AIDesign Software and Hardware Chip

Sarthak Shreyas[1], Shriram Elangovan[2], Guru Viknesh[2], Shania Mitra[2], Huzaifa Mustafa Unjhawala[4], Naresh Kumar[4], Nilotpal Chakraborty[4], Vishal Nandigana[3, 4, 5*]

[1]Department of Ocean Engineering, Indian Institute of Technology, Chennai, India

[2]Department of Chemical Engineering, Indian Institute of Technology, Chennai, India

[3]Department of Mechanical Engineering, Indian Institute of Technology, Chennai, India

[4]AIDesign Private Limited GSTIIN., Chennai, India, https://aidesign.today

[5]AICartoon.Today, https://aicartoon.today

Email address:

nandiganavishal@gmail.com (Vishal Nandigana)

[*]Corresponding author

Abstract

In this paper, we present for the first time a novel .jpeg format story board page for cartoon characters in the software feature film cinema studio industry to make cinema at millisecond time. The earlier works of the cinema studio industry uses Celtx commercial software where in-built figure selection is carried out for story board generation of cartoon character feature film. The use of Artificial Intelligence technology enabled AIDesign commercial software generates the .jpeg format story board with feature options of figure creation, selection, extrapolation and conversion of .jpegs into .mp4 software feature film as individual options along with complete software feature film product in the generation time of millisecond output feature film product. Also, other advantages of AIDesign commercial software is the software is loaded from AI operating system or as executable (.exe file) loaded from Windows operating system. The software generates the .jpeg story board using engineering and product design technology savy enabled trignometric operators, truncated Fourier series operators. Lastly, the software gets trained from the story board (.jpeg image) page 1 and page 2 and predicts the story board page 3 and page 4. Noteworthy aspect is the product design and art illustrated in this paper, provides the engineering and technology advancements to precision manufacture enabled with advancements of science of 2021.

1. Introduction

The idea of a paper sketch to a discussion of paper sketches translation to a single paper sketch discussion of a collection of paper sketches makes the story board of paper sketches in a cartoon to illustrate the art of character from visual images (.jpeg) viewed as cartoon characters and the final story board page illustrates the engineered position locations to imply the characters and the product design of engineering correctness when the .jpeg engineering visual looked as a real product design. The Walt Disney company, Disney studios in real name, an American international cinema studio industry [1] headquartered at the Walt Disney Studios complex in Burbank, California viewed the illustration of .jpegs, .pdfs, .docx, .pptx and other advanced zillions of ways to illustrate a visual in engineering technology way .jpeg, .mp4 (all versions of .mp4 as Writers Guild accepted versions

[2]) created the international cinema studio industry where the engineering technology is as well illustrated till date, 2021 [1]. Pixar, co-owned by Disney International cinema studio industry illustrated the art of marketing including mediums outside that considered as a mass media until Pixar did the inclusion in early 2010s [3, 4]. Celtx, a commercial software aimed at creating the story board pages in .pdf, .rdf, .html, .jpeg, cartoons, for cinema studio and in the business world of cinema [5, 6]. The Celtx commercial software has later went to many advancements with Pixar cinema studio industry use with .jpeg conversion to .mp4 to create a complete cartoon animation product feature film in the early part of twentieth century [7] with commercialization of animation cartoon characters to engineering toys and products and advancements till date of engineering use to humankind in world [8]. The success of engineering advancements with the engineering art and product design technology from Pixar and Disney in the early part of 2000's till date has made the art form from a story board page to a cartoon character to next generation robotics, perpetual machines and concepts science can forsee doable in humankind of 2021 era [9]. In this paper, AIDesign commercial software [10-12], downloaded from https://aidesign.today shows the advancement of story board page cartoon character sketch with engineering precision and manufacturing standards met of humankind of 2021 era also guild certified the creation of .jpegs is they are millisecond timescales differing in four orders of magnitude the story board page creation from Celtx software and also AIDesign software uses artificial intelligence technology to predict the extrapolation of story board new pages from page 1 and page 2 to generate page 3 and page 4 in millisecond time and complete the software feature film product in millisecond time. AIDesign commercial software has in-built artificial intelligence terminal based operating system also has in-built Windows compatible to run as .exe (executable file), to generate the cartoon character sketch (.jpeg) and predict the future of the story with the cartoon character sketches.

