

# Remote Automation Programming system using Rabbit Processor RCM3750

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**Abstract:** Embedded systems and evolution in electronics has made dramatic change in world. It is widely used in automation, process control, data monitoring, remote jumbo displays and many more. There are lots of manufacturers of such products in market. These products are installed at various locations around the country by particular manufacturer. One major problem these manufacturers face is if there is need of change of software at remote site, then one engineer need to send at that location to change the program. Our aim is to develop a system (RAP) with online programming download facility. Such "E-programmer" can be kept at remote end. This programme will be connected to Internet and program will be changed and downloaded in remote application unit from server (i.e. from anywhere in the world).

**Keywords:** RAP, E-programmer, RCM3750.

## I. INTRODUCTION

Embedded systems and evolution in electronics has made dramatic change in world. It is widely used in automation, process control, data monitoring, remote jumbo displays and many more. There are lots of manufacturers of such products in market. These products are installed at various locations around the country by particular manufacturer. One major problem these manufacturers face is if there is need of change of software at remote site, then one engineer need to send at that location to change the program.

Our aim is to develop a system with online programming download facility. Such "E-programmer" can be kept at remote end. This programme will be connected to Internet and program will be changed and downloaded in remote application unit from server (i.e. from anywhere in the world). Remote Automation Programming (also known as online Automation Programming, remote workbench) uses telecommunications system to remotely conduct automation programming, at the physical location of the operating technology. Remote Automation Programming allows users to perform tasks or change the task of the automated equipment by changing its programming, over the Internet without being near to the actual equipment. This facility provides an environment for remote users to do many automation tasks while using different controllers together with several types of sensors, actuators, and industrial communication networks.

The physical architecture of remote automation programming is designed for an easy and convenient up gradation, which converts automated equipment into a highly flexible and versatile tool which is able to do the required work. With the help of this remote automation programming technique we are able to upgrade system and able to remove the bugs from the automated equipment for the improvements in the automated system. Here, remote automation programming system uses the networking part

which is the interface between internet and the automation equipment.

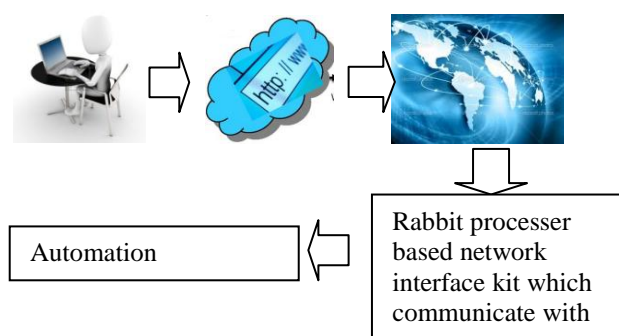


Fig 1. Overview of the Remote Automation Programming System.

Remote automation programming system consists of the client which produces the hex file of the program which we want to burn on the application. Remote user is connected to Rabbit processor unit through internet. Rabbit processor unit is connected to the automation application. Web browser is used to access processor unit which is connected to the automation application. This web browser gives the information about the automation application.

Automation programming code is written in programming tool, which on compilation generates hex file. Hex file is generated for desired automation application. Hex file generated is first tested for the desired application. Web browser has the option for resetting automation application which is required for burning hex file on target application. On resetting application unit hex file is send on the internet. Hex file will be received at processor unit. Rabbit processor unit then burn hex file serially on target application unit.

## II. II PROBLEM FORMULATION

In conventional systems if we want to modify, update any application by changing its code of circuit, we have to manually approach the application site and change it accordingly. In this conventional system human work, time, cost is unnecessarily getting wasted and so as the stopping of application for long time takes place which is not at all desirable for any industrial automation application because it can lead to tremendous amount of loss in applications having higher production rates.

The proposed work is introduced to overcome this drawback of conventional system. The proposed system will reduce the unnecessary wastage of time, cost and human labour by smartly adapting to the fault which is unlikely to conventional system. The system will smartly change the code of circuit on the move to adapt to the required task dynamically.

