



## Rural Education Development: A project of Govt.of India

### Abstract

The design, implementation and evaluation in setting up a remote laboratory for programming microcontrollers on an embedded web server residing over an ARM (Advanced RISC Machine) microprocessor based embedded system is proposed in this paper. The hex files or c codes generated with the help of various client machine IDE's (Integrated Development Environment) can be transferred to the server through the TCP (Transmission Control Protocol) port 80 which in turn programs the microcontroller attached to Raspberry Pi with help of various software tools like avrdude, mspware etc. The system is designed by setting up an Apache web-server over the Raspberry Pi Black single board computer. Client machines can access the server through the static IP address assigned. The evaluation of the remote lab is done by programming Atmel microcontroller remotely and by performing a webcam interface to Raspberry Pi thereby achieving video streaming, the real time video result can be viewed at the client end.

### Hardware used

1. Raspberry Pi 3 Model B UK version
2. Arduino UNO R3
3. Memory Card Class B 16GB
4. HDMI to VGA Converter
5. Power Unit
6. Motors
7. Computer Application



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8. GUI Creation
9. Sensors
10. Connecting Wires etc

## Software Used

1. Raspbian OS
2. Tkinter
3. Embedded Linux with Python

## Block Diagram

