The Ultimate Human Atlas
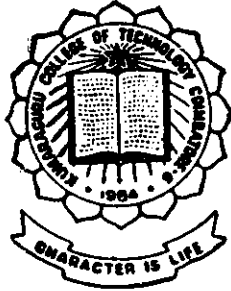
Project Work 1997-98

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UNDER THE GUIDANCE OF

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IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF
BACHELOR OF ENGINEERING IN
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CERTIFICATE

This is to certify that the Bonafide Project entitled

"The Ultimate Human Atlas"

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in partial fulfilment of the requirements for the award of the Degree of Bachelor of Engineering in the Computer Science and Engineering branch of the Bharathiar University, Coimbatore during the year 1997-1998.
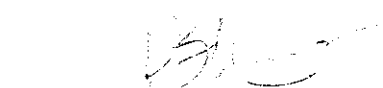
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Internal Examiner

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External Examiner

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CONTENTS

SYNOPSIS

"The Ultimate Human Atlas" is a multimedia presentation on Human body. The anatomy, physiology, and associated Diseases of various Organs have been covered. This is an interactive project where the user can travel freely and explore the fascinating human body. The major systems Circulatory, Respiratory, Digestive, Excretory, Reproductory and Nervous systems (Brain, Eye & Ear) have been covered. The most popular and powerful multimedia & animation tools as 3D Studio, Photoshop, Authorware, etc. have been used. A breadth wise coverage on various parts provides the user with the basic knowledge. This software contains real photographs of the organs that puts an end to the weird imaginations & unravels the beauty of God's creation.

WHY MULTIMEDIA?

A revolution is taking place today the way humans access, learn and interact with information. This revolution called Multimedia has opened up a new avenue for creativity. What is Multimedia ? Multimedia is any combination of text, graphics art, sound, animation, video. In simple words multimedia is life. The use of multimedia is aimed at injecting more life into applications for which it is developed. The implementation of multimedia capabilities in computers is the latest episode in the long series radio, television,art.... These advances reflect the innate desire of man to create outlets for creative expression, to use technology and imagination to gain empowerment and freedom for ideas.

Producing a Multimedia project requires more than creative skill and high technology. You need organizing and business talent as well. You need good ideas along with talent

and skill to make Multimedia. The field where the need for Multimedia is more felt is the education field. The aim is to produce a turn around in the educational system.

In Multimedia there are five ways to format and deliver your message. You can write it, illustrate it ,hear it ,wiggle it and interact with it. In a few years interactive multimedia will be delivered to many homes throughout the world . Interest from a confluence of entertainment mega corps, information publishers and providers, cable and telephone companies, and hardware and software manufacturers are already driving this inevitable evolution and profound changes in a global communication strategy are on the drawing board .

INTRODUCTION TO THE SOFTWARE

The time old custom of learning has been book reading. With advent of multimedia in computers a major change has occurred in current education pattern. Many schools and universities have started using computer as a teaching aid. This project is one such teaching aid for medicos and other science students. It is a tedious process to search for a specific topic in books, this has been greatly reduced in this presentation. The main screen is the entry to the major systems. Once a particular system has been selected there are several icons that entertain the needs of the user. For example the camera icon takes the users to photographs Of various pictures. A high resolution scanner has been used for this purpose. The animation icon is the door to the working concept of the part under study. The modeling and animation have been done using 3D Studio with it's advanced rendering and animation features. The movie icon presents a journey through the system.

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The audio icon enables the user to switch the audio on and off to his requirements. The sound of various types of heartbeats have been recorded and presented to the user

First the project was divided into various modules, The first step was modeling and animation. Photo scanning and editing, sound and movie editing was done next. Finally all the media was integrated by an authoring tool. The required pictures and models were obtained from various books like Gray's anatomy, Color atlas of Human anatomy, etc.

