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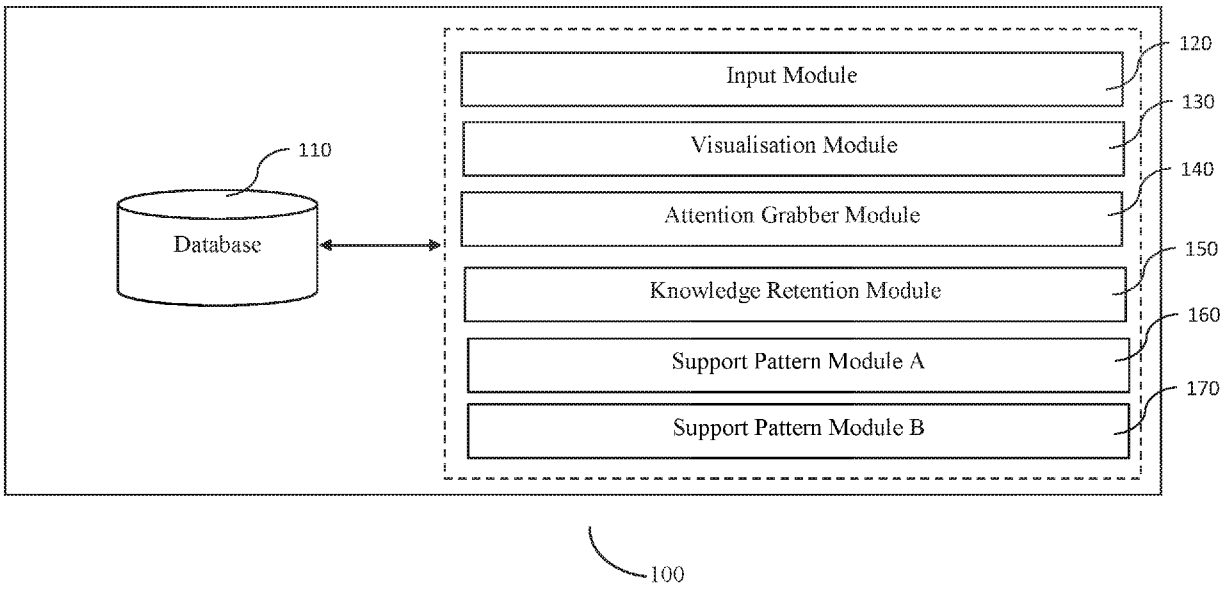

Figure 1

(57) Abstract: The present invention provides a system (100) for analysing problems in design phase of a product comprising: a database (110), configured to store data related to the product, characterized in that, the system (100) further comprises: an input module (120), configured to input a problem statement of the product by a user; a visualisation module (130), configured to provide a visualisation model of the inputted problem for the user; an attention grabber module (140), configured to highlight necessary information related to the problem on the visualisation model for the user to focus on; a knowledge retention module (150), configured to receive the solution from the user based on the stored previous solutions, for solving the problem; a support pattern module A (160), configured to provide assistance to the user while inputting the solution; and a support pattern module B (170), configured to provide supporting tools for the user to record the data related to the problems and its solution identified for the product.

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A TECHNOLOGY ASSISTED PROBLEM SOLVING SYSTEM AND METHOD THEREOF

FIELD OF INVENTION

The invention relates to an interactive multimedia problem solving system. More particularly, the invention relates to a system and method for analysing a technology assisted problem during a design phase of a product.

BACKGROUND OF THE INVENTION

Analysis and simulation software is an indispensable tool in the development of large-scale machinery. These tools allow the developer to evaluate designs early in the design cycle, determine causes of premature failures in the field, quickly explore design changes aimed at reducing cost and weight, and determine the product's factor of safety. Use of the analysis tools is of particular value to machine designers due to the size and complexity of the systems they are developing. The analysis tools can identify design issues that may elude a designer's review simply because of the dynamic nature of machinery's many moving parts.