Physical quantities such as temperature, stress, fluid velocity, dynamics of a body needs to be predicted on entire spatio-temporal 2D or 3D body to understand or determine the final material property like heat transfer coefficient for thermal application, Young's modulus for stress-strain analysis, coefficient of drag or friction factor from flow velocity, degree of freedom rotations admissible from dynamics simulations in engineering applications [1]. Partial differential equation (PDE) mathematics formulate the basic underlying physical laws which help us calculate such 2D or 3D spatio-temporal profiles that help researchers or engineers predict earlier mentioned physical and material properties [2–5]. Depending on the process, a single PDE or a system of simultaneous, oftentimes called multi-physics PDEs are solved for the same. Over the last four hundred years PDEs are solved by analytical methods like separation of variables, Fourier series, finding an integral form of the solution, change of variable method to transform the equation to something that is easily solvable. With the advent of numerical methods and high-end computer architecture, PDE mathematics were solved using three extremely powerful and highly successful approaches like finite element method (FEM), finite difference method (FDM), and computational fluid dynamics (CFD) or finite volume method (FVM) [2–5]. Numerical methods like FEM, FDM and FVM iterate the values of the variables of interest a large number of times to satisfy the PDE based formulation of conservation laws to match with the experiments. Such numerical methods need dividing the calculus math into either Fourier series approximations or introducing splines of various degrees of power laws (1, x, x^2) to solve. The use of such approaches necessitates the need for fine marching in space or time ($O(\Delta x, \Delta y, \Delta z, \Delta t) << O(1)$) to approximate the PDE formulation to a close accurate solution or also oftentimes called grid or mesh independent solutions. The notion of needing fine grid spacing triggers the user to use thousands to millions of grid points for solving a

real world high dimensional problem like a 3D flow over a car or a 3D heat distribution over an electronic cooling chip. This leads to computational inability as such high dimensional matrix inversion costs $O(N^2)$ operations, where N being the number of dimensions. With the present capability of high-performance supercomputing facilities, the time needed to solve such complex and exhaustive matrix inversion calculations is difficult. The solution is yet to be resolved even after we adopt adapative and smart mesh allocation in regions of interest based on the prior knowledge on the given problem. The challenges are continued to be addressed across the globe with google making recent headlines on solving a complex pattern recognition task with revolutionary quantum computing hardware which otherwise would take 10,000 years for a summit supercomputer - the most powerful in the world today - to solve. Deep Learning was initially introduced as an automatic feature extraction system, requiring minimum pre-processing effort by the user [6, 7]. This is an old technique that has existed from 1940 and is known by different names such as - Cybernetics and Connectionism [6]. It was reintroduced as deep learning in 2007 [7]. The sudden increase in popularity of this field was due to the development of niche algorithms for training these networks. The most popular deep learning models are Convolutional neural network (CNN), which uses images to identify similarities and patterns. They take in image pixel information as input and learn patterns based on the RGB values of the pixels. Advancements in CNN architecture led to the development of sophisticated algorithms such as Recurrent Neural Network (RNN) [7].

2. Artificial Intelligence Technology for Product Design of Cartoon Character

2.1 Distributed Artificial neural network (DANN) algorithm

The input data at each point i and for each sample, j, is trained using Distributed Artificial neural network (DANN), where the activation function is RELU function. The mathematical formulation of DANN is given below.

$$\text{DANN} = \forall \oint_\Omega \int_{j=1}^{M} (h_{ji}+b_{2i})\,dj\,d\Omega_i \tag{1}$$

$$h_{ji}=W_{1i}\cdot h_{j-1i}+W_{2i}\cdot x_{j-1i}+b_{1i} \tag{2}$$

input, h_{ji} is the hidden cell state and W_{1i}, b_{1i} and W_{2i}, are the weight and bias matrices for hidden-hidden and input-hidden connections, Ω is the domain of interest, M is the number of training examples the boundary condition for each grid point i, for sample j, is denoted as b_{2i}.

2.2 AIDesign software technology DANN algorithm used for training from the samples

data = pd.read_csv('product_design_cartoon_sample1.csv',header = None,skiprows = [0])

product_design_cartoon1.csv file first row header title

Node Number X Location (m) Y Location (m) Z Location (m)

mesh = data[[1,2,3]]

mesh = mesh.values

nodes.append(mesh)

Nx = 2 # samples

Ny = mesh.shape[0]*mesh.shape[1] # features

model = Sequential([

 Dense(1024,activation='relu', input_shape=(Ny,)),

 Dense(1024, activation='relu'),

 Dense(Ny, activation='linear')

 ])

model.compile(loss='mse', optimizer='Adam')

2.3 AIDesign software technology DANN algorithm used for predicting new product design cartoon character from the trained samples

BC = 0

BC = BC.values

node_boundary_l.append(BC)

node_boundary = array(node_boundary_l).reshape(1, Ny)

test_output = model.predict(node_boundary, verbose=1)

U_final = pd.DataFrame(test_output)

U_final.to_csv('product_design_cartoon_output.csv',header = None, index = False)

The predicted product design cartoon character output is saved as a .csv file using the python3 command variable_name.to_csv('product_design_cartoon_output.csv',header = None, index = False)