MODULES

CIRCULATORY SYSTEM:

Body's entire blood flow is being controlled by this centrally operated system. This system includes the Heart, the Arteries & the Veins. The Heart's Pumping cycle has been animated. Several cross sectional view brings out the positions of the various parts and the valves like the vena cava,mitral valve etc. Functioning of the pace maker is also explained. A movie file explains the process of blood circulation through out the body. Diseases of the heart like myocardial infarction, arrhythmia and the various causes have been discussed. How the heart beats differ during each disorder has clearly been differentiated and presented

RESPIRATORY SYSTEM:

The process of inhalation and exhalation of air into the body for the purpose of Oxygen intake is the main function of the respiratory system. This is well brought out under this section. 3D view of lung has been modeled. The fine details of the alveoli and the bronchial tree are shown through exotic pictures. The diseases section has a good explanation on the illeffects of smoking.

NERVOUS SYSTEM

There are three main sections under this system they are the brain, the eye & the ear. True pictures of the brain beautifully show the various parts very clearly. Very rare disorders also have been discussed with good illustrations.

The eye is the organ of sight. It is a very delicate part. How vision is enabled, long sight and near sight viewing have been explained well. A model of the eye gives a good view on the

structure. The widely covered area is the diseases. Most of the common diseases and some rare disorders have been very well illustrated through photographs and how any object appears to the impaired eye is also showed.

The Ear, the organ for hearing and balance has been similarly discussed in a broad manner.

EXCRETORY SYSTEM

The Kidney and its associated parts continuously work to release the waste products from our body. The non functioning of these organs results in serious consequences. A 3d model of kidney brings out the organization very well.

The formation of urine by the nephrons has been animated. There is also a cross sectional model of the kidney. The actual location and size and other details are seen in true pictures. The common disorders have been treated under the disease section.

DIGESTIVE SYSTEM

Food is the source of energy for human being. The stomach churns the food with the help of enzymes and releases energy. This operation of how a food is being digested is modeled and animated. The various associated parts like the colon are shown. There is wide dealing on the disorders with rich text and illustrations.

REPRODUCTORY SYSTEM

The non perishment of any living thing is being achieved through the wonderful system of reproduction. There are separate bitmaps on the male and the female reproductory organs. The important parts like testes and ovary are separately shown. The major diseases that attack these beautiful organs are very well brought out.

SYSTEM FLOW

The main screen has eight icons for each system the circulatory, excretory, respiratory, brain, eye, ear, digestive and reproductory system. This is the entry point for these systems. Clicking on any one of the icon takes the user to another screen which has the details on that system. There are several illustrations of the organ. From here the user can navigate to any option of his desire. There are several icons for this purpose. The animation icon shows any animation done if one is available. The movie icon when clicked takes us to a video clipping . Sound can turned on and off according to the requirement of the user . Through another icon we can go to the diseases section. The camera icon reveals the photographs.

Throughout the entire program there are options for switching to the next or previous or main screen. The file menu has the option to quit at any point of time. There is a help menu for discussing the various options available.

SYSTEM REQUIREMENT

HARDWARE

1. PC WITH INTEL PENTIUM - 166 MHz PROCESSOR

2. 24-X CD-ROM DRIVE

3. MULTIMEDIA KIT COMPRISING SPEAKERS, MICROPHONE

4. A SCANNER WITH A MINIMUM RESOLUTION OF 600 Dpi

5. 1.2GB HARD DISK

6. 32MB RAM

7. ADDITIONAL DRIVES

SOFTWARE USED

1. WINDOWS 95 OPERATING SYSTEM

2. 3D STUDIO R4

3. ANIMATOR PRO

4. ADOBE PHOTOSHOP

5. ADOBE PREMIERE

6. WAVE STUDIO

7. AUTHORWARE

TOOLS USED

1. 3D STUDIO R4:

3D STUDIO appeared in 1990. It was a major breakthrough in the field of animation using computers. It is basically a rendering and animation software with very powerful features like it allowed a lot of plug-ins to be added.

The main features of this version are

1. Inverse Kinematics-gives the ability to manipulate from child to parent.

2. keyframer Scripting Language-provides facility to use custom scripts

3. Encapsulated Post Script out file

4. Camera control and perspective match

5. Options for fast preview

1. 2D SHAPER

This module provides facility to create basic shapes like line, arc, quad, circle, ellipse(polygons). These shapes can be modified with options like vertices which is the start and end point between a segment. Either the vertices or the segment or the polygon as such can moved , bent , adjusted, curved, deleted and so on. With these techniques we end with a combination of polygons known as shapes. Text can also be shaped or imported.

