# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Aram A. Acemyan

**Project Number**
**S1201**

**Project Title**
## Can a Robot be Taught?

**Abstract**

**Objectives/Goals**
My project covers robotics, programming and Artificial Intelligence. The amount of applications on a subject like this is unbelievable. My project specifically illustrates the ability of a robot to find its way through a path, record it, and return the information.

**Methods/Materials**
For this project I built a robot, a maze, and the program. The program acts as a list of instructions for many difficulties that the robot will have to endeavor. The program controlled a Basic 2 stamp. The stamp was connected to three IR sensors that were used to detect walls. The program used the data and recorded it.

**Results**
Through tests i was able to see that the robot was unable to move in a straight line, this was caused by the servo tolerances on the motors, which caused a variance in the speed. The robot was able to complete the maze, record it, and repeat it without its IR sensors.

**Conclusions/Discussion**
In the end the robot was a success it had run the maze and learned it, and it was able to use its memory to navigate blindly. This shows that the robot was able to learn and that the Artificial Intelligence was a success.

**Summary Statement**
A robot will attempt to navigate a maze, remember it, and use its memory to repeat the course.

**Help Received**
Brother helped build the maze.

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Aaron Adelson; Brian Tannenbaum

**Project Number**
S1202

**Project Title**
## A Computer Model of Human Perception

**Abstract**

**Objectives/Goals**
The goal of this project was to write a computer program that would be able to solve a simple letter analogy based on human perception. For example, if the program was given "ABC is to ABD as IJK is to what?", then the program will return an answer for "what", such as "IJL" or "IJD".

**Methods/Materials**
A programming language known as Scheme was used to create and compile this program. The progeram uses human ideas and links between them in order to make connections between the letters, known as perceptual structures. Small programs called "codelets" use these ideas to make the connections between letters. All of this happens in the "workspace" of the program.

**Results**
The program was able to build mental connections between the different letters in the analogy. However, the program never fully translated an answer.

**Conclusions/Discussion**
The program was not able to run completely due to programming errors that prevented it from finishing. The program must be debugged before it can be used.

**Summary Statement**
This project is about using computers to model human perception in solving letter-string analogies.

**Help Received**
Teacher and high school senior helped mentor and to understand program logic and syntax.

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Roger A. Billingsley

**Project Number**
**S1203**

**Project Title**
# Probing the Impact of Man's Genetic Manipulation via Computer Modeling

**Abstract**

**Objectives/Goals**
The objective was to create a computer model to probe the consequences of a recessive, sex-linked deleterious or lethal gene being introduced into a population.

**Methods/Materials**
Developed a computer model using the IBasic program on a Dell laptop computer. Model assumed the simultaneous introduction of seven fruit flies with a recessive, sex-linked lethal gene into an uncontrolled population. Modeled ten independent accidental introductions. Model was used to determine whether gene would survive at a significant rate after nine generations.

**Results**
Three out of ten times, the fruit flies with the gene were killed off during the first generation, eliminating it from the population. In the other seven runs of the model, the gene had survived and was present in a large percent of the population. The number of fruit flies with the gene after nine generations ranged from fifty thousand to one-hundred sixty thousand.

**Conclusions/Discussion**
The gene will decimate the fruit fly population seventy percent of the time if it occurs in seven fruit flies simultaneously. However, the odds of seven fruit flies receiving this mutation at the same time are extremely low without genetic interference. It is plausible that, because of genetic manipulation, entire populations may be exterminated.

**Summary Statement**
The project is a risk assessment of a lethal gene accidentally introduced by genetic engineering.

**Help Received**
No help recieved.

# CALIFORNIA STATE SCIENCE FAIR
# 2002 PROJECT SUMMARY

**Name(s)**
Allison G. Chin

**Project Number**
**S1204**

**Project Title**
## How Reliable Is the Information from Computer Programs?

**Abstract**

**Objectives/Goals**
The objective is to determine if the computer program, "Brain Works," tells the subject whether he/she is an auditory or visual learner.

**Methods/Materials**
Informed consent was received from twelve students in the eleventh grade who were sixteen-years-old. The #Brain Works# program was provided for free by Synergistic Learning Incorporated. This program consisted of a series of twenty questions, which the computer would use to determine the percentage that the subject was an auditory or visual learner. The program also informed the subject whether they were more dominant in their left brain, or right. To test the accuracy for this program, there were a series of #observed# tests that were administered. The two tests, observed auditory and observed visual told the subject whether they were dominant in the auditory or visual area. An #observed auditory# and a #visual observed# score was then given to the subject.