2.3 Artificial Intelligence Software Product Design Creation

Here, for a given engineering application, analysis, boundary conditions, along with experimental/simulation data is used as training sets to extrapolate the engineering application for the same problem of interest considered. The extrapolated boundary conditions and analysis were tested for 1000% extrapolated conditions. A set of 2 training data sets stored in .csv files are used

for the DANN training algorithms and a set of 100s extrapolated test conditions asked in .csv files are tested using DANN testing algorithms. Schematics of the DANN model is shown is Fig. 1.
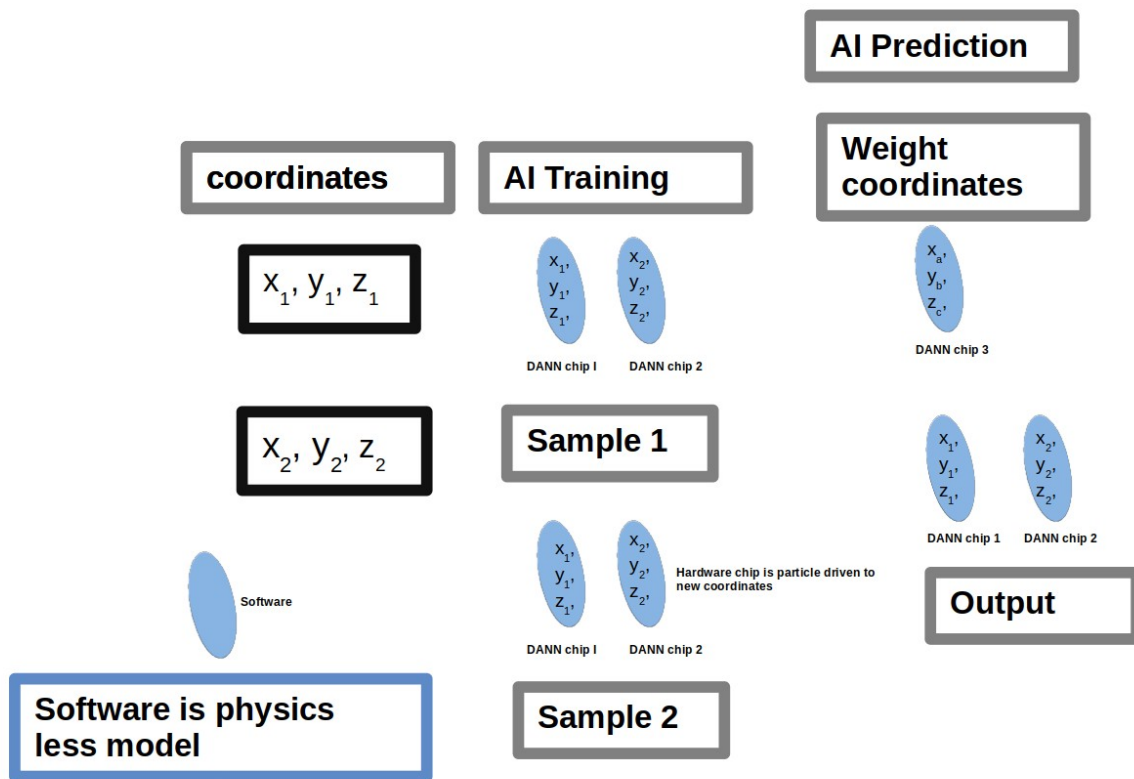
Figure 1. Schematic of AIDesign Artificial Intelligence DANN model