2. 3D LOFTER

This module converts or lofts the 2D shape obtained from the shaper to a 3D object. A 2D object is converted to a 3D object when we apply a path to the existing shape. The 3D lofter has options to adjust the path and levels in the path . The option deform has further options like twist, bevel, tweeter, etc. which when properly applied enables us to create new objects. The surface of revolution option when applied to any small piece of the object can loft for us the entire objects. From

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here we make the object i.e. we create a 3D object. There is an option to preview the object that is to be made.

3.	3D EDITOR

As the name indicates 3d objects are edited in this screen. It is not necessary that we have to create objects in the shaper and then bring it to the editor screen. There options to directly create 3d objects but only limited objects like sphere, hemisphere, torus, cylinder, cone, etc. can be created. For undefined objects we make use of the shaper module. The objects created are in the form of a mesh or it resembles a wired object. Only when proper materials are assigned we get the true image.

The important feature in the 3D editor is the availability of lights and camera. We can select from a variety of lights like ambient, omni, spot. The ranges and various other characters can be adjusted to produce a very good lighting effect, hence we get the required output when rendered.

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The concept of rendering has to be introduced here. After all the effects have been applied we can render the required view so as to obtain the final image. There are four basic types under this they are flat, phong, gourad and metal shading . These are classified on the basis of the quality of the output. There are many views for any object namely front, top, left, user ,right, bottom ,etc. Apart from these we can have a user defined view namely the camera view. In this view the appearance of the object to the human eye when seen through camera is visualised. Numerous modifications can be done using this option. The various characters of a camera namely dolly, field of view, aperture size etc. can changed.

4. KEY FRAMER

The key framer is where you make models come alive. Here we work as the master animator generating the key frames providing any kind of motion to our desire. The key framer generates all the in-between frames and makes the entire animation into a flic file format which can be viewed later. The changes that can be made are move an object,

rotate and rotate absolute, scale, squash, change light movements or camera movements, hide and unhide objects in each frames. The creativity of the user plays an important role. The preview option helps to see a preview of the movie to be made and hence any necessary changes can be added.

There is an interesting feature called the Hierarchy where there are options to link two or more objects. This feature is used mainly for walkthrough effects.

5.   MATERIAL EDITOR

Wonders can be performed under this module there are three material library. The user can change any material according to his desire. Changes can be made to the ambience ,spot ,hue, saturation, etc. The smoothness or the bumpiness or rugged features can be changed. We can create a new material and save it. Any BMP can be mapped on to the current material. Here to we have the preview option. Two or more materials can be combined together.

2. ANIMATOR PRO 1.3

Animator is a powerful artist's tool for drawing original artwork and enhancing scanned images. These can the be combined to create impressive video presentations, the kind that only a few years ago would have been unthinkable for any company or individual operating on a limited budget.

Animator has broken down the process of creating professional quality presentations into three parts:

1. Painting on the PC. Still images are created and manipulated using animator's highly specialized painting tools, whose capabilities rival and surpass those offered by the most sophisticated painting programs currently available for the PC.

2. Animation. Images are transformed in gradual steps, then stored as frames, like frames in a movie reel. Animator plays these frames in a specified order to create the illusion of movement and life.

3. Input and Output. Photographic images and backgrounds are added using scanner or video camera

connected to the video capture board. The final animation can be recorded to video tape or film or played directly on any PC with a VGA-compatible monitor.

3. ADOBE PHOTOSHOP V 4.0

Photoshop basically is a graphics software. In simpler terms it is a photoeditor tool or an image editor. This is the granddaddy, and in many people's opinion ,still the champion -of the image processing programs. It contains almost every editing tool that you can think of. You can cut, copy, paste, resize an image or do anything you want. It provides many many powerful options for editing the alpha channel in Targa files. This feature is a good choice for editing and creating maps for 3D Studio's Material Editor. In fact there are options to deform the pictures by applying twist, twirl, spherize, distort etc. There are various kind of select tools like the magic wand, sprite tool, pen tool, lasso and so on . Hence you can select any area of your choice and do any .modifications. The more advanced options include adjustment of mode (grayscale, RGB, indexed mode, etc.), adjustment of brightness, contrast ,hue ,saturation etc. The rubber stamp or cloning option allows us to clone any pattern or design.