**Results**
The Pearson#s Product Moment Correlation Coefficient was used to show if there was a direct linear relationship between the data sets. The r-value of the auditory data sets was .1836, while the r-value of the visual data sets was -.753.

**Conclusions/Discussion**
Since only an r-value close to 1 suggests a direct linear relationship, there are not direct linear relationships shown in either the auditory or visual data sets. Therefore, the research hypotheses: [1) If the auditory computerized results and the auditory observed results are the same, then the computer program is accurate and reliable. 2) If the visual computerized results and the visual observed results are the same, then the computer program is accurate and reliable.] were rejected. Thus, the computer program was not very accurate or reliable. The null hypothesis that the computer program is not accurate and reliable, and the computer results are different from the observed, was not rejected.

**Summary Statement**
The purpose of this project is to determine if the computer program, "Brain Works," tells the subject whether he/she is an auditory or visual learner.

**Help Received**
My senior research teacher helped set deadlines for the science fair report.

# CALIFORNIA STATE SCIENCE FAIR
# 2002 PROJECT SUMMARY

**Name(s)**

Todd B. Christensen

**Project Number**

**S1205**

**Project Title**

## TerraBattles: A Role-Playing Game for the PC using My Own Scripting Language

**Abstract**

**Objectives/Goals**

To show that it is feasible to develop a role-playing game (RPG) for a personal computer in real mode without any dedicated gaming hardware, such as that found in a Sony PlayStation. Although many games have been produced for PC's in the past, no role-playing games with "dedicated system console-like" features have ever been commercially written and developed for the PC. This means creating my own scripting language for certain aspects of the program.

**Methods/Materials**

This role-playing game was written using Microsoft QuickBASIC 4.5, Microsoft Macro Assembler 6.15, and Borland Turbo Assembler 4.0 over the course of a year and a half. Modified (by me) parts of the DirectQB 1.61, Future.Library 1.35, and SVGAQB graphical libraries as well as DS4QB++ were used to facilitate high-speed graphics and sound. I created and wrote my own editors to develop the game as well.

**Results**

TerraBattles has many of the characteristics of professional role-playing games written for dedicated consoles. For example, it has it's own unique scripting language and engine comparable to those used by commercial role-playing games.

**Conclusions/Discussion**

Inventing a working scripting language and programming an interpreter to run the scripts is more challenging than I had at first thought it would be. This was compounded by the fact that the 640 kilobyte conventional memory barrier severely limited the power of TerraBattles' scripting language. Although I found Assembly programming to be difficult at first, I learned that it proved extremely useful in optimizing the program's speed. I found that it is therefore possible to develop a role-playing game for a personal computer such as I set out to do.

**Summary Statement**

TerraBattles RPG is about making a role-playing game for the PC using real mode, game console-like programming and concepts.

**Help Received**

Brother helped type Abstract; Friend helped with computer graphics and sound.

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Charles C. Ciongoli, III

**Project Number**
**S1206**

**Project Title**
## Chaos in the Brain: A Simulation of Coupled Differential Equations

**Abstract**

**Objectives/Goals**
The goal of this project was to effectively and numerically solve coupled differential equations that display chaotic behavior in a computer program. The differential equations modeled the system dynamics of neural firings inside of a human brain.

**Methods/Materials**
In order to complete this project, the researcher had to first acquire the programming skill that would be needed in order to write the computer project. The program was written in a language known as #Scheme.# Scheme is a function based language meaning that functions can be passed as parameters. Also the researcher had to learn ways of finding the derivative (slope of a function), integration (area under a function), and numerical methods to solve the differential equations.

**Results**
The written computer program returned a graph of the functions. It showed phase trajectories moving towards either of two points.

**Conclusions/Discussion**
It is concluded that it is indeed possible to write a computer program to numerically solve coupled differential equations that display chaotic behavior. Two points of attraction, or places where there is stability, were found on the graph. However, a limit cycle was wanted in return rather than the points of attraction. The parameters used must have not been correct in order to form the limit cycle. Another program will be written to explore the possibilities for all of the parameters.