3. Cartoon Characters – Art and Design

AIDesign commercial software is an artificial intelligence technology based engineering and product design software that reduces the time to market engineering industries by extreme rapid millisecond any product make technology [10]. AIDesign commercial software is built for use in engineering industries domains including heat transfer, strength of materials, design of machine elements, 3D component analysis, 3D assembly analysis, fluid dynamics, kinematics/vibrations/control, robotics and control [13,14], animations, VR technology, image processing and signal processing [15,16], cartoon character product design, toy product design and engineering precision manufacturing enabled in advancements of science for humankind of 2021 demands and rapid engineering creation software technology met with existing rapid engineering hardware manufacturing [17-19]. In this paper, AIDesign commercial software is used for the generation of toy design cartoon character story board art and product design.
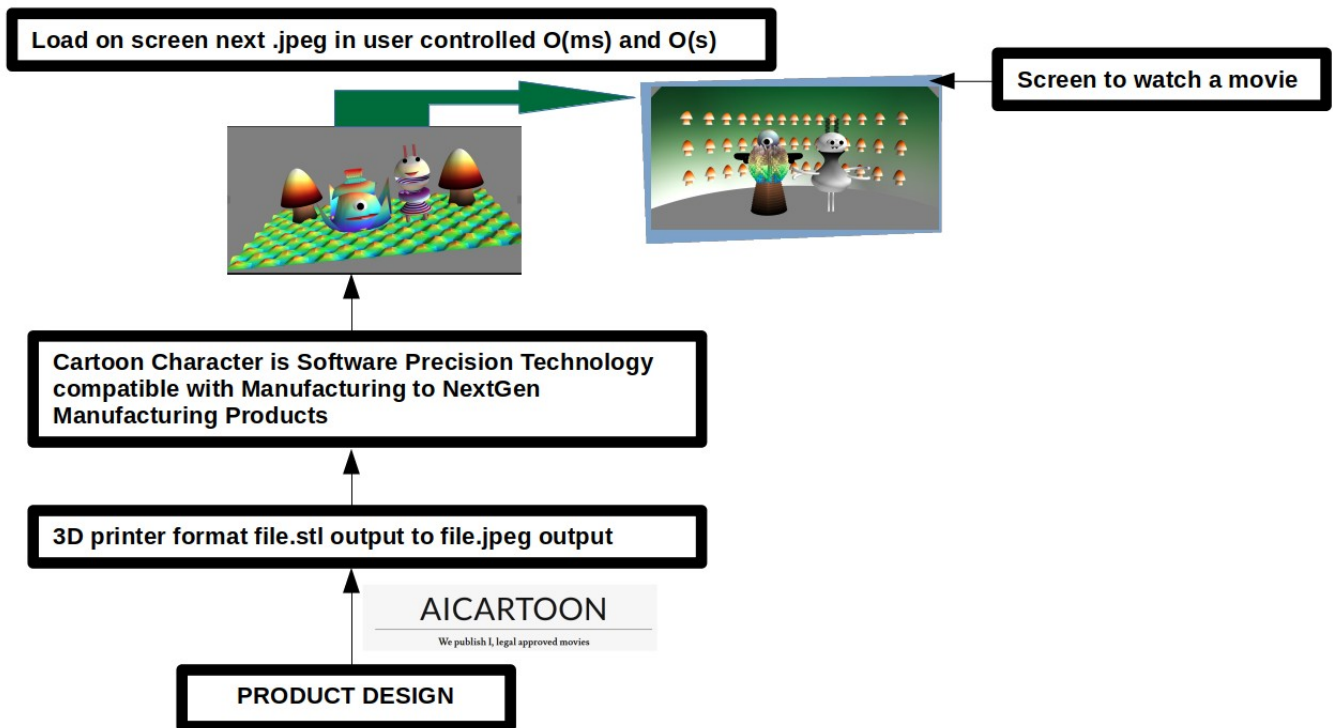
Figure 2. Schematic illustration of Product Design of Cartoon Character to a software film format movie, example .mp4

3.1 AICartoon Software Technology cartoon design algorithm

```
source: [
    for i in range(10):\n,
    for j in range(10):\n,
x0 = 2 * (i-5)\n,
z0 = 2 * j-5\n,
y0 = sqrt(300- x0*x0)\n,
t = linspace(0,2*pi,10)\n,
u = cos(t)*pi\n,
x,y,z = sin(u),cos(u),sin(t)\n,
mush=mlab.points3d(x+x0+2,y+y0,z+z0+4,t,colormap = 'Oranges',scale_mode='none')
  ]
 }
],
metadata: {
 kernelspec: {
 display_name: Python 3,
 language: python,
 name: python3
 },
 for j in range(10):\n,
 x0 = 10 * (i-5)\n,
 z0 = 10 * j-5\n,
 y0 = sqrt(3000- x0*x0)\n,
 phi1=np.linspace(0, 2 * np.pi, 100)\n,
```

```
theta1=arccos(np.linspace(0,1,20))\n,
for k in range(15):\n,
x_pol = np.cos(phi1) * np.cos(theta1[k])*5\n,
y_pol = np.sin(phi1) * np.cos(theta1[k])*5\n,
z_pol = np.ones_like(phi1) * np.sin(theta1[k])*5\n,
mlab.points3d(x_pol+x0+10, y_pol+y0, z_pol+z0+20, color=(1,0,0))\n,
s,t = mgrid[0:pi*2:100j, 0:pi*2:100j]\n,
r = (0.5 – 0.2*sin(t/2))*5\n,
x = r* cos(s) \n,
y = r * sin(s) \n,
z= (t/(2*pi)*(1) + 1)*5\n,
mush_stalk = mlab.mesh(x+x0+10,y+y0,z-1.2+z0+15,color=(1,1,1))
```

4. AIDesign Computer Software Technology: Product Demonstration

AIDesign software industry logo is shown in Fig. 3.