The unyielding demands upon machinery manufacturers by customers and the market to create systems that are cheaper, more reliable, and more productive necessitate that companies that wish to remain successful utilize all the tools available to them. These analysis tools reduce product development costs through a reduction of late engineering changes. They ensure the products reach the market promptly, allowing the product to capture the largest piece of the market possible. Finally, it allows engineers to experiment with materials and designs that can result in products of minimal weight and cost. Analysis software enables engineers to simulate design performance and identify and address potential design problems before prototyping and production.

Regardless of the specific application, machine designers are under pressure from their customers: increase reliability and longevity; be quicker to market with new, improved products; reduce product weight and cost; and increase productivity. Working in this type of environment, the engineers have little time to produce multiple prototypes and use trial and error to gain a better understanding of the physical behaviour of their designs. Yet, that information is vital for producing innovative, high-quality products.

The analysis tools also helps the machine designers to understand the physical behaviour of their designs quickly without resorting to expensive prototypes and physical tests that extend the product design cycle. Further, the analysis tools can substantially reduce the number of ECOs, missed deadlines due to redesigns late in the design cycle, and costly redesigns at manufacturing time. All of these markedly decrease development costs and time-to-market. Furthermore, these analysis tools increase communication between design, sales, marketing, manufacturing, and the customer through their easy-to-read and understandable graphical results.

The analysis tools also carryout motion analysis which is extremely valuable in the development of the machines are, by their nature, extremely complex, dynamic assemblies. Running the motion analysis allows designers to perform virtual testing before manufacturing physical prototypes, saves time and money during the iterative design cycle. Changes prior to cutting metal are far cheaper and quicker to enact. This motion analysis allows the designer to learn more about the machinery in the concept phase and perform dynamic interference detection prior to building engineering models. However, the existing tools are not reliable as they do provide only detection of the problems. Further, they are not designed to solve engineering problems in a step-by-step fashion.

Therefore, there is need for such a system that use patterns of interactions for solving

the engineering problem related to relative motion analysis based on step-by-step method.

SUMMARY OF INVENTION

The present invention provides a system for analysing problems in design phase of a product comprising: a database, configured to store data related to the product, wherein the data comprises but not limited to previous engineering problems and their solutions related to the product, characterized in that, the system further comprises: an input module, configured to input a problem statement of the product by a user; a visualisation module, configured to provide a visualisation model of the inputted problem for the user; an attention grabber module, configured to highlight necessary information related to the problem on the visualisation model for the user to focus on; a knowledge retention module, configured to receive the solution from the user based on the stored previous solutions, for solving the problem; a support pattern module A, configured to provide assistance to the user while inputting the solution; and a support pattern module B, configured to provide supporting tools for the user to record the data related to the problems and its solution identified for the product.

Preferably, the visualisation module comprising: a graph generator controller, configured to generate a graph for the inputted problem; a two dimensional animation controller, configured to generate a two dimensional model for the inputted problem; a three dimensional model controller, configured to generate a three dimensional model for the inputted problem; a stereoscopic three dimensional viewer, configured to provide stereoscopic views of different angles for the generated three dimensional models; a multi-dimensional three dimensional viewer, configured to provide multi-dimensional views at different angles for the generated three dimensional models; a three dimensional trail generator and controller, configured to assist the user in visualizing motion trail of the inputted model in the three dimensional form; and a

zooming module, configured to provide the user with zoom in and zoom out features on the generated three dimensional models.

Preferably, the attention grabber module comprising: an expand and hide effect module, configured to provide the user with the effects to expand contents or hide unnecessary contents on the visualisation model; a blinking effect module, configured to provide a blinking effect on the data, for indicating the user to provide required data for the model; an animated line marking module, configured to highlight equation required in a calculation based on the movement of the model; and an animated arrow effect module, configured to show the user about the part of the model to focus on.

Preferably, the knowledge retention module comprising: a point click response module, configured to allow the users to choose solutions available for the problem and provide feedback on the chosen solution for the problem, wherein the user is provide with an exercise; a learning module, configured to provide an explanation for the generated graphs and three-dimensional models, for the user to understand about the problem; a solution input module, configured for the user to key in the chosen solution for the problem; a solution checker module, configured to check whether the key in solution is appropriate for the problem; an information module, configured to remind the user on fundamental concepts of mechanics dynamics based on the keyed solution; and a hoovering module, configured to provide hoovering effects over the models included with the solution.