**Summary Statement**
This project is a computer program that models the chaotic behavior in a neural population by solving coupled differential equations.

**Help Received**
Biology Teacher helped proofread report; Computer Teacher taught advanced math and programming skills; Mother and Father proofread report and helped with backboard.

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Courtney E. Groden

**Project Number**
**S1207**

**Project Title**
## Law and Order: Benford's and Zipf's Laws

**Abstract**

**Objectives/Goals**
The purpose of this project was to test Benford#s Law and Zipf#s Law, two mathematical laws, to see if they actually work. Also, this experiment was to test if certain seemingly random numbers are in fact not random. My hypothesis is that certain seemingly random lists of numbers are, in fact, not random, and will follow Benford's Law and Zipf's Law. Furthermore, if one number list follows one of the laws, it will also follow the other law.

**Methods/Materials**
Using ranked lists found on the Internet, count how many of the numbers begin with 1, 2, 3, etc. and record. Find the percentage of the total numbers that begin with 1, 2, 3, etc., record, and compare to Benford#s Law. Then, decide whether the list of numbers follows Benford#s Law. Using the same lists, find the numbers according to Zipf#s Law (the first stays the same, the second number is ½ of the first number, the third number is 1/3 of the first number, the fourth number is ¼ of the fourth number, etc.) and record. Compare the real numbers to the numbers created by Zipf#s Law and decide whether the ranked list follows Zipf#s Law.

**Results**
Only Chart #5 (227 Countries Ranked by Population) and Chart #6 (Top 100 Languages by Population Chart) followed Benford#s Law. Only Chart #6 followed Zipf#s Law. Chart #5 followed Zipf#s Law for about the first 50 numbers before becoming too inaccurate.

**Conclusions/Discussion**
Though some of the other lists did have the characteristics of a set of numbers that should follow Benford's Law, there were not enough items on the list for the law to show itself. In other words, one should use lists of numbers that are long enough to allow Benford#s Law to emerge. Also, because Chart #5 only followed Zipf's Law for about the first 50 numbers it shows that Zipf#s Law needs modification to work correctly. It also proves that numbers do not have to follow one law in order to follow the other.

**Summary Statement**
The purposed of this project was to test Benford's Law and Zipf's Law, two mathematical laws, to see if they actually work, and to see if certain seeminly random lists of numbers are truly random.

**Help Received**

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
William Kammer; Erik Yde

**Project Number**
**S1208**

**Project Title**
## The Intentional Loss

**Abstract**

**Objectives/Goals**
The goal was to determine whether or not the intentional walk in baseball is a good idea or not, using two separate C++ programs. One program with the intentional walk, and one without. After that, the objective was determining how many more runs were gained/lost from doing this.

**Methods/Materials**
The Method used was a C++ program. Our materials, being general, consisted of a computer, C++ software, bored materials, text books, and the internet.

**Results**
Running each program 50 times, and finding the averages, we found that with the intentional walk the SF Giants gain over 3x's more runs. The program with the intentional walk's percentage of runs being 77%, and the program without the intentional walk's percentage of runs being 23%

**Conclusions/Discussion**
After running our project, we decided that using the intentional walk is a bad idea. The team up to bat gains a lot more runs if you use the intentional walk. It is a better idea to pitch to the batter and hope for a strike out.

**Summary Statement**
We used two C++ programs to determine whether or not the intentional walk in baseball is a good idea.

**Help Received**
Student helped with bored suggestions; Teacher suggested topic; Student helped with working out bugs in programs.

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Daniel L. Kluesing

**Project Number**
**S1209**

**Project Title**
# Implementing a Collective Knowledge System for Memetic Algorithms

**Abstract**

**Objectives/Goals**
Memetic algorithms are an agent based artificial intelligence method. Memetic algorithms are unable to effectively distribute information and do not benefit from ideas known in other agents in the simulation. The goal of this project is to design and test a system for the transmission and management of information between agents in a memetic simulation. If the simulation is able to better utilize information, then the efficiency of the simulation will improve.

**Methods/Materials**
Memetic algorithms combine principals of evolution and genetics to produce computer programs capable of evolving solutions. Through emulation of the biological process of evolution, algorithms representing possible solutions to a problem interact and undergo recombination to produce offspring algorithms. A heuristic local search mechanism constitutes the primary search method for the algorithms, with the genetic recombination serving as a micro-search mechanism to optimize the local search. A custom memetic algorithm simulation was written in C++ as a multi-threaded, parallel execution application. The knowledge system was written in SQL as a multi-tired database application.