4.1. AIDesign Artificial Intelligence opearting system

anaconda python3 Artificial Intelligence opearing system is released by AIDesign Software industry and is downloaded and used to create the cartoon character product designs and the cartoon character product design images are trained using DANN algorithm written in python inbuilt in AIDesign AI operating system software and new cartoon character product designs are predicted using DANN algorithm predictions inbuilt in AIDesign AI operating system software.
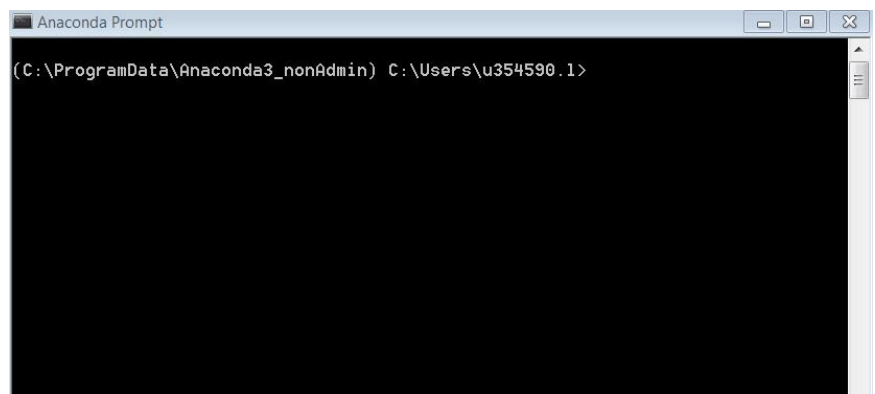

Figure 3. (a) AIDesign engineering analysis and visualization software industry logo (b) Anaconda python3 Artificial Intelligence opearing system released by AIDesign Software industry

4.2. AIDesign Visualization Software

points3d, show, figure, axes, orientation_axes, outline
scale_factor=0.001
scale_mode='vector'
x,y,z is stored in .txt or .csv file
orientation = 'vertical'
figure (bgcolor=None, fgcolor=None)
show()
mayavi2 visualization coded in python3 and saved as plot.py and launched from anaconda python based AI operating system dos prompt terminal with virtualenv==20.0.23; virtualenv aidesignenv

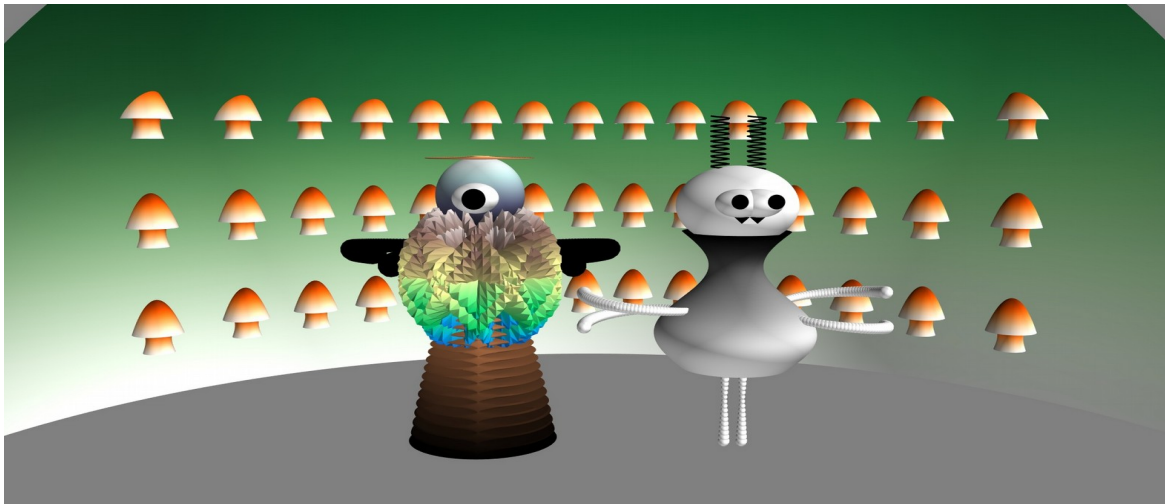and sourcing aidesignenv/bin/activate and running the bash script run.sh the following command python3 plot.py