4. ADOBE PREMIERE

This Adobe product is a video or movie editor. It is the most popular editor software for movies. It can convert any type of movie file into a AVI file. It supports other formats like mve ,mov ,bmp , flc, fli, etc. There are basically three windows, one the construction window, two the transition window, and three the project window. The project window is used to import files or directory or project that is to be added to the existing project. The construction window is one where we place the frames in a sequential manner in the respective order so that it can be made into a movie file. In construction window we can also add sound files at the desired position. The transition windows has many instances of transition which can be placed between any two frames to give transition effects. The position of the frames and how the picture enters or the leaves the screen can be designed. The output options can be adjusted to the user's need. After the proper construction of the frames it is converted into required format.

5. WAVE STUDIO

This software is available along with sound blaster driver. It is compatible with any type of 16 bit sound card. This software is basically used for sound recording from a microphone or from any compact disc. Not only recording but editing features are also available. These files are stored as wave files (*.Wav). Any existing wave file can edited with the various options available. We can eliminate a particular portion or add any files at the required position or two or more files can be copied as a single file. Audio properties like balance of the speaker, sampling rate(22Khz, 44Khz), mono mode or stereo mode, the noise level ,tone can be set. Some gimmicks like fade in ,fade out ,reversing the file, silence, etc. can be added for attractions. This software stands from the rest of the audio utility due to its enhanced user interactivity features.

6. AUTHORWARE

As indicated multimedia is the combination of text, graphics, audio, animation and movie. An authoring tool is definitely necessary for the purpose of interleaving all the media and to sequence it properly. Authorware is one such powerful software. But this is an expensive software. In this there is no need for programming. It is all in the form of flow chart diagrams. These charts indicate the sequence of the execution. There are various icons or options available like bmp icon, movie icon, path icon, wait icon, erase icon, group icon, response type icon and conditional icon. We have nothing to do except to pick and place these icons. This might be suitable only for simple presentations. We need to do some coding in the case of complex programs. Options are available for this purpose also . We have an in-built library of pre-defined functions like jump, quit, cd play, pause, etc. We can write our own functions and the description of the function and add it to the existing library. There also other libraries like movie, sample, sound, and photo library file.

ICONS

1. Picture icon:

   To include bitmap or Tiff files and edit them to screen, text can also be included special effects can also be added to the Text.

2. Path icon:

   We can specify the path for the motion of any Picture.There are different types like fixed destination, scaled path, fixed path, etc.

3. Eraser icon:

   This to enhance the transition effect i.e. the transition from one screen to another.Barn door, venetian blind, iris in, iris out are some of the effects that can be added.

4. Wait icon:

   A time gap can be included between two screens with the help of this icon. This enhances user interactivity i.e. only when a button is clicked or pressed the next screen can be made to appear.

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5.   Movie icon:

This is to include movie files.The play back rate,the start and end frame can be explicitly specified.

6.   Sound icon:

Similar to movie icon except that it is used to add sound files.

7.   Group icon:

Many of the above icons can be combined together under this icon.

8.   Response icon:

We can branch to any of the above described icons based on the response. The various response types are text, pull down menu, clickable object, click/touch, etc.

9.   Condition icon:

Variables are declared and the value of the variable can be checked and based on the value we can branch to any specified icon with the help of this icon.