Preferably, the supportive pattern module A comprising: a nomenclature module, configured to provide explanation for the user on the metric systems and its purpose for the inputted solution; an assistant module, configured to provide description of the icons in the system for the user to use while inputting the solution; and a glossary module, configured to search for the technical terms and its definition for the inputted solution.

Preferably, the supportive pattern module B comprising: a sticky note module, configured to assist the user in taking notes of during the interaction; a calculating module, configured to assist the user during the problem solving; a note recording pad module, configured to support the user with the notes taking and calculation purposes; and a narration module, configured to assist the user throughout the problem solving steps.

The present invention also provides a method for analysing problems in design phase of a product comprising the steps of: storing in a database, data related to the product, wherein the data comprises but not limited to previous engineering problems and their solutions related to the product, characterized in that, the method further comprising the steps of: inputting, via an input module, a problem statement of the product by a user; providing, by a visualisation module, a visualisation model of the inputted problem for the user; highlighting, by an attention grabber module, necessary information related to the problem on the visualisation model for the user to focus on; receiving, by a knowledge retention module, the solution by the user based on the stored previous solutions related, for solving the problem; providing, by a support pattern module A, assistance to the user while inputting the solution; and providing, by a support pattern module B, supporting tools for the user to record the data related to the problems and its solution identified for the product.

Preferably, the steps of providing the visualisation model of the inputted problem by the visualisation module comprising: generating, by a graph generator controller, a graph for the inputted model; generating, by a two dimensional animation controller, a two dimensional model for the inputted model; generating, by a three dimensional model controller, a three dimensional model for the inputted model; providing, by a stereoscopic three dimensional viewer, stereoscopic views of different angles for the generated three dimensional models; providing by a multi-dimensional three dimensional viewer, multi-dimensional views at different angles for the generated three

dimensional models; assisting, by using a three dimensional trail generator and controller, the user in visualizing motion trail of the inputted model in the three dimensional form; and providing, by a zooming module, the user with zoom in and zoom out features on the generated three dimensional models.

Preferably, the steps of highlighting necessary information related to the problem on the visualisation model, by an attention grabber module comprising: providing, by an expand and hide effect module, the user with the effects to expand contents or hide unnecessary contents of the model; providing, by a blinking effect module, a blinking effect on the model, for indicating the user to provide required data for the model; highlighting, by an animated line marking module, equation required in a calculation based on the movement of the model; and highlighting, by an animated arrow effect module, the user about the part of the model to focus on.

Preferably, steps of receiving the solution from the user by the knowledge retention module comprising: allowing, by a point click response module, the users to choose solutions available for the problem and providing feedback on the chosen solution for the problem, wherein the user is provided with an exercise; providing, by a learning module, an explanation for the generated graphs and three-dimensional models, for the user to understand about the problem; keying in, in a solution input module, the chosen solution for the problem by the user; checking, by a solution checker module, whether the entered solution is appropriate for the problem; reminding, by an information module, the user on fundamental concepts of mechanics dynamics based on the keyed solution; and providing, by a hoovering module, hoovering effects over the models included with the solution.

Preferably, the steps of providing assistance to the user by using the supportive pattern module A comprising: providing, by a nomenclature module, an explanation for the user on the metric systems and its purpose based on the inputted solution; providing,

by an assistant module, a description on the icons in the system for the user to use while inputting the solution; and searching, by a glossary module, for the technical terms and its definition for the inputted solution.

Preferably, the steps of providing supporting tools by using the supportive pattern module B comprising: assisting, by using a sticky note module, the user in taking notes; assisting, by using a calculating module, by the user during the problem solving; supporting, by using a note recording pad module, the user with the notes taking and calculation purposes; and assisting, by using a narration module, the user throughout the problem solving steps.

