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| [LAB PROJECT] | MADAM SAEEDA |

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| de-32 dce syn-a | semester project algorithms and computing **operating remote controlled car from keyboard** |

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# INTRODUCTION

This project was about operating a remote control car by using an input device connected with a computer, for this purpose we had to connect the remote of RC Car with the computer so that when we operate the computer, remote would start its function and car will be operated. Therefore at the same time we had two grounds to play one was software development and second was hardware interfacing. It was never an easy task to perform with our limited knowledge and short time span available to us for this project. Still we managed to complete the task because of dedicated team work of all team members.

# BACKGROUND

The idea of this project came from an engineer of DISNEY LAND who worked on the same theme years ago but with more complex and precise circuitry and calculations thus making DISNEY LAND more and more famous. As in field work a Computer Engineer has to work on both hardware as well as software so basic objective of choosing this project was to get used to of working on hardware and software at the same time. While working on the project we discovered that how seniors can prove to be of great value in terms of their experience and knowledge.

# PROJECT GOALS

As already mentioned there were two basic parts of this project

1. Hardware interfacing
2. Software development

In order to connect the remote of RC Car with computer we used LPT1 commonly known as Parallel Port. This parallel port was connected to a cable just like the one used to connect a computer with a printer except that its farther end was connected to a Gender Converter for making the circuit work effectively. This cable was then connected to the remote through a circuit that we to worked on.

In the other part of project we had to build an application that could take an input from the user and control the parallel port voltage according to input.

# PROJECT TEAM

All four team members worked on equal level to the best of their skills. To keep the work organized we distributed the work so to make the efforts more and more effective. Umer Javaid being good in electronics work took the responsibility of handling the hardware, Qalab E Abbas had the job of providing us with all the required hardware although it was a panic yet he did his job well, Taimur had to search in library and internet all the related stuff in order to figure out an effective circuit. Burhan had to do all the textual stuff like making of project report and discuss the new ideas for project. None of us was exceptional in programming so we decided to work mutually in the area of software development.

# PROJECT PLAN

Almost all the things were new to us because we had never worked on parallel port before. Similarly we had never designed any circuit or made any Windows application on Visual C++ 6.0. Therefore before the start of work we had to arrange for all the stuff like an RC Car and things used for hardware work. Then we had to study the functionality of remote and design an appropriate circuit for that. As a final step we had to develop a program to control voltages across the Parallel Port.

# PROJECT DETAILS

There were many stages of the project so we will discuss them step by step.

## STAGE-1

There are two types of remotes available in the market.

1. One uses a physical short circuiting and open circuiting to control the device.
2. Second uses variable resistances for the same purpose

After analyzing the circuitry of remote we discovered that our RC Car used the first method to operate. Therefore we now had the direction to work in circuit design.

## STAGE-2

We used bread board to work on the circuit. In the circuit we used transistors which were so connected that they would work as a switch in the circuit. We used an n-p-n transistor in which Base was connected to the cable where as Emitter and Collector were connected to the circuit. This configuration is commonly known as use of transistor as a switch.

Figure i

The circuit works such that when a signal is provided at the base, it will act as a short, making the circuit complete and allowing the remote to operate the object accordingly.

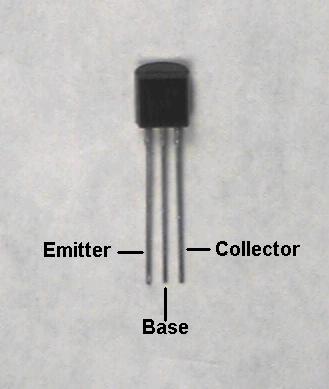
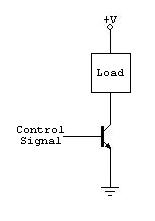


Figure iii

Figure ii

In order to have check on the performance of circuit and avoid any confusion in case of malfunction we connected LED’s with each transistor so that when a voltage is provided to the base of a transistor, LED will glow to show that which one of the four transistors is functional. Therefore we can also know immediately about any error in circuit by looking at LED’s.

## STAGE-3

In the third stage we had to make a program to access the parallel port using C++. At this stage we realized that most of our instructors and seniors had only one advice for us and that was to use Turbo C. This seemed to be very unrealistic approach that developers of C++ had not made it to be able to make an application of windows. So we had a real hard time in finding the answer to this question. After we had lost all hope we accidentally came across a header file that was meant to be used for accessing parallel port C++.

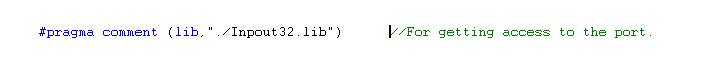


Figure iv

The above file accessed the port directly so there was no further need of programming on Turbo C.

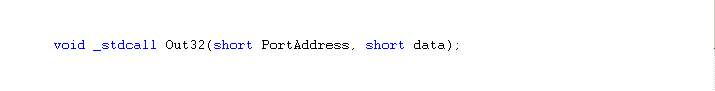
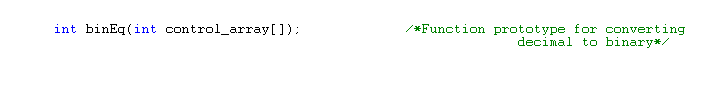
The above function, out32 was used to send the data to the parallel port.