Figure 4. Software cartoon character images created, using AIDesign commercial software, downloaded from https://AIDesign.today. AIDesign commercial software works with AI operating system terminal based operating system written in python language. The GNU of AIDesign commercial software is loaded from terminal command using AI Operating system and AIDesign commercial software also can be loaded directly clicking the .exe file to use only in Windows operating system.
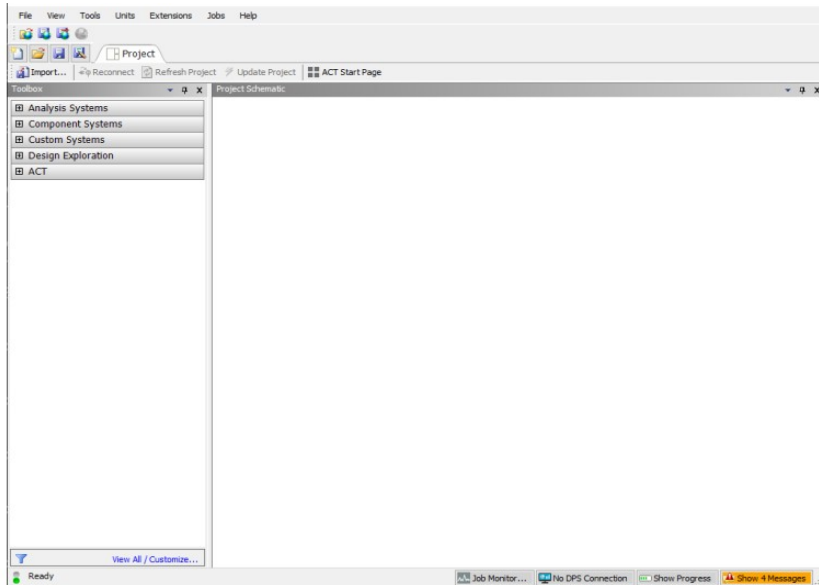
4.3. AIDesign engineering and analysis software GUI

```
PyQt5 import QtCore, QtGui, QtWidgets
from functools import partial
import os, sys
class Ui_MainWindow(QtWidgets.QMainWindow):
self.treeWidget.topLevelItem(3).setText(0, _translate(MainWindow, Design Explorations))
self.treeWidget.topLevelItem(3).setToolTip(0, Design Explorations)
self.tableWidget.setItem(2,0, item3)
    self.tableWidget.setItem(3,0, QtWidgets.QTableWidgetItem(AI Setup Files))
    self.tableWidget.setItem(4,0, QtWidgets.QTableWidgetItem(AI Training))
    self.tableWidget.setItem(5,0, QtWidgets.QTableWidgetItem(AI Pretrained))
    self.tableWidget.setItem(6,0, QtWidgets.QTableWidgetItem(AI Solution))
    self.tableWidget.setItem(7,0, QtWidgets.QTableWidgetItem(Results))
    self.tableWidget.cellClicked.connect(self.getGeometry)
 def open_project(self, MainWindow):
    self.statusbar.showMessage(Opening a Project..)
    options = QtWidgets.QFileDialog.Options()
                        fileName,   _   =   QtWidgets.QFileDialog.getOpenFileName(self,
'QtWidgets.QFileDialog.getOpenFileName()', '', 'Images (*.png *.jpeg *.jpg *.bmp *.gif)',
options=options)
        image = QtGui.QImage(fileName)
       self.imageLabel.setPixmap(QtGui.QPixmap.fromImage(image))
```
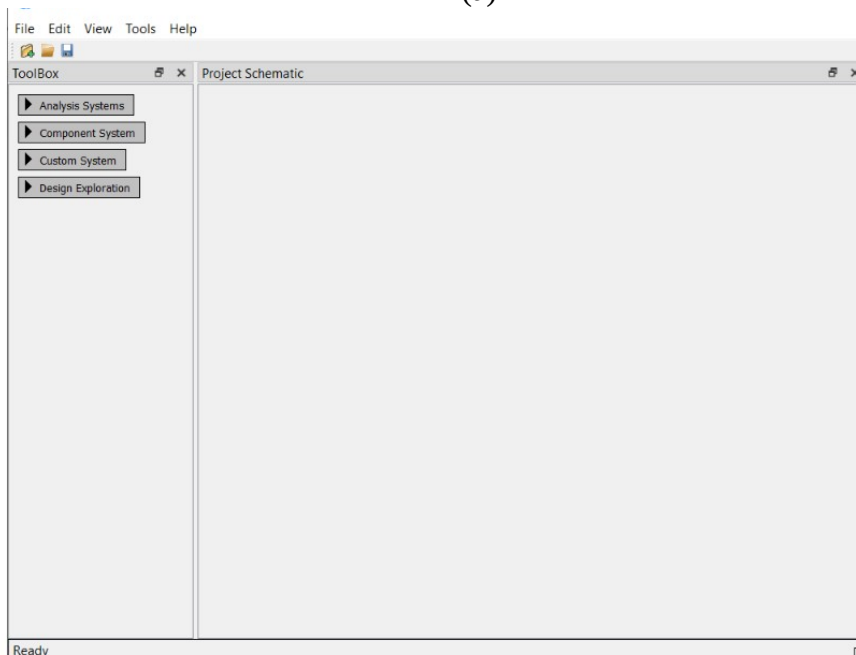
```
    self.scaleFactor = 0.001
    self.tab.setVisible(True)
def getGeometry(self, row, column):
os.system(mayavi2)
```

AIDesign engineering analysis and visualization software GUI is released comparable to Ansys engineering analysis and visualization software

(a)

(b)

Figure 5. (a-b) AIDesign engineering analysis and visualization software GUI is released comparable to Ansys engineering analysis and visualization software