One skilled in the art will readily appreciate that the invention is well adapted to carry out the objects and obtain the ends and advantages mentioned, as well as those inherent therein. The embodiments described herein are not intended as limitations on the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For the purpose of facilitating an understanding of the invention, there is illustrated in the accompanying drawing the preferred embodiments from an inspection of which when considered in connection with the following description, the invention, its construction and operation and many of its advantages would be readily understood and appreciated.

Figure 1 illustrates the block diagram of the system to analyse problems in design phase of a product.

Figure 2 illustrates a block diagram of a visualisation module.

Figure 3 illustrates a block diagram of an attention grabber module.

Figure 4 illustrates a block diagram of a knowledge retention module.

Figure 5 illustrates a block diagram of a support pattern module A.

Figure 6 illustrates a block diagram of a support pattern module B.

DETAILED DESCRIPTION OF THE INVENTION

The invention will now be described in greater detail, by way of example, with reference to the drawings.

The present invention provides a system using patterns of interactions for solving an engineering problem for relative motion analysis based on step-by-step method. The advantages are flexibility to use, navigate, solve, comprehend, repeat and visualize the same problem supplemented with preferably using 25 patterns of interactions till user understands the concepts better in which the focus to solve the problem.

The present invention also provides the system and method that could be re-used to design and include other engineering problems provided the design is customized to solve that particular problem.

Further, the present invention provides the system and method to visualize the relative motion analysis with regards to the animation.

Referring to figure 1, illustrates the block diagram of the system (100) to analyse problems in design phase of the product comprises: a database (110), an input module (120), a visualisation module (130), an attention grabber module (140), a knowledge

retention module (150), a support pattern module A (160) and a support pattern module B (170).

The database (110), configured to store data related to the product. Preferably, the data relates but not limited to previous engineering problems and their solutions of the product.

The input module (120), configured to input a problem statement of the product by a user. Preferably, the problem statement is about relative motive analysis of the product.

The visualisation module (130), configured to generate a visualisation model of the inputted problem for the user. Preferably, the visualisation model is presented in two dimensional and three dimensional mode.

The attention grabber module (140), configured to highlight necessary information related to the problem on the visualisation model for the user to focus on. Preferably, the attention grabber module (140), is configured to grab or retain the user's attention during problem solving.

The knowledge retention module (150), configured to input the solution by the user based on the stored previous solutions related, for solving the problem. The knowledge retention module (150), preferably configured to recall the knowledge learned previously or to revise the fundamental knowledge of the mechanics dynamics or strengthen the knowledge/principles needed to solve the inputted problem.

The support pattern module A (160), configured to provide assistance to the user while inputting the solution.

The support pattern module B (170), configured to provide supporting tools for the user

to record the data related to the problems and its solution identified for the product. Further, the supporting tools provided for the users throughout the learning process.

Referring to figure 2, illustrates the block diagram of the visualization module (130) comprises of: a graph generator controller (131), a two dimensional animation controller (132), a three dimensional model controller (133), a stereoscopic three dimensional viewer (134), a multi-dimensional viewer (135), a three dimensional trail generator and controller (136) and a zooming module (137).

The graph generator controller (131), configured to generate a graph for the inputted problem. Preferably, the graph generator controller (131) is also configured to support the user's interaction with the graph generation in the graph mode.

The two dimensional animation controller (132), configured to generate a two dimensional model for the inputted problem. Preferably, the two dimensional animation controller (132) is configured to support the user's interaction with the two dimensional animation to see the movement possibility for the two dimensional engineering mode.

The three dimensional model controller (133), configured to generate a three dimensional model for the inputted problem.

The stereoscopic three dimensional viewer (134), configured to provide stereoscopic views of different angles for the generated three dimensional models.

The multi-dimensional three dimensional viewer (135), configured to provide multi-dimensional views at different angles for the generated three dimensional models.

The three dimensional trail generator and controller (136), configured to assist the user in visualizing motion trail of the inputted problem in the three dimensional form.

The zooming module (137), configured to provide the user with zoom in and zoom out features on the generated three dimensional models.

