wireless module for communication with the robot at distances of as much as 250 m. Li, Zhenwe et al [4] proposed consists of static gesture recognition based on Kinect vision and mobile robotic movement control. Gould, Sandy JJ et al. [5] We designed an interactive visual device to extract the events.] Ribeiro, Roberto et al. [6] proposed UAV interaction system via the interface in line with the task scheduling algorithm to facilitate sequential and rapid operation.] Muezzinoglu et al. [7] proposed a way in which the signal data acquired from the gloves had been processed with machine-learning-based techniques and labeled multi-mode instructions had been included in the human. Bonato et al. [8] proposed the improvement of the vision device is its integration to a mobile robot. Sanso et al. [9] proposed a device that gives each direct and inverse kinematics to govern the articulations. Wang et al. [10] proposed a layout to simplify the pose estimation problem, permitting us to employ a nearest-neighbor method to track hands at interactive rates.

3. PROPOSED MODEL

We propose a hand gesture controlled automobile that can be used in disaster management. It senses the presence of poisonous gas in disaster affected areas. It passes the signals to the rescue operator for immediate action.

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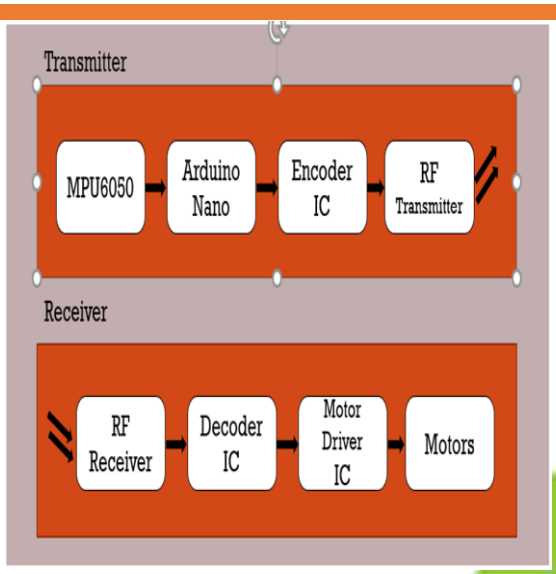

Figure 3: Block diagram of transmitter and receiver

This venture essentially carries stages, gesture managed car implementation and toxic gas sensing. Each circuit has a transmitter and a receiver circuit. In car control circuits, the hand gestures are transformed into electric indicators with the aid of using the MPU6050 accelerometer sensor, and the Arduino Nano procedures the incoming signals and sends them to the RF transmitter. In the receiving end, those signals are acquired by the RF receiver and despatched to the Decoder for decoding. The Decoder, on receiving the indicators, actuates the automobiles via the motor driver. In the toxic gas detection circuit, the sensor module linked on Arduino Uno detects presence of toxic gas and passes the statistics to rescue team.

4. DESIGN AND IMPLEMENTATION

The complete system may be divided into parts: the hand control end and the clever automobile control end. Among them, the software program layout is enter into every corresponding module based at the Arduino platform, and the hardware module is established at the clever automobile and the control glove, the two communicate through the nRF24L01 wireless module. The essential additives of the complete system are that smart automobile's central control chip, motor drive module, power supply module, infrared obstacle avoidance module, manipulate glove essential control chip, movement processing component, wireless module, etc. After the MPU6050 six-axis mind-set sensor collects the hand posture alternate records, it passes the records to the sports glove microcontroller through filtering and calculation. It should be mentioned that RF-NANO has a integrated nRF24L01 chip, so there's no need to put in a wireless module at the sports glove. The nRF24L01 at the control glove gets the signal. It then transmits it to the microcontroller of the smart automobile, the microcontroller of the smart automobile controls the motor to transport the car in line with the statistics from the control glove.

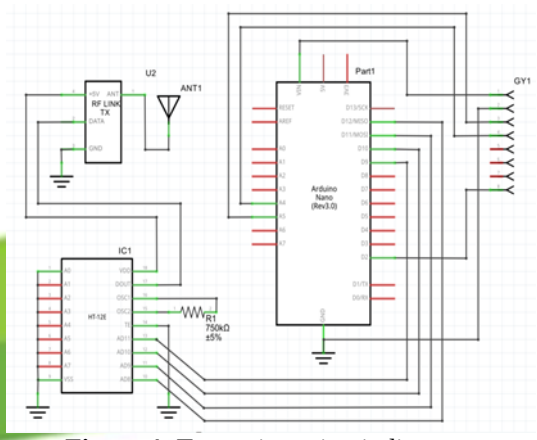

Figure 4: Transmitter circuit diagram.

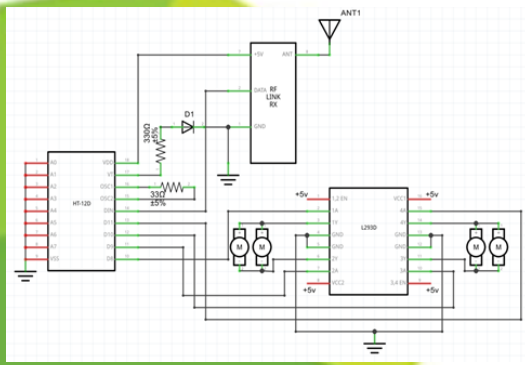

Figure 5: Receiver circuit diagram.

Figure 6: MQ-9 sensor

MQ-9 fueloline sensor has excessive sensitity to Carbon Monoxide, Methane and LPG. The sensor can be used to come across one of a kind gases consists of CO and flamable gases, it is with low price and appropriate for one of a kind application. The sensor set up on the car senses the presence of toxic gas . The

sign is fed returned to the rescue operator . An LED connected to the glove of the rescue operator is turned on while toxic gas is sensed.

5. RESULT AND CONCLUSION

Figure 7: Proposed Model

A hand gesture controlled automobile has been developed which also detects the presence of poisonous gas. The proposed automobile can move in the designed directions based on the operator's hand gesture. Due to its smaller size, the automobile can easily enter the disaster struck areas for first level of inspection. A LED module attached on the glove of the operator turns on when poisonous gas is detected by the automobile. The device can be utilized in disaster affected areas before the rescue operators start their mission. Necessary precautions can be taken for the successful completion of the mission.

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