Intelligent Feedback Mobile Robot Control System using Multiprocessor

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Abstract: - In This paper a new methodology of using multi stage microprocessor has been used to enhance the robot technology. Managing the movement of the robot based on the information from the on-board sensor systems attached to the first microprocessor allowing the second microprocessor to optimize the movements of the robot. The system has been tested using robot with free movements in multi-dimension wheels

Key-Words: Robot, Mecanum wheel, Microprocessor, Sensor, Navigation.

1 Introduction

Currently, mobile robots are highly used in various fields of science and technology. Motion control of robots requires a wide range of tasks, which are basic for mobile robots [1-4]. Among these tasks: obtaining information about the environment coming from the sensor system, its transformation into a form suitable for use in the management, motion planning of the robot in a dynamically changing environment, and control of the robot, implementing a plan formed.

To solve these problems, the robot must have the necessary set of sensors and certain dynamics [5, 6, 7]. The most common robots discussed in the presence of a single microprocessor in control systems. which serves as the sensor interrogation and generating control signals to the actuators. This imposes on the speed limitation control system which limits the number of sensors that can be used in the system. This will reduce the reliability of the control system.

In this paper we consider a block diagram using multi-microprocessor system controls movement of the mobile robot, the first one of the microprocessors serves as polling of sensors and display information, the second microprocessor, on the basis of the sensor readings, generates control signals to the wheel drive motors . At the same time, in case of failure of one of the processors, which performs the function of sensors survey partly be possible to control a robot in a manual mode or in standalone mode using the earth's magnetic field sensor.

2 Problem Formulation and Robot Implementation

Managing the movement of the robot based on the information from the on-board sensor systems as well as external sources of information, information which comes from over the air. As an on-board sensor systems use ultrasonic distance sensors and a magnetometer. Further, in the autonomous mobile robot includes:

- Four reverse-collector motor with metal spur gear;
- Four-wheel rolikonesuschih Ilona;
- Two ultrasonic range finder HC-SR04;
- ATMega16 microcontroller (poll sensors and display of information);
- ATmega162 MCU (motor control);
- L293D drivers for controlling gearmotors DC;
- Bluetooth-radio HC-05;
- Infrared Motion Sensor HC-SR501;
- Piezoelectric transducer (buzzer);
- LED to control the robot mode and the lighting of the space in front of the robot;
- Battery;
- RC5 infrared receiver to control the robot via an infrared channel using the remote control;
- Intelligent sensor DS18B20 temperature;
- LCD alphanumeric display 16×4;
- Electronic compass HMC5883L.

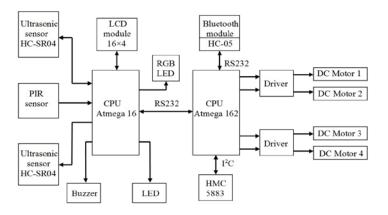Fig. 1 is a block diagram of the microprocessor control system of the mobile robot.

Fig. 1.The block diagram of the robot control system

Communication between microcontrollers is organized via the RS232 interface, which is due to the convenience of its use. Each microcontroller has its own network address, and control commands and Bluetooth-radio modem, which contains the address of the microcontroller for which they are intended. Fig. 2 shows the appearance of the designed autonomous mobile robot with free movement wheels. On the platform, you can also set the camera and equip the robot vision system to solve navigation tasks.
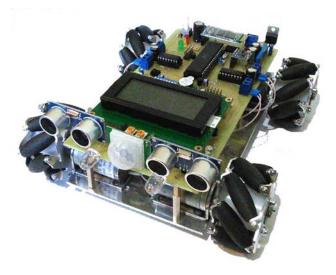

Fig. 2. Autonomous mobile robot on wheels rolikonesuschih

Using the robot in the educational process allows students to learn the principles of mobile robotic platform management with flexible wheels, developed a mobile robot. The features of the control system and the various laws of motion control robotic platform to learn the practical skills of programming of different types of mobile robot.

Using the robot can conduct research information as one of the sensors under certain conditions, a mobile robot, and at the same time collected information sensors of different modalities or several sensors of the same type. In the first case, the analysis and interpretation of the raw data are subject to the same physical type, in the second - it is necessary to use methods or multimodal multisensory analysis.

3 Conclusion

In this paper multi-microprocessors were used in robot control system. An implementation of this system is experimentally applied on wheels, so that it can move freely in the space. Presented robot has the ability to install on-board video camera, and can be used as a highly compact and unobtrusive means of remote exploration.

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