The above mentioned seven modules (131 to 137) are related to support the visualization tasks when the users interact with the enhanced multimedia. The modules (133 to 137) are also configured to support the user's interaction in three dimensional mode.

Referring to figure 3, illustrates block diagram of the attention grabber module (140) comprises of: an expand & hide effect module (141), a blinking effect module (142), an animated line marking module (143) and an animated arrow effect module (144).

The expand and hide effect module (141), is preferably configured to play the role to expand the contents or hide unnecessary contents of the visualisation model and the system (100). This would allow the user to focus on certain portion of the contents that are needed at that instant without losing the focus when following the procedure for problem solving. However, the user can choose to hide or expand the contents according to their personal needs and preferences. This can help to accommodate to different user's preference in learning.

The blinking effect (142), the animated line marking module (143) and the animated arrow effect module (144), are configured to provide focus for the user on the important statement or figure on the visualisation model when solving the engineering problem.

The blinking effect module (142), is preferably configured to attract the user's attention especially on the initial stage of problem solving. For example, when certain variables are required for problem solving, the variables would be blinking for few times, thus grab the user's attention to identify given variables that are needed for calculation.

The animated line marking module (143) is preferably configured to highlight the necessary equations that are required in calculation based on the movement of the model in the visualisation model at specific instant.

The animated arrow effect module (144), is preferably configured to pin point in the visualisation model (i.e, an engineering diagram) the part that the user needs to focus at each step. For an example if the engineering diagram includes collar or rod, the specific location and movement of the collar or rod at certain instant. Further, the animated arrow effect module (144) is configured to provide mouse over highlighting effect to support the user's interaction with the text based contents that are associated with the details shown in the engineering diagram. For example, when certain text is highlighted, the engineering diagram would display extra information.

Referring to figure 4, illustrates the block diagram of the knowledge retention module (150) comprises of: a point click response module (151), a learning module (152), a solution input module (153), a solution checker module (154), an information module (155) and a hoovering module (156). The point click response module (151) and the learning module (152) are in problem module.

The point click response module (151), preferably configured to provide exercises for the user to interact with the options available for each of the exercise question. Further, the point click response module (151), configured to provide response immediately right after the user performed the selection. The user may receive the feedback directly through the system (100).

The learning module (152) is available on the graph module to strengthen the user's understanding on different dynamic movement of the engineering model that lead to generate different form of graphs (e.g. position, velocity & acceleration of the particular

collar based on x-axis, y-axis and z-axis).

The remaining four modules which are solution input module (153), solution checker module (154), information module (155) and the hoovering module (156) are available in the solution module.

The solution input module (153), configured to allow the user to key in the correct solution for certain steps in problem solving. Preferably, the user can key in the solution by searching for the existing solution available in the database

The solution checker module (154) configured to provide the instant feedback based on the solution provided by the user. Few attempts from the user are allowed before the accurate solution is provided together with explanation.

The information module (155), configured to remind the user regarding the fundamental concept / principle in mechanics dynamics. For example, the assumptions that the user needs to know if the initial linear velocity and initial linear acceleration were mentioned in the engineering problem.

The hovering effect module (156), configured to act as the interaction pattern by which when the mouse move over the particular text or graphic elements, some information would be displayed and opt for further selection that the user need to perform.

Referring to figure 5, illustrates the block diagram of the supportive patterns module A (160) comprises of a nomenclature module (161), an assistant module (162) and a glossary module (163).

The nomenclature module (161), configured to provide the basic explanation regarding the definition of the SI unit and its purpose for mechanics dynamics course.

The assistant module (162), configured to assist the user to use the features in the system (100) whenever it is necessary.

The glossary module (163), configured to support the explanation of the engineering technical terms use in dynamics course.

Referring to figure 6, illustrates the block diagram of the supportive pattern module B (170) comprises: a sticky note module (171), a calculating module (172), a note recoding pad module (173) and a narration module (174).

The sticky note module (171), configured to record the notes (in short form) as a reminder throughout the problem solving process.

