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A Human Following Trolley

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ABSTRACT

Robotic technology has played a vital role in this moving world for the past couple of years. Such innovations were only a dream for some people a couple of years back. But in this rapidly moving world, now there is a need for robots such as 'A Human Following Trolley' that can interact and co-exist with them. To perform this task accurately, trolley needs to avoid obstacles and it must be intelligent enough to follow a person in a crowded area, rich environment, and indoor and outdoor places. The image processing carried out to get the information about the surroundings visually is a very important thing.Typically, human following robots are equipped with several different diverse combinations of sensors i.e., Multiple User (MU) vision sensor sensing modules, thermal imaging sensors, camera, wireless transmitter/receiver etc. These sensors and modules work in union to detect and follow the target. In this paper, a method of a human following robot based on tag identification and detection by using a camera. Intelligent tracking of specified targets is carried out by the use of multiple user vision sensors and modules. An intelligent decision is being made by the robot control unit based on the information 2 obtained from the vision sensors and modules, hence finding and tracking the particular object by avoiding the obstacles and without collision with the target is possible.

EXISTING SYSTEM

An intricate resolve-based technique is required for path tracking based on comprehending the surroundings and controlling the robot under different constraints. The autonomous vehicle consists of 4 ultrasonic range finders (sensors) mounted on the Skelton which is used to determine the distance between the user's leg and the robot, and detect the movement of the user's leg and move accordingly. Various experiments are considered to take into account different situations like different types of obstacles and the position of legs and obstacle detection are sent as notification to the user's phone using Bluetooth technology. Connectivity of the auto walker is also maintained using Bluetooth technology. User's phone consists of special android application where the auto walker can be controlled using the GUI of the application. Remote controller and the voice controller are embedded inside the android application. The robot makes its decision using if-else conditions and the speed is varied for smooth navigation. Human speech has become a specific key to influence a robot. In this system an android application is used to recognize human voice and is controlled through Bluetooth technology. This system can perform several studious on control style variants for robots. Findings show that it is indeed possible to learn to economically influence real world objects with voice (human voice) and remote as a control mechanism.

PROPOSED METHOD

Figure 1 shows the circuit diagram of human following trolley. It starts following when a human body is detected and stays idle when no human body is detected. The Arduino board is programmed using the Arduino Uno Software.

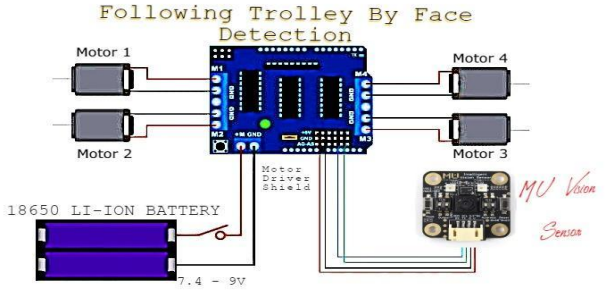


Figure 1. Circuit diagram of Following Trolley

MU vision sensor, motor driver shield, gear motors are used. When the MU vision sensor detects a human body it sends the signal co-ordinates, distance of the body and the frame rate per second (FPS) to the motor driver shield. Then the motor driver shield sends the signal to four gear motors which are controlled according to the movement of the human body.

COMPONENTS USED

The system design consists of various hardware components which are used for the construction of human following trolley.

i. MU Vision Sensor
ii. Arduino Uno
iii. Motor Driver
iv. Gear Motor

i. **MU Vision Sensor**

The MU vision sensors recognize and locate a variety of objects, such as colors, balls, humans and cards. The detected result can be an output through UART and IIC. It can process information locally without a network connection. In addition, the parameter configuration and firmware update of the module can be directly realized via the on-board USB serial port. The sensor supports UART, IIC, and WIFI communication modes.

ii. **Arduino Uno**

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

iii. Motor Driver Shield (L293D)

The L293D is a dual-channel H-Bridge motor driver capable of driving a pair of DC motors or single stepper motor.As the shield comes with two L293D motor driver chipsets that means it can individually drive up to four DC motors making it ideal for building four-wheel robot platforms.The shield offers total *4 H-Bridges* and each H-bridge can deliver up to 0.6A to the motor.The shield also comes with a 74HC595 shift register that extends 4 digital pins of the Arduino to the 8 direction control pins of two L293D chips.

iv. Gear Motor

A DC gear motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current in part of the motor.