**Results**
The memetic algorithm was 16.6 times more efficient than genetic algorithms and 108.2 times more efficient than sequential search algorithms for solving a simple equation. A system for distributing knowledge discovered during the simulation was implemented and shown to improve the efficiency of the memetic algorithm by 18.5%. The information stored in the knowledge system was used as an additional feedback loop for the simulation. This allowed the simulation to bias the areas of the solution space searched. The time required to solve subsequent test cases of the problem type was reduced by a further 9.7%.

The simulation had a tendency to be #lazy# and avoid difficult regions of the solution space. Methods were implemented to force the simulation to consider difficult regions of the solution space.

**Conclusions/Discussion**
The simulation was able to use the knowledge system and improve the efficiency of the memetic algorithm search. The information contained in the knowledge bank represents a more general description of the problem type with each new test case. The author is working to implement an induction system capable of deriving a general case solution from the data stored in the knowledge system.

**Summary Statement**
Improving the efficiency of memetic algorithm simulations by giving greater access to information.

**Help Received**
Discussions with Professor Emeritus Pat Pizzo, Ph.D, of San Jose Sate University and Professor Dave Barnett, Ph.D, of Stanford University.

# CALIFORNIA STATE SCIENCE FAIR
# 2002 PROJECT SUMMARY

**Name(s)**
Connie H. Leung

**Project Number**
**S1210**

**Project Title**
## A Novel Search for Face Attractiveness Using Reverse Correlation Methods and Web-Based Visual Experiments

**Abstract**

**Objectives/Goals**
With our research, we can obtain a more complete picture of the brain and its involvement in perception. Neuroscientists can use our model to understand people#s perception of beauty, and plastic surgeons and developers in the beauty industry can use this technique to make people look more attractive.

**Methods/Materials**
This Web-based experiment is set up on a Linux computer using the Apache Web server and a mySQL database and is written in Perl. Observers created an account,logged in, and selected an experiment. They rated the attractiveness (from 1 to 10, with 10 being the highest) of 100 stimuli, either male or female images, randomly generated from the data file on-the-fly.
Finally, to analyze the test data, we imported the user information and responses from the database to MATLAB and EXCEL for further mathematical and statistical analysis.

**Results**
By determining a correlation between the observer#s response and a filtered signal pattern, we created a kernel. After adding the kernel to the base image using reverse correlation, we produced a more attractive face than the original one. Out of the 4,092 pixels representing a human face, only 134 key pixels contribute to an attractive face.

**Conclusions/Discussion**
The reverse correlation technique and classification image (kernel) are effective methods for studying face attractiveness. Reverse correlation directly estimates the areas of an image that observers used to reach their decisions. Since this method is based on one model, it can determine the significant components that yield attractiveness.
This Web-based experiment offered significant advantages to traditional lab experiments. Outside of the U.S., we gathered data from participants all over the world in countries like the United Kingdom, Greece, Spain, Australia, and the United Arab Emirates. Online experiments allow for hundreds of users to participate in the experiment simultaneously at minimal costs. As high bandwidth becomes more readily available, we can incorporate more features such as dynamic filtered signals, movie scripts, and colorful images into online experiments.
Our goal is to investigate spatial sampling strategies used by observers in choosing between an unattractive and attractive face. Finally, we can explore possibilities of the model in other fields of studies in Neuroscience and the practical applications of this technique in the beauty industries.

**Summary Statement**
Reverse correlation and Web-based experiments were used to generate an attractive face and to determine significant components for attractiveness in a human face.

**Help Received**
Used lab equipment at USC under the supervision of Dr. Biederman

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Andrew Min

**Project Number**
**S1211**

**Project Title**
## Proving Symmetry Properties of Mandelbrot Sets

**Abstract**

**Objectives/Goals**
To prove Symmetry rules found by the iterations of complex equations by utilizing fractal geometry.

**Methods/Materials**
Materials: Linux operating system, C code compiler, and knowledge of using Linux and C.

**Results**
From the data generated by the programs, I noticed that the symmetry of the image seems to be related to the power of the function.
This is pretty interesting because it demands a reason why. The reason why lies in the mathematics. If someone examines the function x^2 or x^3 then that person will notice that for complex numbers, this is a rotation. In the data we saw what happens when we multiply the original function by 2d. The point behind 2d was its relation to the circumference of a circle 2d r. In this case r is assumed to be 1. When simplified, the function doesn#t change at all. It acts like the 2d was 1. The 2d created an effect of #circling# all the way back around to the same starting place. Since the power was 1, the circle wraps around a whole time producing a totally equal effect. It generates a screen full of black.