The calculating module (172), configured to be used by the user when dealing with complex calculations.

The notes recording pad module (173), configured for the users to key in their own study notes related to dynamics course.

The narration module (174), configured to provide with on/off feature to on or mute the narration sound in the system (100). This provides an option for the visual learning preference user to off the narration sound if it is found to be unnecessary or cause any disturbance.

In an embodiment, the present invention also provides the method to analyse problems in design phase of the product comprising the steps to: store in a database (110), data related to the product; input, via an input module (120), a problem statement of the product by a user; provide, by the visualisation module (130) a visualisation model of

the inputted problem for the user; highlight, by an attention grabber module (140), necessary information related to the problem on the visualisation model for the user to focus on; receive, by a knowledge retention module (150), the solution from the user based on the stored previous solutions related, for solving the problem; provide, by a support pattern module A (160), assistance to the user while inputting the solution; and provide, by a support pattern module B (170), supporting tools for the user to record the data related to the problems and its solution identified for the product.

The present disclosure includes as contained in the appended claims, as well as that of the foregoing description. Although this invention has been described in its preferred form with a degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangements of parts may be resorted to without departing from the scope of the invention.

CLAIMS

1. A system (100) for analysing problems in design phase of a product comprising:

a database (110), configured to store data related to the product, wherein the data comprises but not limited to previous engineering problems and their solutions related to the product,

characterized in that, the system (100) further comprises:

an input module (120), configured to input a problem statement of the product by a user;

a visualisation module (130), configured to provide a visualisation model of the inputted problem for the user;

an attention grabber module (140), configured to highlight necessary information related to the problem on the visualisation model for the user to focus on;

a knowledge retention module (150), configured to receive the solution from the user based on the stored previous solutions, for solving the problem;

a support pattern module A (160), configured to provide assistance to the user while inputting the solution; and

a support pattern module B (170), configured to provide supporting tools for the user to record the data related to the problems and its solution identified for the product.

2. The system (100) according to claim 1, wherein the visualisation module (130) comprising:

a graph generator controller (131), configured to generate a graph for the inputted problem;

a two dimensional animation controller (132), configured to generate a two dimensional model for the inputted problem;

a three dimensional model controller (133), configured to generate a three dimensional model for the inputted problem;

a stereoscopic three dimensional viewer (134), configured to provide stereoscopic views of different angles for the generated three dimensional models;

a multi-dimensional three dimensional viewer (135), configured to provide multi-dimensional views at different angles for the generated three dimensional models;

a three dimensional trail generator and controller (136), configured to assist the user in visualizing motion trail of the inputted model in the three dimensional form; and

a zooming module (137), configured to provide the user with zoom in and zoom out features on the generated three dimensional models.

3. The system (100) according to claim 1, wherein the attention grabber module (140) comprising:

an expand and hide effect module (141), configured to provide the user with the effects to expand contents or hide unnecessary contents on the visualisation model;

a blinking effect module (142), configured to provide a blinking effect on the data, for indicating the user to provide required data for the model;

an animated line marking module (143), configured to highlight equation required in a calculation based on the movement of the model; and

an animated arrow effect module (144), configured to show the user about the part of the model to focus on.

4. The system (100) according to claim 1, wherein the knowledge retention module (150) comprising:

a point click response module (151), configured to allow the users to

choose solutions available for the problem and provide feedback on the chosen solution for the problem, wherein the user is provide with an exercise;

a learning module (152), configured to provide an explanation for the generated graphs and three-dimensional models, for the user to understand about the problem;

a solution input module (153), configured for the user to key in the chosen solution for the problem;

a solution checker module (154), configured to check whether the key in solution is appropriate for the problem;

an information module (155), configured to remind the user on fundamental concepts of mechanics dynamics based on the keyed solution; and

a hoovering module (156), configured to provide hoovering effects over the models included with the solution.

5. The system (100) according to claim 1, wherein the supportive pattern module A (160) comprising:

a nomenclature module (161), configured to provide explanation for the user on the metric systems and its purpose for the inputted solution;

an assistant module (162), configured to provide description of the icons in the system (100) for the user to use while inputting the solution; and

a glossary module (163), configured to search for the technical terms and its definition for the inputted solution.

