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**LOW-COST LABORATORY TEACHING KITS FOR  
AUTOMATIC CONTROL EDUCATION IN DEVELOPING  
COUNTRIES**

A PROJECT REPORT PRESENTED BY

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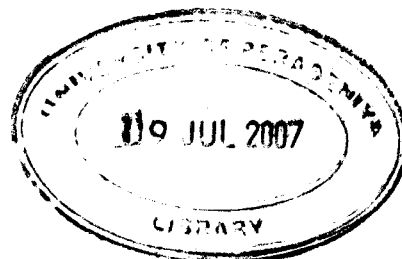
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# **LOW-COST LABORATORY TEACHING KITS FOR AUTOMATIC CONTROL EDUCATION IN DEVELOPING COUNTRIES**

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Automatic control is a subject, which bridges the gap between advanced mathematics and real life. Any automatic control course without a reasonable component of practical demonstrations is not going to suit its purpose. It is well known that off the shelf laboratory set-ups for control education are very expensive and also it is not possible to demonstrate many aspects of the subject using the same set-up. This has prevented most of the institutions in developing countries from offering automatic control courses with sufficient amount of practical demonstrations. In this project, experience of using both active and passive electronic components to build up low-cost system modules of different order and behaviour that can be used in control education will be presented.

In this project circuit components needed to implement a closed loop analog control system such as unity gain summers, PI, PD, PID controllers will be constructed in modular form. Being circuits biased with the same voltage levels, this approach will give a lot of flexibility for the user to connect different controllers to the same system as well as to connect different systems to the same controller and make fine tuning.

A second approach will be to build mathematical models of more complex systems and execute them in a computer having a Digital Signal Processing system. This will open up the possibility of controlling the mathematical model using the analog controller modules that are made initially. On the other hand, this PC based system will also opens up the possibility of implementing digital controllers and they can be used to control the system modules that are made initially.