But when the function is raised to the 2nd power, things change. Instead of wrapping all the way around on the 2nd power, it only wraps ½ way around. Then it wraps around again. This produces the two symmetric parts we see when we raise the function to the 2nd power. For the 3rd power, we see 3 symmetric parts. For the 4th power, we see 4 symmetric parts.

**Conclusions/Discussion**
I conclude that complex number equations have symmetry when raised to a certain power. This symmetry can be proved both thru observing firsthand through empirical observation and mathematical work. From this project I learned many things including how to create a fractal and the discovery of the more hidden parts behind fractal images. I learned why fractals have a certain pattern.

**Summary Statement**
I am trying to prove Symmetry properties of Mandelbrot sets by utilizing a computer

**Help Received**
Used equipment at Jisan Research Institute under the supervision of Dr. Sanza Kazadi

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Hovik G. Nalbandian

**Project Number**
**S1212**

**Project Title**
## Professional Grading Program

**Abstract**

**Objectives/Goals**
My goal was to create a very easy to use program which teachers from different schools could use for all the grading needs. They would not need anything else but this program to do all therer calculations and grading.

**Methods/Materials**
For this project i used visual basic 6 to create the whole program itself. I used MS acess database to create its main data source. For one of the methods I used DAO which stand for Data Access Object to use previously stored data with visual basic 6. DAO is based on Structure Qwery Language. But I used DAO. And for the animations, I used Shriden active thread controls to creat the rotating Globe and some of the other animations found on the program.So basically these were all the materials and methods i used to create this program.

**Results**
Well the results were that I did create the program and it works perfectly now and it is very easy to use and can do anything a teacher needs it to do. For Example( Calulate someones Gpa, Store infrmation about the student, and exc.)
Well basically this is it.

**Conclusions/Discussion**
Alot of accurate data was collected while creating this program. There weren't any unexpected results. The program was created successfully. It was tested sevral times by me to check if any errors could be found, and tested a couple of times by my advisor. And it came out to have a few errors, which were fixed and not it works perfectly and does evrything that it was made to do. And it is a dream come treu to all the teachers who have a hard time calculatuing there grades and keeping track of which student they were grading.

**Summary Statement**
Its A program created to help all teachers with calculating a students grade.

**Help Received**
Advisor helped me understand how to use data environment properly .

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Sahand N. Negahban

**Project Number**
**S1213**

**Project Title**
## Computer Algorithm Design and Linear Algebra: How to Solve Chemical Equations as Linear Systems

**Abstract**

**Objectives/Goals**
The objective of my project is to design algorithms based on concepts of linear algebra and apply the algorithms to solve chemical equations.

**Methods/Materials**
A standard C or C++ compiler is required for the project. I used Microsoft#s Visual C++ compiler on a Dell Dimension 8100 PC running a 1.4 Ghz Processor with 384 megabytes of SDRAM on Microsoft#s Windows ME operating system. I did research from a number of references on specific topics of linear algebra to help me design effective algorithms to complete the design of the program. Once the design of the program was developed I began the actual coding process. I ran through multiple releases of my program and developed better #input# algorithms until I finished the final program.

**Results**
Algorithms designed based on principles of linear algebra can be effectively applied to balancing chemical equations set up as a system of linear equations.

**Conclusions/Discussion**
The algorithms performed their functions as designed. The only problem came from balancing double replacement reactions because the polyatomic ions involved in double replacement reactions usually have more than one element. As a result an extra equation is added to the system of linear equations. The solution to the problem is to count a polyatomic ion as a single element instead of counting each individual element that makes up the polyatomic ion.

**Summary Statement**
This project explores concepts in both linear algebra and algorithm development and their applications to solving chemical equations.