RESULTS AND DISCUSSION

A plastic box is used as the body of the robot. Place the Arduino Uno along with motor driver shield L293D inside the plastic box and fix it with glue gun to stay firm inside the box. Then attach the gear motor outside the four corners of the plastic box. Then attach the MU vision sensor. When the MU Vision's detects a human body which is less than 15 in. The robot starts to move forward if the body turns left or right the robot also moves accordingly to the human body.The whole process is autonomous and Continuous. Different experiments were conducted, and the performance of the human following robot was tested. Each experiment that was performed took about 10 to 15 minutes. Based on results obtained from these tests and experiments the necessary changes in the processing and control algorithm are made. The figure 2 shows the working model of a human following trolley.

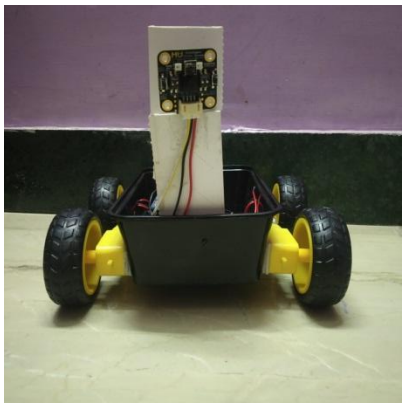
Figure 2. Human following trolley

Case 1: Following Trolley is Idle when no human body is detected

When the MU vision sensor does not detect any human body, the trolley remains idle until further human body detection.

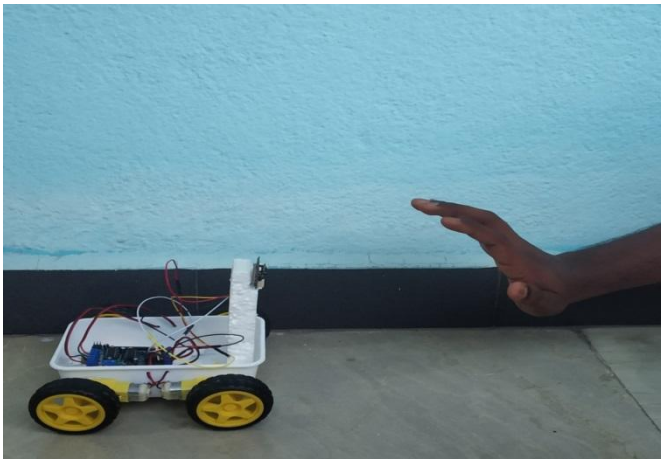
Figure 3. Idle state when no human body detected

Case 2: Following Trolley is moving when human body is detected



When the MU vision sensor detects the human body, it starts to move till it reaches a saturation distance of 15 in. If the human body turn's left or right the robot also turns according to the direction of the human body.

Figure 4. Starts moving when human body detected



CONCLUSION

The human following trolley is used to reduce the time and work in shopping malls. They are designed in such a way that it follows where ever you go. They are designed to replace the trolleys in super market and in shopping malls. It can follow a human whenever he or she moves. The project aims to develop an automatic human guided shopping trolley with a smart shopping system. This shopping trolley can lead a user to the item's locations in supermarket and he or she is able to know the items' locations through a shopping map. It will follow the user. Accurately - advance IR systems improve accuracy. With the aid of automatic human following leading functions portable robot, supermarket owners need only to purchase the portable robot and can easily install it under shopping trolleys. Users can then enjoy shopping without pushing the shopping trolleys themselves.

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