BACKGD

INTRO

MAINSCREEN

key press

Untitled

THANKS

Untitled

TEAM

Untitled

Untitled

Untitled

?
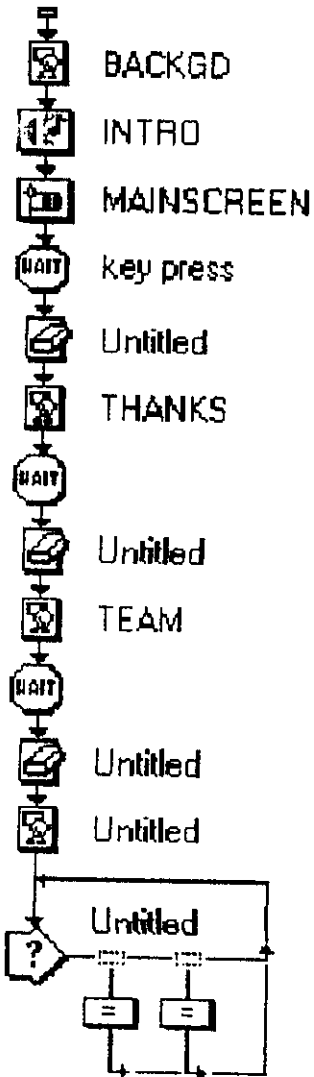
icon
quit

ICON.APW   Level 1

Untitled
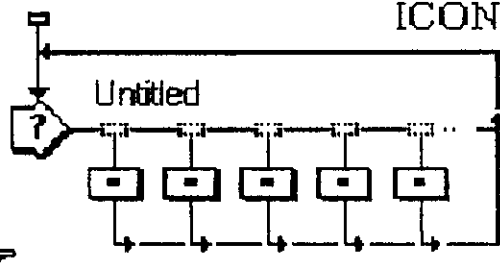
abdomen
brain1
heart11
RESP
eye

ICONAB.APW   Level 1
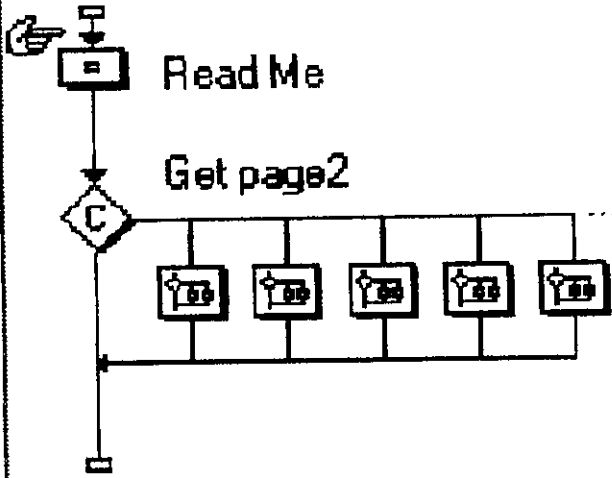
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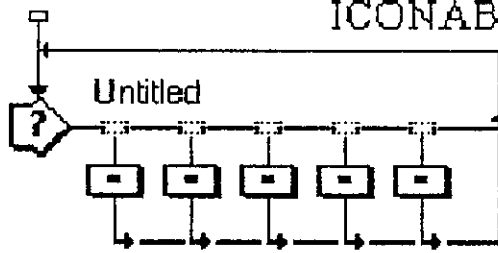
brain1
DISBRAIN
B_MOV
ICON
PHBRAIN

