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A domain specific visual programming language for designing embedded systems

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A Domain-Specific Language (DSL) is a computer language specialized to a particular application domain. The Visual Programming Language (VPL) allows users to create programs by manipulating program elements or visual building blocks graphically rather than by specifying them textually. Today, we are using modern smart electronic appliances which are running on embedded systems to facilitate our needs. Also there are many industrial automation applications as well. In order to program these, the programmers need specific programming skills related to the different programming language for different hardware platforms. The aim of this research project was to design and develop a visual programming language for developing the embedded systems applications without depending on programming languages. Developed visual programming language facilitates graphical building blocks to interface different input and output devices with the existing embedded system. The proposed system use compiler theory and tools such as Lex, YACC etc. The top layer of the proposed architecture graphical UI consists of physical design, logical design and code view in order to reduce the programming complexity of the users. The intermediate layer consists of Intermediate code as a regular expression. The final layer of the proposed architecture consists of Lexical analyzer, Syntax analyzer and Code generator. The language of the proposed domain specific compiler use context free grammar derived based on a microcontroller preferably 8051 in the implementation. The results show that the behavior of above three layers produce zero error assembly codes which can be burned into the microcontroller. For example, when programming a digital UP/DOWN counter, the user needs to connect two push button switches as input devices and seven segment display as an output device in the GUI using the visual blinding blocks while providing the expected behavior in the logic flow according to the user's choice. Then the system generates relevant assembly language codes which are executed in the 8051 based embedded system. The main advantage of the proposed system is providing a user friendly, simple graphical user interface to program the complex embedded system applications rather than following complex programming languages given by different vendors for the different microcontrollers. At the implementation stage, 8051 microcontroller based embedded system platform is used. However, this system can be extended to program or reprogram the other microcontrollers as well without changing the front end GUI and the proposed architecture.

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