### Objectives:

1. To take the requirement of application user ( if there is fault or modification to be done in application)
2. To check the current code of application
3. To diagnose the fault if any
4. To modify the code according to requirement or update if to be updated
5. To make the application controller in program mode using website interface which we have created
6. To wirelessly transmit the hex file to rabbit processor through internet
7. To rabbit processor will burn that file in corresponding application controller

### Methodology:

In the proposed system, first of all the requirement of application is considered. And as per the required task program code is changed. Program code will be written for required task in programming tool at client pc. The hex file generated after compilation it will be tested for required application. After testing it for required task hex file will send through the internet. Client at remote location access the rabbit processor controlling assembly through a VB program. On the web browser there will be interface for controlling application controller for burning code on it. The options will be program mode and reset mode.

## III. WORKING OF PROPOSED SYSTEM

At remote unit we will keep E-Programmer kit with application unit. The E programmer will consist of Rabbit Micro Controller. This will control the all necessary action required for program downloading into application unit. It will establish Internet link with the server and also control reset and other necessary circuit required for programming, and download the program in application unit

The block diagram of a proposed system is as shown in fig.

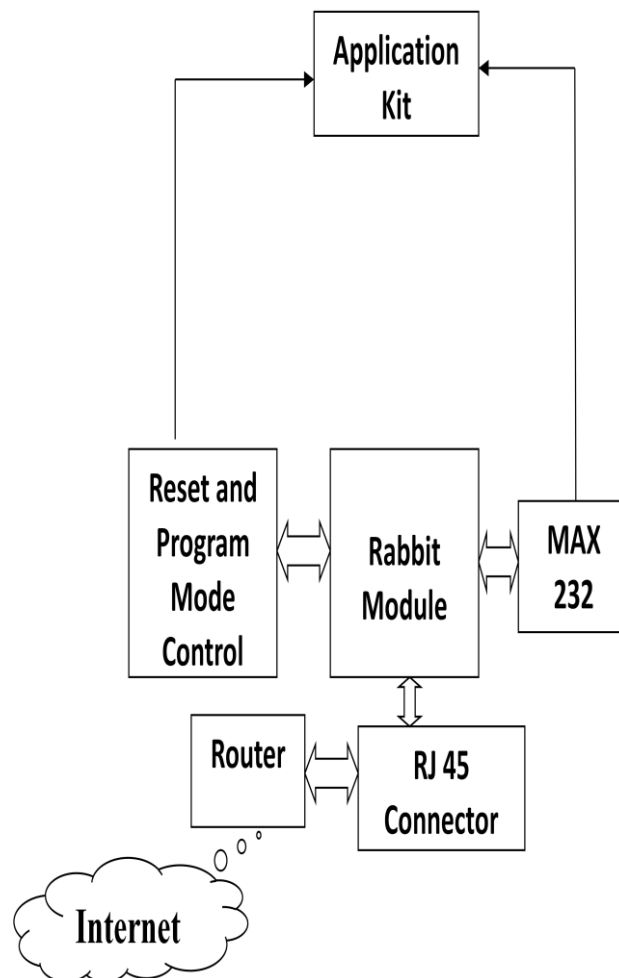


Fig 2. Block Diagram of Remote Automation Programming system

### 1. Description of block diagram:-

This remote automation programming system will work in to three parts, one part will be programmer connected to internet, second part is connection between internets to rabbit processor unit, and third part is interfacing of automation application to rabbit processor unit.

#### 1.1 CLIENT UNIT

In this system programmer will write a program code for automation application. Generated hex file will be sent on internet through Visual Basics. Programmer will communicate through web browser with help of rabbit processor assembly IP address. Web page will have options for controlling automation application.

#### 1.2 CONTROLLING UNIT

In this system rabbit processor assembly used to perform all the tasks. It is used for networking. It acts as gateway

between application and internet. Client at remote location do programming of desired task and generate hex file. Then through internet client gets connected to controlling assembly through networking and send hex file to it. Hex file received at controlling unit is ready to burn on the automation application. Hex file received is loaded in to application serially. Controlling circuitry will interfaced with Rabbit processor assembly. Controlling circuitry controls operation of program mode/reset mode for burning program on application.