ABDOMEN.APW   Level 1

Read Me

Start at Page 1

Paging model

| Previous |
| Next |
| ICONAd |
| ICON |
| MAIN1 |

Level 2

Read Me

Get page2

C
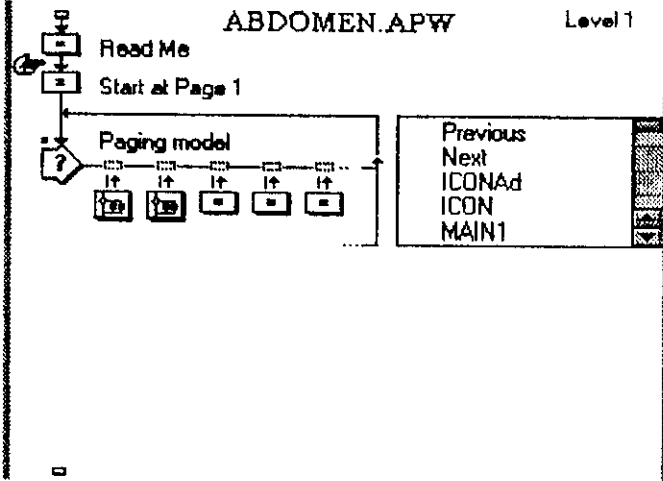
First2
Second
Third
fourth
fifth

Read Me

Start at Page 1

Paging model
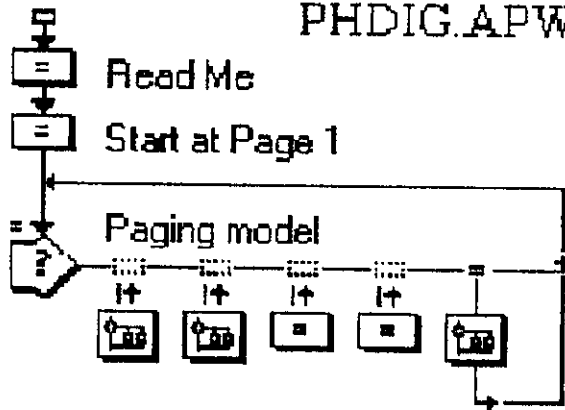
Previous
Next
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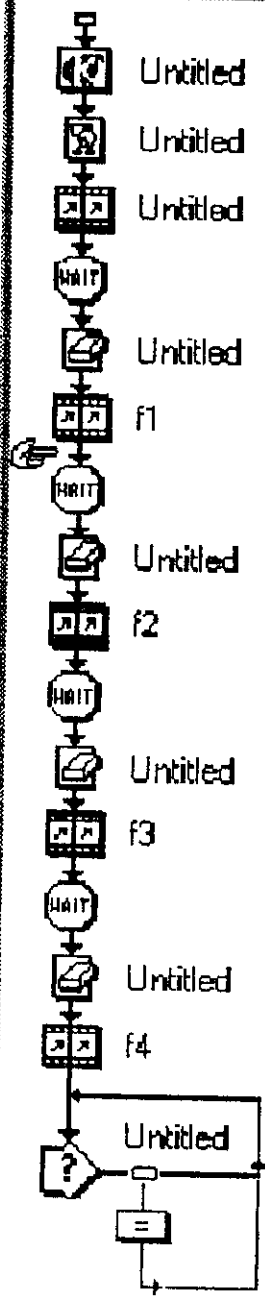
DISDIG.APW   Level 1