**Help Received**
My dad supplied a few of the books that I used for my research. My mom helped me purchase the compiler. Mr. Robert Ferazzi helped test the program.

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Jonathan P. Palley

**Project Number**
**S1214**

**Project Title**
## Virtual FlashCards

**Abstract**

**Objectives/Goals**
The primary objective of developing the Win32 program, Virtual FlashCards was to create a more active flashcard-style learning environment in which interaction is a part of learning and to provide instantaneous feedback on learning progression. Secondary goals included harnessing the power of computers to maximize study efficiency by, for instance, changing the frequency a card is viewed based on the user?s knowledge of the card. In accomplishing these goals, the program was designed for ease of use, customization, expandability and quick Internet distribution.

**Methods/Materials**
The program is designed for ease of use, customization, expandability and quick Internet distribution. Furthermore, algorithms cull and sort FlashCards, changing the frequency a card is viewed based on the user?s knowledge of the card. Programmed in Microsoft Visual Basic 5, the code structure revolves around a core class model allowing for easy expandability and quick debugging. Once the core classes were completed, the secondary functions (printing, saving, etc) and the UI were programmed. Finally, the program was packaged for distribution and web site was created allowing the download of VFC as well as the ability to swap flashcards users have made.

**Results**
The program has been very helpful for thousands of people. With no promotion, well over a thousand people download VFC a month and use it to study a plethora of subjects. User testimonials indicate the objectives were achieved (91% offer praise) and numerous user suggested features are found in this version or will be incorporated into a planned second version.

**Conclusions/Discussion**
Considering numerous people have testified to the helpfulness of VFC, and commented on the usefulness of many of its objectives, the program has been a success that has truly helped people study.

**Summary Statement**
Virtual FlashCards is a program to create, learn, share and print FlashCards

**Help Received**

# CALIFORNIA STATE SCIENCE FAIR
# 2002 PROJECT SUMMARY

**Name(s)**

Jace K. Priester

**Project Number**

**S1215**

**Project Title**

## InSight: Engineering Real World Solutions to PC Organizational Problems

**Abstract**

**Objectives/Goals**

My project, entitled InSight, is a suite of three computer programs, each solving a common PC organizational problem area. InSync was created to solve the problems of keeping files synchronized between multiple computers, updating and backing up files, and cloning hard drives. DeskTab's purpose is to organize the desktop by allowing the creation of multiple, custom desktops. Axx was designed to split large files into multiple pieces, each small enough to fit on a disk such as a floppy, and then reassemble the pieces when they have reached their destination.

**Methods/Materials**

The InSight suite is written for the Windows operating system using the C++ programming language. This allows it to operate quickly and efficiently to complete the complex tasks that it performs. I also found the Windows Application Programming Interfaces (APIs) to be efficient and suited well to InSight. Although it took more time to complete using the APIs instead of the Microsoft Foundation Classes (MFCs), the APIs produced a better end result.

**Results**

InSight has been tested and found to work on all versions of Windows: 95, 98, NT, 2000, XP, and ME. Testing has shown InSync to operate faster and more reliably than the function provided by Windows. Unlike Windows' Virtual Desktops, DeskTab does not associate each program that is run on the computer with the desktop it was started from. Thus the user can switch between desktops without switching between programs. All programs are easier to use than others on the market. The graphically based, drag-and-drop interface, makes them simple enough for beginning users, yet the programs contain enough advanced options for more experienced and demanding users.

**Summary Statement**

InSight is a suite of three computer programs, each solving a common PC organizational problem area.

**Help Received**

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Kanishka Reddy

**Project Number**
**S1216**

**Project Title**
## Balancing Chemical Equations

**Abstract**

**Objectives/Goals**
Can an Algorith be created to efficiently balance a chemical equation? My objective is to create an algorith capable of accepting input, in the form of a chemical equation, from the user and be able to balance the equation.

**Methods/Materials**
1 IBM compatible computer
1 Borland Turbo C++ Compiler
1 Windows XP Operating System

**Results**
After completing the test chemical equations I found that my algorithm, using a matrix, successfully balanced chemical equations.

**Conclusions/Discussion**
My conlusion is that I was able to create an algorithm, incorating a matrix, that is able to balance chemical equations.

**Summary Statement**
My project is a program that balances chemical equations.

**Help Received**
Professor Rick Yunke for help with coding the program; Dr. Satish Reddy for providing equations to test my program.

