Software and Hardware to Control a Car Model Based on Dspace Controller

Gumeniuk P.O., Tokarchuk V.V., Lysenko R.I.

Abstract – **This paper describes an algorithm for a vehicle model avoiding obstacles. Also hardware was designed to test the algorithm and model's performance was coordinated with single-crystal high-performance controller dSPACE DS1104.**

Keywords: **vehicle model, ESP, dSPACE, ConrolDesk.**

I. INTRODUCTION

Computer-aided driving is an important issue in vehicle construction. To explore the possibilities of computer intervention into vehicle movement at the Department of automated management of production processes of Lutsk national technical university a software-controlled vehicle model was designed. The system includes RC model with remote control attached to the controller, which is connected to the PC motherboard via PCI. The controller dSpace DS1104 is used. Four relay are soldered to the remote control for transmitting current to move forward, backward, right and left. Software used for programming is MathLAB and ControlDesc.

II. COMPLEX DESIGN

Programming passed in two stages: in MathLAB route is given by language of block diagrams, as shown on Fig.1. Considering the peculiarities of hardware components and model's small weight voltage to motors is given by pulses to avoid excessive acceleration. After being turned on the model moves straight ahead, then turns right, moves ahead, turns left and moves ahead again. This type of movement was chosen as modelling of maneuver of avoiding obstacles on road by a real vehicle.

In ControlDesc environment route program is connected to the controller interface and launching element is added. ControlDesc sends MathLAB program to the hardware, namely through I/O channels voltage goes to the needed relay. A relay contact is closed on the remote control and corresponding signal goes from the remote transmitter to the model receiver. As a result, the model moves in the direction given by program.

As an input to the controller a saw-toothed signal was chosen, meaning a signal that increases to a certain limit and after accomplishing the limit takes value of zero. Constant 4 (Fig.1) is responsible for start and stop transmitting signals to the controller outputs. Afterwards by comparison operations and logical operators the algorithm of motion of the object is implemented. As seen from Fig.1 the model will be constantly moving forward and the trajectory of its movement will be similar to a sinusoid. Display outputs are given for visualizing the signal level at the output without downloading the program to the controller.

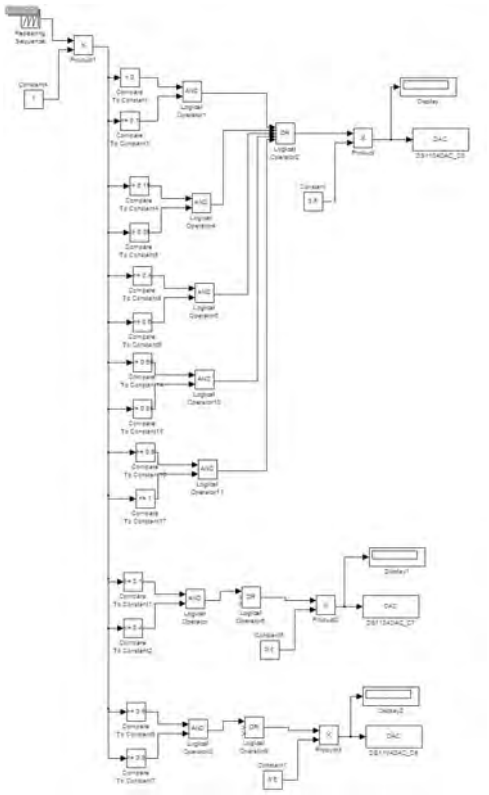

Fig. 1. Scheme logic of vehicle model movement.

Constant 4 is bound to checkbox and can take values of 0 or 1. Defining zero value signals will not come to the DAC output. The other three blocks correspond to the DAC outputs. Value 0.5 means 5V voltage at the output at this moment of time. Zero value means no voltage at the output.

III. CONCLUSION

This paper reviews connecting dSpace controller DS1104 to the mobile vehicle model.

REFERENCES

[1] Robert Bosch GmbH, Automotive Handbook. Bentley Publishers, 6th Edition.- 2004.

[2] dSPACE Software Installation and Management Guide.

Gumeniuk P.O., Tokarchuk V.V., Lysenko R.I. - Lutsk national technical university, Potebni st., 56, Lutsk, 43018, Ukraine
E-mail: nacacom@gmail.com