5. Artificial Intelligence Product Design Cartoon Character Training and Prediction

Fig. 4 shows the generation of a complex spiral dress to the top and bottom of the cartoon characters with conventional dark green homogenous ground and gradient green in the front view with mushrooms floating in the gradient green space and the two cartoon characters are steady legged on the dark green homogenous land space. The complex spiral dress for the left cartoon one eyed character is created using multiple Fourier truncated series with additive and multiplicative built-in such truncated functions inside AIDesign commercial software. The complex spiral dress for the two eyed cartoon character is created using trignometric additive and multiplicative built-in such functions inside AIDesign commercial software. The series of structured mushroom layout with similar mushroom is created using operator built-in functions of topology geometry. The color selection for the complete story board shown in Fig. 4 is created using image selection of white/black/green organic dye selection image built-in function numeric code method inside AIDesign commercial software. The placement of the cartoon characters and the mushroom array along with the dark green homogenous land space and gradient green integration with the dark green homogenous land space is automated using in-built function loop for image error tolerance adding/removing extra gradient green to ensure minimization of the numerical error for the numeric values of image color and the locations of cartoon characters.

Fig. 6(a) shows the cartoon character story board of a hetrogenous wavy membrane with fluorescent dye color map coded onto the hetrogenous wavy membrane. The fluorescent dye color map is an option available to choose from the set of color maps inside the AIDesign commercial software. On the surface of the hetrogenous wavy membrane four cartoon characters are placed. One eyed multi-legged cartoon character is floating on the wavy membrane and next to that is a two eyed cartoon character with two antenna on its head and two thin legs resting on the wavy membrane. Further, two mushroom toy design cartoon characters are also standing on the wavy membrane. The color grading of the story board page is generated similar to Fig. 1 to ensure minimization of the numerical error for the numeric values of image color and the locations of cartoon characters.
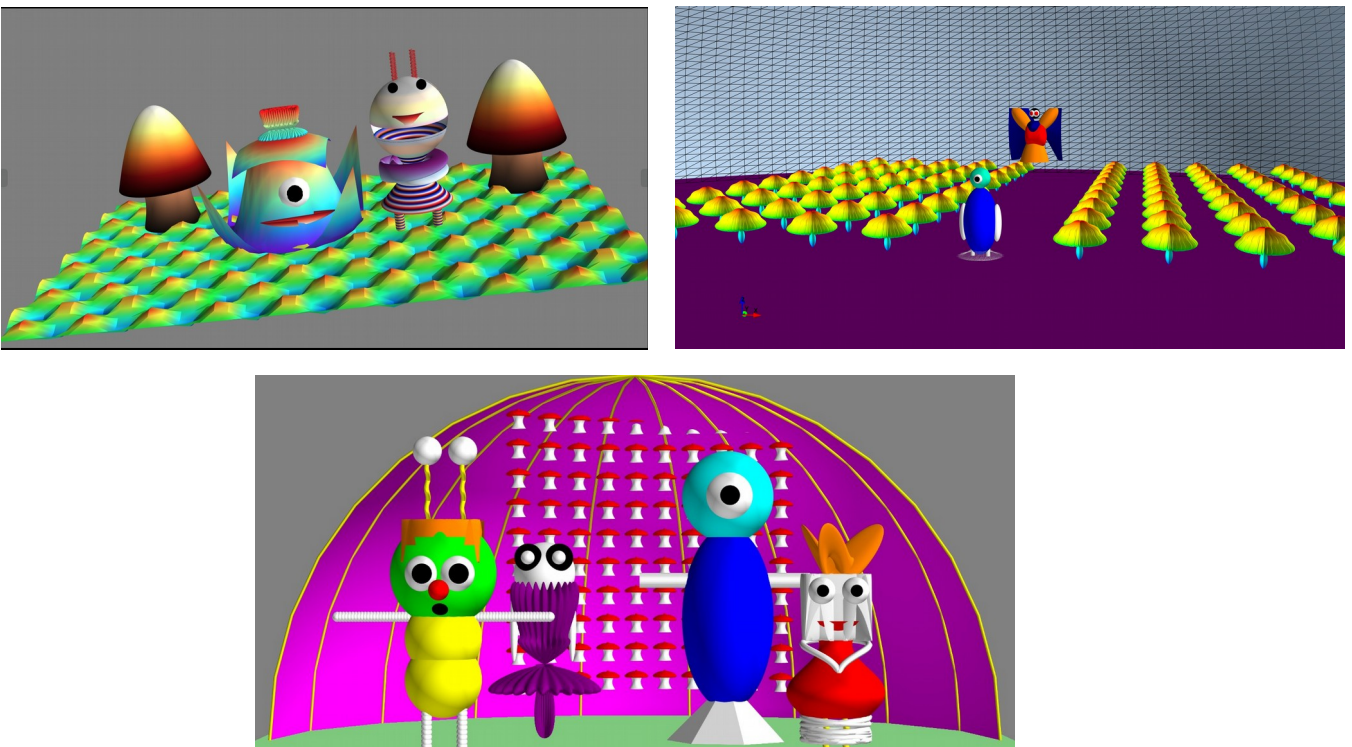
Figure 6 (a-c). Software cartoon character images created, using AIDesign commercial software, downloaded from https://AIDesign.today. AIDesign commercial software works with AI operating system terminal based operating system written in python language. The GNU of AIDesign commercial software is loaded from terminal command using AI Operating system and AIDesign commercial software also can be loaded directly clicking the .exe file to use only in Windows operating system. (b) Software cartoon character images created, using AIDesign commercial software, downloaded from https://AIDesign.today. AIDesign commercial software works with AI operating system terminal based operating system written in python language. The GNU of AIDesign commercial software is loaded from terminal command using AI Operating system and AIDesign commercial software also can be loaded directly clicking the .exe file to use only in Windows operating system. (c) Software cartoon character images created, using AIDesign commercial software, downloaded from https://AIDesign.today. AIDesign commercial software works with AI operating system terminal based operating system written in python language. The GNU of AIDesign commercial software is loaded from terminal command using AI Operating system and AIDesign commercial software also can be loaded directly clicking the .exe file to use only in Windows operating system.