### 1.3 AUTOMATION APPLICATION UNIT

Third part will be automation application part. Application will be interfaced with rabbit processor assembly. Controlling circuitry also interfaced with rabbit processor for controlling operation of serially loading program in to the application. Automation application will communicate with rabbit processor through MAX232 logic converter. In our project, application unit is taken as combination of master and slave unit, as shown in figure below.

Application Unit: Slave unit:

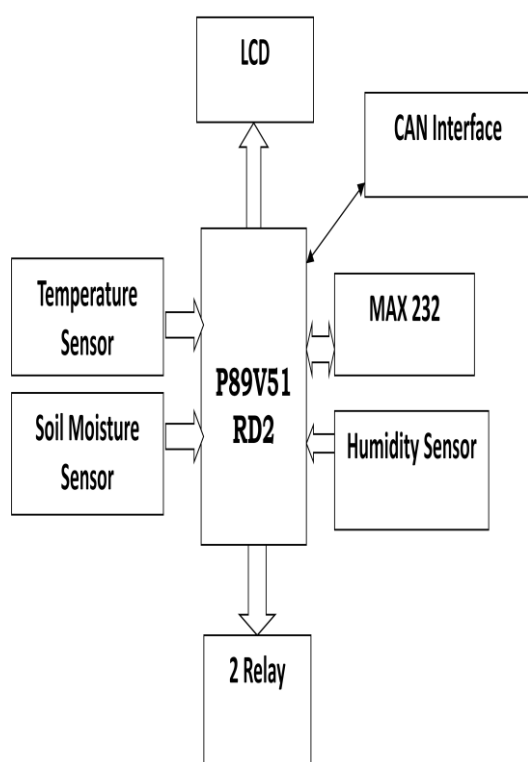


Fig 3 a) Slave unit

Slave unit consist of P89v51RD2 microcontroller, temperature sensor, soil moisture sensor humidity sensor, relays and LCD. In which all the sensors are connected to the controller and respective readings are taken and processed. We can connect this controller directly to the Rabbit processor also but here we have treated this unit as a slave unit (fig 3 a) and is connected to the master unit through CAN interface.

Master Unit:

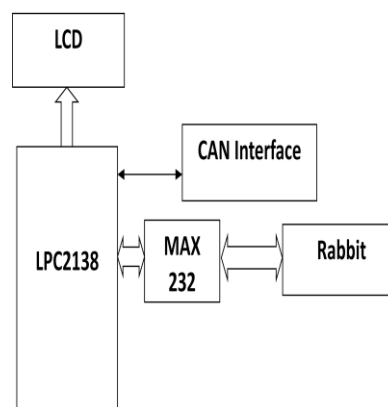


Fig 3 b) Master unit

Master unit consist of ARM7 Micro Controller- LPC2138. Rabbit processor is connected to ARM7 through MAX 232 as shown in figure above.

The application code is downloaded in a application unit using Rabbit processor. After downloading of hex code, the output after changing the code will be available at server end in the VB form.

### ❖ FACILITIES REQUIRED FOR PROPOSED WORK

#### 1. Hardware Requirement:

- Rabbit Micro Controller- RCM3750
- ARM7 Micro Controller- LPC2138 (Application unit)
- 8051 Microcontroller- P89V51RD2
- Max 232
- 16X2 LCD
- Temperature Sensor
- Soil Moisture Sensor
- Humidity Sensor
- Relay
- Power Supply
- Internet Connection with router and modem etc.

#### 2. Software Requirement:

- Embedded C for Micro Controller
- Flash magic for program downloading
- Dynamic C for Rabbit Programming

### IV CONCLUSION

Remote Automation Programming allows users to perform tasks or change the task of the automated equipment by changing its programming, over the Internet without being near to the actual equipment. This facility provides an environment for remote users to do many automation tasks while using different controllers together with several types of sensors, actuators, and industrial communication networks. With the help of this remote automation



programming technique we are able to upgrade system and able to remove the bugs from the automated equipment for the improvements in the automated system. As in conventional system human work, time, cost is unnecessarily getting wasted and so as the stopping of application for long time takes place which is not at all desirable for any industrial automation application because it can lead to tremendous amount of loss in applications having higher production rates. Hence it is better to use online program downloading kit to avoid inconvenience as in conventional system.

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