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Tedd D. Smith

**Project Number**
**S1217**

**Project Title**
## The Double-Array Sort: A Study of C++ Sorting Methods

**Abstract**

**Objectives/Goals**
For my project I developed a new sorting algorithm in c++ programming code. This sorting algorithm used a second array that represented the range of the numbers in the array (sort of like a histogram) to sort the array. My objective was to see if my new sort could sort a large array of numbers faster than any of the traditional sorting algorithms.

**Methods/Materials**
To test my new sorting meathod, I used a computer with a c++ compiler installed on it. I wrote a program in c++ that would create array that would contain ten thousand randomly generated numbers that ranged from zero to 9999. The program would then have each of the sorts (insertion, selection, bubble, shell, divide and conquer, and my double array sort) sort the array and time how long each took to sort the array.

**Results**
After conducting the expiriment, I found that my double array sort was in fact the fastest of the six sorts that I tested. The divide and conquer sort was the second fastest, while the insertion sort was the third fastest. The selection sort was in the middle, while the bubble and Shell sorts were the two slowest of the sorting meathods.

**Conclusions/Discussion**
My conclusion was that using a second array that represents the range of the numbers to sort an array of numbers does greatly increase the speed of a sorting algorithm.

**Summary Statement**
For my project, I created a new sorting algorithm in c++ and compared it's speed to other c++ sorting algorithms.

**Help Received**
none

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Andrea L. Thornquist

**Project Number**
**S1218**

**Project Title**
## Non-Euclidean Geometry

**Abstract**

**Objectives/Goals**
My goal and objective was to understand non-euclidean geometry, understand when people use is and is it legitimate in our world and univers

**Methods/Materials**
My materials were: a ball, globe, marker, protractor, knowledge of Euclidean geometry.
My method was to study euclidean and non-euclidean geometries then to take the globe and with a marker draw a line around it.
Draw a dot somewhere else on the globe.. Draw a line going through the dot but not touching the line.
Drw another line going through the dot and still
not touching the origonal line.
Nextdraw ten triangles on a ball. Measure the angle of each triangle and add them up separately. Compare the answers of the triangles.

**Results**
The globe showed that the parallel postulate was not valid for a positively curved surface since two lines could go through the same dot and still not tough the other line.
Then witht he triagles every triangle came out to greater than 180 degrees.

**Conclusions/Discussion**
Non-Euclidean geometry must exist and be legitimate in our world because Euclidean geometry is not full proof. It only stands for strait flat plains and our world is not flat. It's full of curves.

**Summary Statement**
My project is studying how elliptical and hyperbolic geometry are useful in our world and universe.

**Help Received**
I used teachers books

# CALIFORNIA STATE SCIENCE FAIR
## 2002 PROJECT SUMMARY

**Name(s)**
Deborah E. Berg

**Project Number**
**S1299**

**Project Title**
## Can People Choose Truly Random Numbers?

**Abstract**

**Objectives/Goals**
The researcher attempted to determine if people could choose truly random numbers.

**Methods/Materials**
Via e-mail, the young investigator contacted people throughout the world and asked them to choose random numbers in certain intervals. She used a TI-83 graphing calculator to generate truly random numbers for comparison. She then used the calculator to determine if any statistically significant patterns occurred and to ascertain the probability of obtaining specified chi-square values with given degrees of freedom.

**Results**
The researcher found that there was less than a one in ten million chance that the distributions of numbers humans picked for 1 to 5, 1 to 10, and 1 to 20 were randomly selected. She found similar, though not quite as dramatic, results for some first digits and last digits. She also found that people chose unusually high or low amounts of squares and primes.

**Conclusions/Discussion**
To determine the probability of obtaining results as extreme or more extreme than hers, the scientist used the chi-square statistical analysis. She concluded that, even when instructed to do so, people were unable to choose truly random numbers. Possible applications of this project include cryptology, where humanly generated codes could be analyzed to find trends that could be applied to previously unsolved codes, the lottery, where people could choose numbers that do not seem random in order to try to be the only one choosing those numbers, and choosing Personal Identification Numbers that do not seem random, and therefore, would be harder to guess.

**Summary Statement**
This project is a complex mathematical study of whether humans can generate truly random numbers.

**Help Received**
Father supported decision to use chi-square analysis.