Fig. 6(b) shows the story board predicted using AIDesign commercial software from the input of .jpeg images, Fig. 4 and Fig. 6(a) and the two figures can be trained different ways with AIDesign software providing options to rotate the land space and floating space shown in Fig. 4 and Fig. 6(a). The color grading of the new predicted story board page (see Fig. 6(b)) is generated in the same way as before ensuring MSE minimization. Fig. 6(c) shows an example of a different story board predicted from Fig. 4 and Fig. 6(a) when the land space and floating space in Fig. 4 and Fig. 6(a) are rotated to different degrees and inputted as training. The color grading of the new predicted story board page (see Fig. 6(c)) is generated in the same way as before ensuring MSE minimization of the entire.jpeg cartoon character Product design.

6. Artificial Intelligence Product Design Cartoon Character NextGen Software feature film

The AIDesign DANN software Technology output file product_design_cartoon_output.csv

points3d, show, figure, axes, orientation_axes, outline
scale_factor=0.001
scale_mode='vector'
x,y,z is stored in .txt or .csv file
orientation = 'vertical'
figure (bgcolor=None, fgcolor=None)
show()
mayavi2 visualization coded in python3 and saved as plot.py

ffmpeg -r 1 -i loveinair_%d.jpeg -vf "scale=1920:1080,format=yuv420p" -codec:v libx264 Cartoon_Character_Software_Feature_Film.mp4

7. Artificial Intelligence Product Design Cartoon Character NextGen Software Language text to Coordinates Technology

The AIDesign DANN software Technology output file product_design_cartoon_output.csv

points3d, show, figure, axes, orientation_axes, outline
scale_factor=0.001
scale_mode='vector'
x,y,z is stored in .txt or .csv file
orientation = 'vertical'
figure (bgcolor=None, fgcolor=None)
show()
mayavi2 visualization coded in python3 and saved as plot.py
ffmpeg -r 1 -i loveinair_%d.jpeg -vf "scale=1920:1080,format=yuv420p" -codec:v libx264 Cartoon_Character_Software_Feature_Film.mp4

7. Artificial Intelligence Product Design Cartoon Character NextGen Manufacturing Products

8. Conclusions

Here we present for the first time a novel artificial intelligence technology use for the creation of story board and software feature film. Also, we illustrate AIDesign commercial software generates the story board and also predicts the new page in the story board, by extrapolating the existing story board pages. The main difference between the AIDesign commercial software with earlier

international cinema studio industry using Celtx commercial software is that our AIDesign software creates the story board using trignometric operators, truncated Fourier series operators and creates/predicts the future new story board page in millisecond time that is four orders of magnitude faster than Celtx software. Another niche aspect discussed in this paper is that the art and design illustrated here, enables the manufacturing of the product design seen in the science of 2021. The rapid software feature film product creation in millisecond time makes the formidable difference from other international cinema studio industry like Disney and Pixar (Co-product) of Disney that have guild certification.

9. Credit authorship contribution statement

Sarthak Shreyas, Shriram Elangovan, Guru Viknesh, Shania Mitra, Huzaifa Mustafa Unjhawala, Naresh Kumar, Nilotpal Chakraborty - written the python code to product design the cartoon character .jpeg images, Vishal Nandigana – conceptualized, written the python code for AIDesign DANN software technology, AIDesign GUI software technology, AICartoon software feature film software technology, AIDesign DANN hardware chip technology

10. Declaration of competing interest

The authors declare no potential competing interest or conflict of interest was reported by the authors

11. Acknowledgements

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