Figure v



The above function binEq was used to convert the input into a decimal number.

Figure vi

This decimal number had then to be converted to binary by parallel port itself. Therefore the decimal number had to be such that it would result in an appropriate output at the desired pin of parallel port.

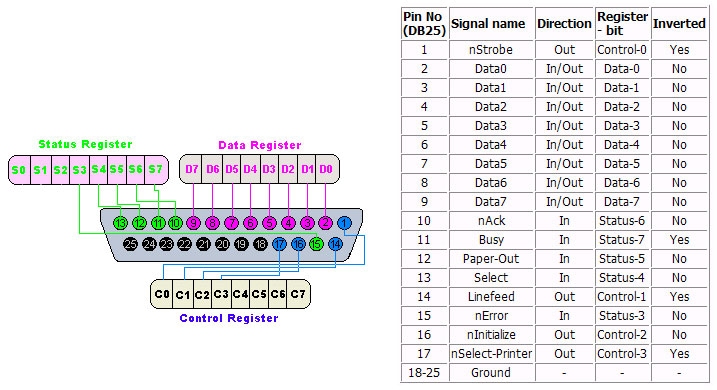


Figure vii

The same output will appear at the end of connecting cable thus providing voltage to the base of transistor.

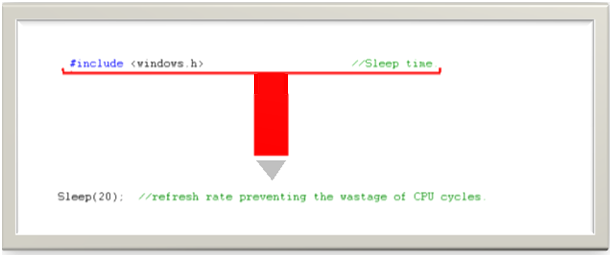


Figure viii

The above figure shows the use of another header file windows.h for win32 applications. This file was included because we had to use its function “Sleep()” which is shown in above figure. The sleep function provides two advantages

1. It makes sure that cycles of c.p.u are not wasted
2. Screen refresh rate is slower so the input given by user is also readable

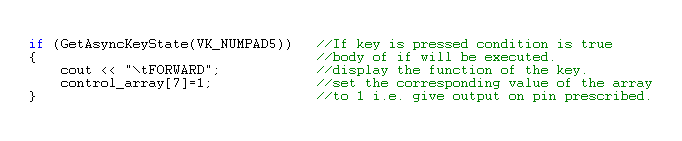


Figure ix

This code was used to check if a button was pressed by the user or not and if the button was pressed the array initialized in main function would get the assigned value and the further steps would take place as mentioned earlier.

# SCREEN SHOTS

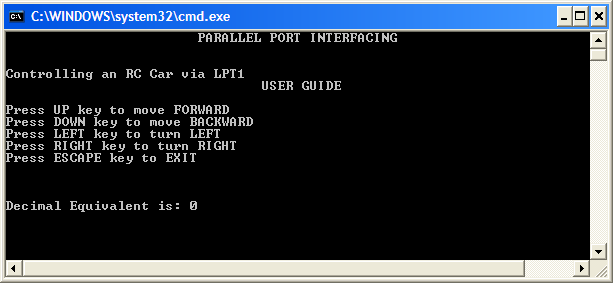


Figure x

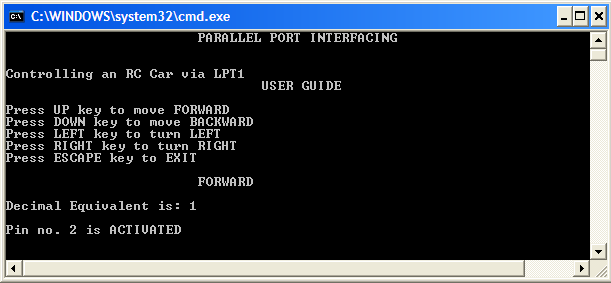


Figure xi

# RESULT

We made various circuit on WARROW BOARD, PRINTED CIRCUIT BOARD & BREAD BOARD, finally the last one worked. We also tried to use a BUFFER to make the circuit work more effectively but it did not work so we had to remove that from our circuit design. Similarly we used <conio.h> to get input from user but then discovered a better and more effective way to watch over the control keys in the form of

GetAsyncKeyState(VK\_key name).

# CONCLUSION

Things related to circuit were really problematic but as a result we learnt a lot. We came to know about the use of transistor as a switch and also realized that the project which seemed too difficult in the beginning was a source of speedy learning and confidence building along with the improvement in our team work abilities. Generally speaking I can say that this project was a great source of learning for all of us, it also built our interest in working on more projects related to our daily life.

# REFERENCES

1. <http://msdn.microsoft.com/library/default.aspx>
2. <http://www.electronics-project-design.com>
3. <http://en.wikipedia.org/wiki/Wikipedia>
4. <http://www.codeproject.com/kb/cpp/>

***The end…***