Select

? ━━ 🗔 ━ 🗔 ━ 🗔 ━ 🗔 ━ 🗔 ··

DIVERTICULITIS
DISEASE OF LIVER
CIRRHOTIC LIVER
PANCREATIC CANCER
GALL BLADDER STONES

D1

Untitled

D2

Untitled

D3

Untitled

D4

Untitled

quit

MOVHRT.APW   Level 1

Untitled

Untitled

Untitled

Untitled

Untitled

WAIT

Untitled

f1

WAIT

Untitled

f2

WAIT

Untitled

f3

WAIT

Untitled

f4

Untitled
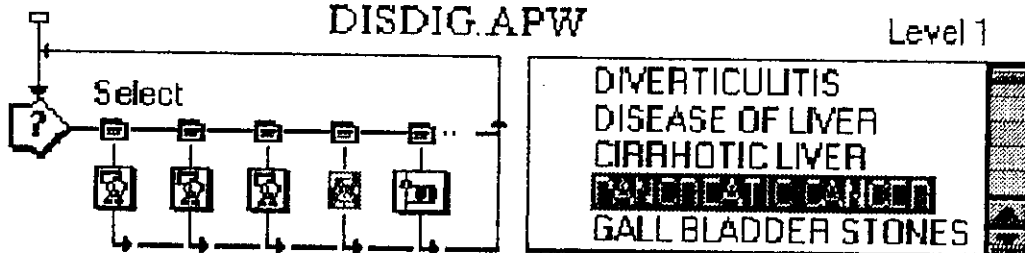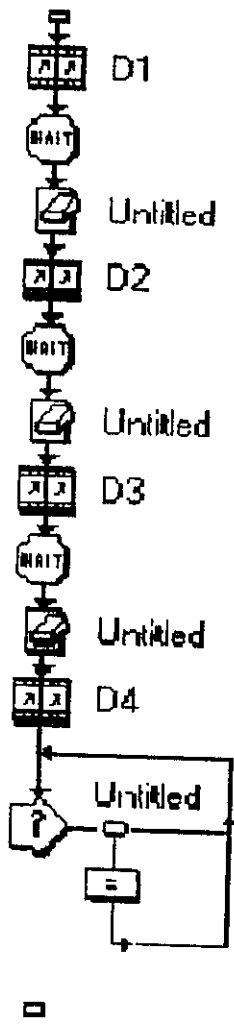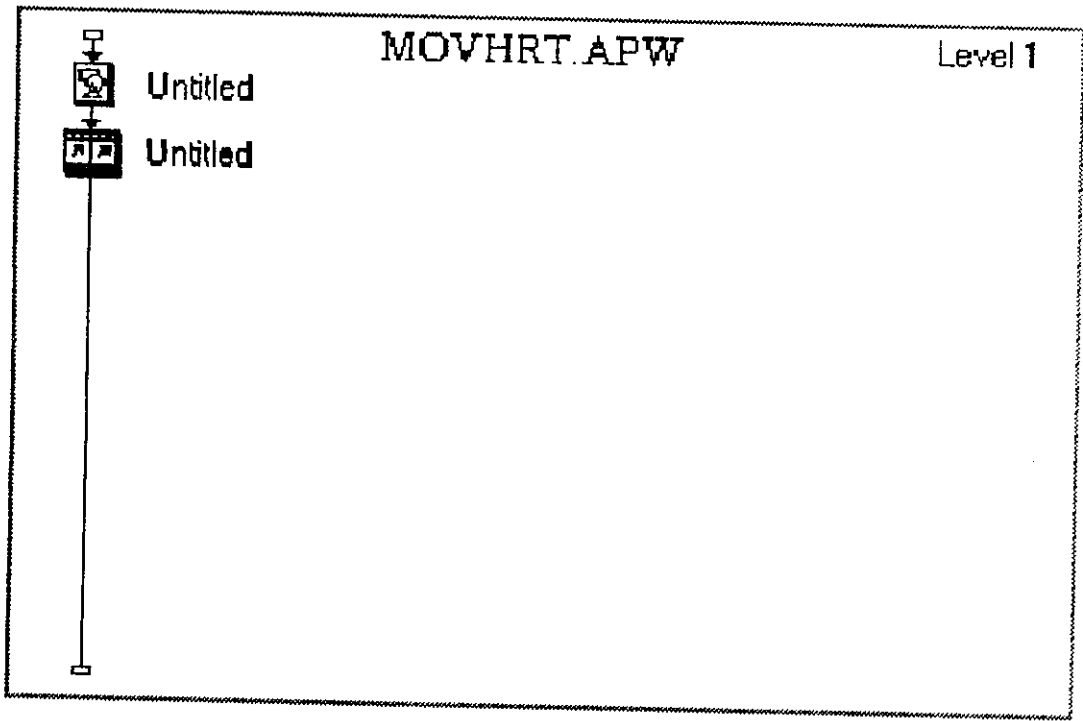
quit

SCOPE OF THE PROJECT

This project was successfully tested. Some more interactivity like the display of the parts when clicked on a specific area can also be extended. This project on the whole has been a breadth wise presentation, in the sense that though lot of topics were covered, a detailed explanation of individual parts would still enhance the quality of the project. This project is only for reference & should never be practically applied under any circumstances. The reachability of the product is such that, it has been designed to be appealing, simple and understandable to any common user. Some related topics left out are symptoms of diseases, Details on drugs and medicine, First aid techniques and references to national and international organizations. The future expansion of the project in topics discussed above would be another interesting project, as this has been to us.

Conclusion

CONCLUSION

The basic objective of this Multimedia project is to replace voluminous text and to provide medical students an interactive way of learning. The burden of browsing through huge text is removed. Though all the areas have not been covered , all that has been covered is done precisely. The breakthrough in Multimedia computing has enabled us to achieve this. No other methodology is more apt for such kind of presentations other than multimedia. With the advent of processors specially designed for multimedia applicctions the importance of this field cannot be overlooked. It is left to the user to explore the possibility of any such options available better than this.

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