Chhatrapati Shivaji Institute of Technology, Durg
Computer Science & Engineering Department
Semester – 8th
Section - B

Programmer's Keyboard

Major Project Presentation

Presenting a brief idea of our project, proposed by
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Contents

Abstract

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Designing and building of a *keyboard* with those feature which helps in speeding up the programmer or say to coder to do coding on the respective IDE editor window.

Overview

Overview

- This project is partly based on embedded systems and rest of the part is software based.
- Special key sets are provided which are dedicated to do specific task.
- This project is been developed keeping the programmers as our audience.
- This project has been developed in two languages, C++ and C#.

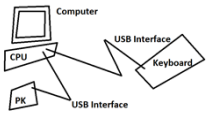
Overview

- This project is not been developed as per IEEE, FCC(Federal Communication Commission) Electronics specification.
- This keyboard having an USB interface to connect with your system.
- A software will been developed for rendering this keyboard from your system.

Challenges

Challenges

- To provide such an interface which is from current technology. One of them is USB(Universal Serial Bus).
- The key arrangement.
- The monitoring control unit.
- How we can implement the same without any kind of special control system, instead, just using simple logic gates and registers etc.
- Communication from our device to computer.



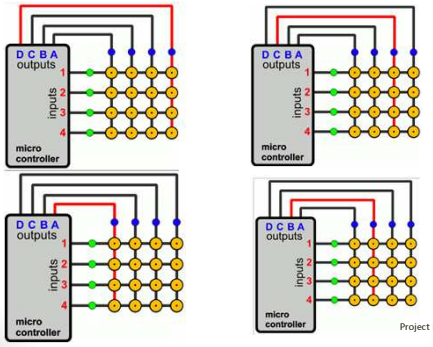
Methodology

Methodology

- **Hardware Modules**
  - Keyboard Module
  - Controller Module
- **Software Modules**
  - Software in C++ using WinAPI.
  - Software In C# .NET.

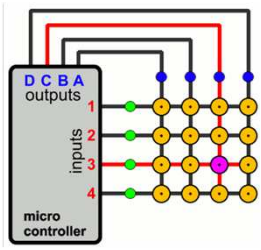
Methodology

- **Keyboard Module** along with controller connection…



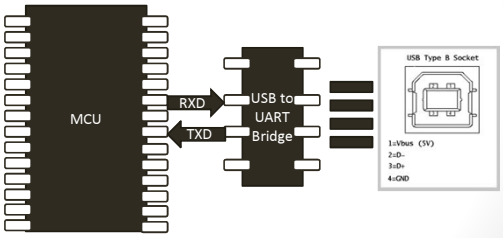
Methodology

- **Keyboard Module** along with controller connection…



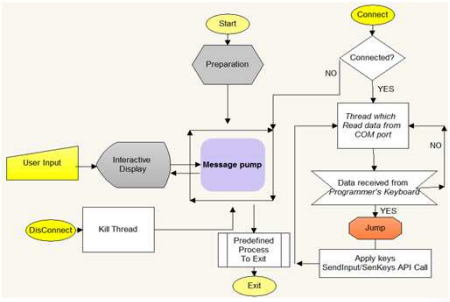
Methodology

- **Controller Module** along with serial communication connection



Methodology

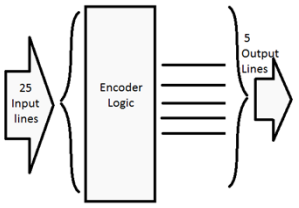
- **Software front**



Solutions

Solution

➢ **To make the same without MCU and USB to UART bridge…**



O1 = A+C+E+G+I+K+M+O+Q+S+U+W+Y.
O2= B+C+F+G+J+K+N+O+R+S+V+W.
O3= D+E+F+G+L+M+N+O+P+T+U+V+W.
O4= H+I+J+K+L+M+N+O+X+Y.
O5= P+Q+R+S+T+U+V+W+X+Y.

➢ To derive an encoder logic.

Solution

➢ **To communication of MCU with computer**

- Few more hardware required –
  - One 8-bit parallel in, serial out shift register chip-
    - This takes 5 input lines parallel and put the same data out in serial way.
    - Still 3 bits left, consider as *don't care*.
    - Requires a clock tick to push serially data out from chip towards computer port and get it register on computer's port buffer.
- Case-
  - Computer peeks onto port buffer for any data except 0x00f.
  - Iff any button pressed-
    - For once and for first time, a high signal shall be issued over D+ line and negative of the same too over D-.
    - The point when the software program finds a change in port buffer, it then recognised as ***START*** of the communication.
    - XOR the computer's port buffer with 0x00f data.
    - For next 8 cycles…
      - From computer, D+ carries a dummy HIGH signal to give a clock to parallel-in-serial-out sift register and over same channel D+, one by one bit will be transferred in to computers port buffer by ORing the value with previously stored data in computer's port buffer.

Solution

➢ **To communication of MCU with computer**

- The final value so obtained in the computer's port buffer will be in binary format indicating the n^{th} number of key is been pressed!
- Immediately XOR the computer's port buffer with 0x00f for clearing the buffer.

- Put a voltage inverter will put the mirror of D+ in D- BUS line for correct communication as per USB data communication protocol.
- Place a fuse on D+ and D- line for eliminating noise and have strong strength of data in BUS lines.

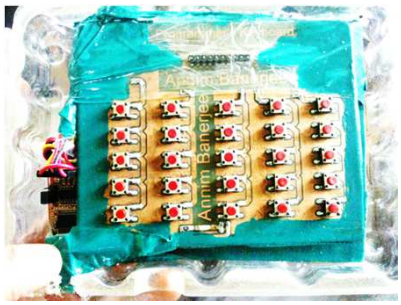
➡ **Protocol to call for communication to happen-using Serial port DB9, RS232 technology…**

- With this port, we got one more signal BUS line and that is DTR signal which stands for ***Detect-To-Ready*** signal which acts as ***RESET*** signal for any MCU or any digital system. NOTing to this signal will be better in terms of usage.
- Case regarding this technology is quite similar to USB technology based theory-protocol. We shall send a DUMMY ***START*** signal to computer from DTR BUS line and over software end, program will constantly pulling LOW. If found HIGH, that indicates a START condition and rest goes the same. This DTR will be used to give a clock tick to parallel-in-serial-out shift register to get the data bits out from it.
- The TXD line of DB9 pin shall be used to put data from keyboard to computer's port buffer.
- A voltage doubler of +10V circuit will be required to put data which will be evaluated for validation purpose by the PC.

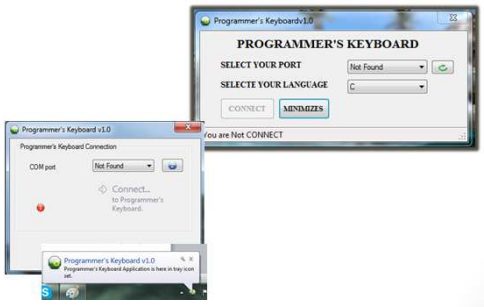
Results

Results

Results



Results



Scope

Scope

- The USB module should be included in the circuitry of controller board with best suitable USB-to-Serial converter chip.
- Can be converted into a normal workable keyboard with 102, 104 keys.
- Can be converted into a controller for specific game.
- A good logic should be developed to replace the controller, i.e. MCU from the project and also UART communication can be re-designed by using very simple TTL logics. A small mechanism is been shown which might replace the MCU and also the USB-to-Serial converter chip, but this will be an experimental.

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