Remote Control Microscope for Research using Internet

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***Abstract*- Now-a-days internet is spreading widely in every corner of the world. So communication become faster and easier. Network technology makes possible instant communication over great distance and it can control the device in remote place in real time. Particularly, the broadband internet achieves high quality image data as well as other data transmission. Many people anticipate that various devices can be connected to networks easily. In the area of distant learning, search is going on for different ways to provide more hands-on time for students in an efficient, flexible and cost effective manner. This is especially true for engineering departments that may have limited access to labs with higher cost equipments. There is one solution which pulls attention that is use of remote access to equipment. Many of today`s instruments have built in networking capabilities, which allow them to be accessed all the time. To this end we are planning to develop a Remote Control Microscope that will be beneficial for students to operate the microscope from distant areas.**

1. INTRODUCTION

The widespread availability of local area network enabled different teaching techniques. The idea is to develop Remote Control Microscope for research using Internet which will allow a distant student who has internet access to operate the microscope in real time. To perform an experiment student has to present in the laboratory physically. It is not possible to provide expensive instruments in every laboratory. Particularly for microscope, transportation of specimen under observation is time consuming as well as it increases cost. It is possible virtually to see outcomes of operations using simulation software. Unlike virtual web simulations, remote access gives student hands on experience with direct control over test instruments. The aim of "Remote Control Microscope for Research using Internet" is to design a DAS (Data Acquisition System) which can be connected to any type of computer serial port giving the user flexibility of selection of desired number of channels for data acquisition and the instrument (in this case microscope) can be operated by remote operator with least complexity and cost.

2. SYSTEM ARCHITECTURE AND IMPLEMENTATION

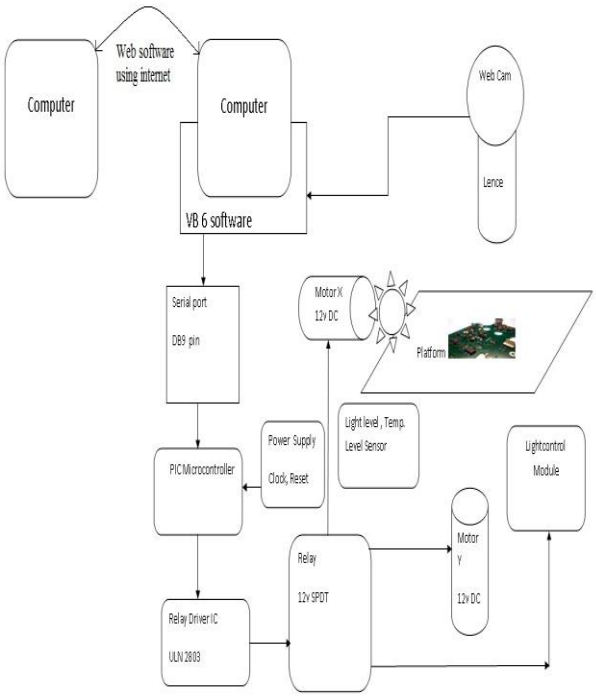

Fig.1. Proposed System Block Diagram

In this project webcam is attached to lens of microscope which will capture the image information of the object under specimen and send it to the local computer. A user friendly screen is to be generated on the local computer with the help of Visual Basic software. Commands UP, DOWN, RIGHT, LEFT and LIGHT LEVELS are to be displayed on the screen, The local computer send commands to connected microcontroller (PIC16f877). PIC controller is to be interfaced with relay driver which is connected to motors attached with lens and slide for movement in vertical and horizontal direction respectively to adjust the focus of microscope. Relay driver is also to be interfaced with light control module for change in light intensity. According to commands given to PIC controller it will generate output which will responsible for the movement of lens and slide and change light levels in light

control modules. The Team Viewer software is to be used to connect local computer with remote computer via internet. The remote operator has to give commands through keyboard. Accordingly microscope will be focused to see specimen under observation.

A.PIC 16F877

PIC microcontrollers are a family of specialized microcontroller chips produced by Microchip Technology in Chandler, Arizona. The acronym PIC stands for "peripheral interface controller," although that term is rarely used nowadays. A microcontroller is a compact microcomputer designed to govern the operation of embedded system in motor vehicles, robots, office machines, medical devices, mobile radios, vending machines, home appliances, and various other devices. A typical microcontroller includes a processor memory, and peripherals.

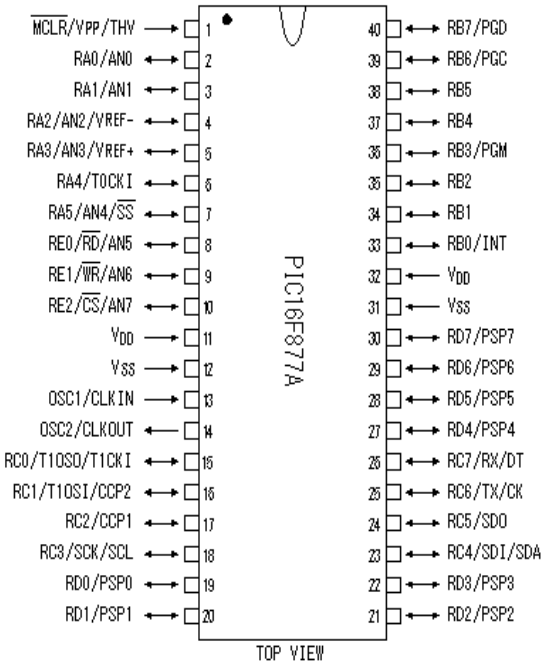

Fig.2. Pin Configuration

The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI) or the 2-wire Inter-Integrated Circuit (I^2C) bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

B. Webcam

A camera is a device that records images, either as a still photograph or as moving images known as videos. This is used in the microscope to capture the image information of the object under observation. And it is transmitted using a carrier signal. On the receiving end it is converted to video signal. It has a range of 70-100Mts with no line of sight.

C. Relay Driver IC ULN2803

A ULN2803 is an integrated circuit (IC) chip with high voltage / high current Darlington transistor array. It allows interfacing TTL signals with higher voltage / current loads. The chip takes low level signals and acts as relay of sorts itself, switching on or off a higher level signal on the opposite side..

3. CONCLUSION

The Remote Control Microscope for research using Internet is the idea studied and explained in this paper. Further part is to implement this. This system is intended to allow students to operate on real processes without being present in the laboratory. While the experiment is running, it might be possible to change controller parameters.

4. FUTURE SCOPE

1. Future enhancements include a migration to a more automated research microscope so that objectives can be changed by remote control; this is solely a function of the microscope platform used, as the programming features necessary to send the commands already exist.
2. In addition, the image resolution will be improved upon. There is also the need for an on-demand digital image capture function. This would provide a high-resolution capture that can then be used for image analysis.
3. Work is in progress to upgrade the system with new MIMO processes. As far as system security is concerned, more advanced tools can be used.

5. ADVANTAGES

1. The system allows for collaborative work to be done by researchers at different sites.
2. It allows for immediate feedback on scientific issues, it allows for work to continue irrespective of time differences between sites; and it is easy to use.
3. While not designed to replace larger, expensive, high-resolution systems currently, this system can be a very cost-effective solution to allow a group of people to view the work from their own work areas, rather than one location, at any time of the day or night.

6. LIMITATION

1. The foremost is the unpredictability of data delivery over the internet. Slow networks can make remote usage and visualization waste of efforts and tim
2. We have not stressed the security issue in the system in great detail. Since the system works in an academic environment and the security is not the important issue

7. REFERENCES

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