6. The system (100) according to claim 1, wherein the supportive pattern module B (170) comprising:

a sticky note module (171), configured to assist the user in taking notes of during the interaction;

a calculating module (172), configured to assist the user during the problem solving;

a note recording pad module (173), configured to support the user with

the notes taking and calculation purposes; and

a narration module (174), configured to assist the user throughout the problem solving steps.

7. A method for analysing problems in design phase of a product comprising the steps of:

storing in a database (110), data related to the product, wherein the data comprises but not limited to previous engineering problems and their solutions related to the product,

characterized in that, the method further comprising the steps of:

inputting, via an input module (120), a problem statement of the product by a user;

providing, by a visualisation module (130), a visualisation model of the inputted problem for the user;

highlighting, by an attention grabber module (140), necessary information related to the problem on the visualisation model for the user to focus on;

receiving, by a knowledge retention module (150), the solution by the user based on the stored previous solutions related, for solving the problem;

providing, by a support pattern module A (160), assistance to the user while inputting the solution; and

providing, by a support pattern module B (170), supporting tools for the user to record the data related to the problems and its solution identified for the product.

8. The method according to claim 7, wherein the steps of providing the visualisation data by the visualisation module (130) comprising:

generating, by a graph generator controller (131), a graph for the

inputted model;

generating, by a two dimensional animation controller (132), a two dimensional model for the inputted model;

generating, by a three dimensional model controller (133), a three dimensional model for the inputted model;

providing, by a stereoscopic three dimensional viewer (134), stereoscopic views of different angles for the generated three dimensional models;

providing by a multi-dimensional three dimensional viewer (135), multi-dimensional views at different angles for the generated three dimensional models;

assisting, by using a three dimensional trail generator and controller (136), the user in visualizing motion trail of the inputted model in the three dimensional form; and

providing, by a zooming module (137), the user with zoom in and zoom out features on the generated three dimensional models.

9. The method according to claim 7, wherein the steps of analysing the visualisation of the model, by an attention grabber module (140) comprising:

providing, by an expand and hide effect module (141), the user with the effects to expand contents or hide unnecessary contents of the model;

providing, by a blinking effect module (142), a blinking effect on the model, for indicating the user to provide required data for the model;

highlighting, by an animated line marking module (143), equation required in a calculation based on the movement of the model; and

highlighting, by an animated arrow effect module (144), the user about the part of the model to focus on.

10. The method according to claim 1, wherein steps of receiving the solution from the user by the knowledge retention module (150) comprising:

allowing, by a point click response module (151), the users to choose solutions available for the problem and providing feedback on the chosen solution for the problem, wherein the user is provided with an exercise;

providing, by a learning module (152), an explanation for the generated graphs and three-dimensional models, for the user to understand about the problem;

keying in, in a solution input module (153), the chosen solution for the problem by the user;

checking, by a solution checker module (154), whether the entered solution is appropriate for the problem;

reminding, by an information module (155), the user on fundamental concepts of mechanics dynamics based on the keyed solution; and

providing, by a hoovering module (156), hoovering effects over the models included with the solution.

11. The method according to claim 7, wherein the steps of providing assistance to the user by using the supportive pattern module A (160) comprising:

providing, by a nomenclature module (161), an explanation for the user on the metric systems and its purpose based on the inputted solution;

providing, by an assistant module (162), a description on the icons in the system (100) for the user to use while inputting the solution; and

searching, by a glossary module (163), for the technical terms and its definition for the inputted solution.

12. The method according to claim 7, wherein the steps of providing supporting tools by using the supportive pattern module B (170) comprising:

assisting, by using a sticky note module (171), the user in taking notes;

assisting, by using a calculating module (172), by the user during the problem solving;

supporting, by using a note recording pad module (173), the user with

the notes taking and calculation purposes; and

assisting, by using a narration module (174), the user throughout the problem solving steps.

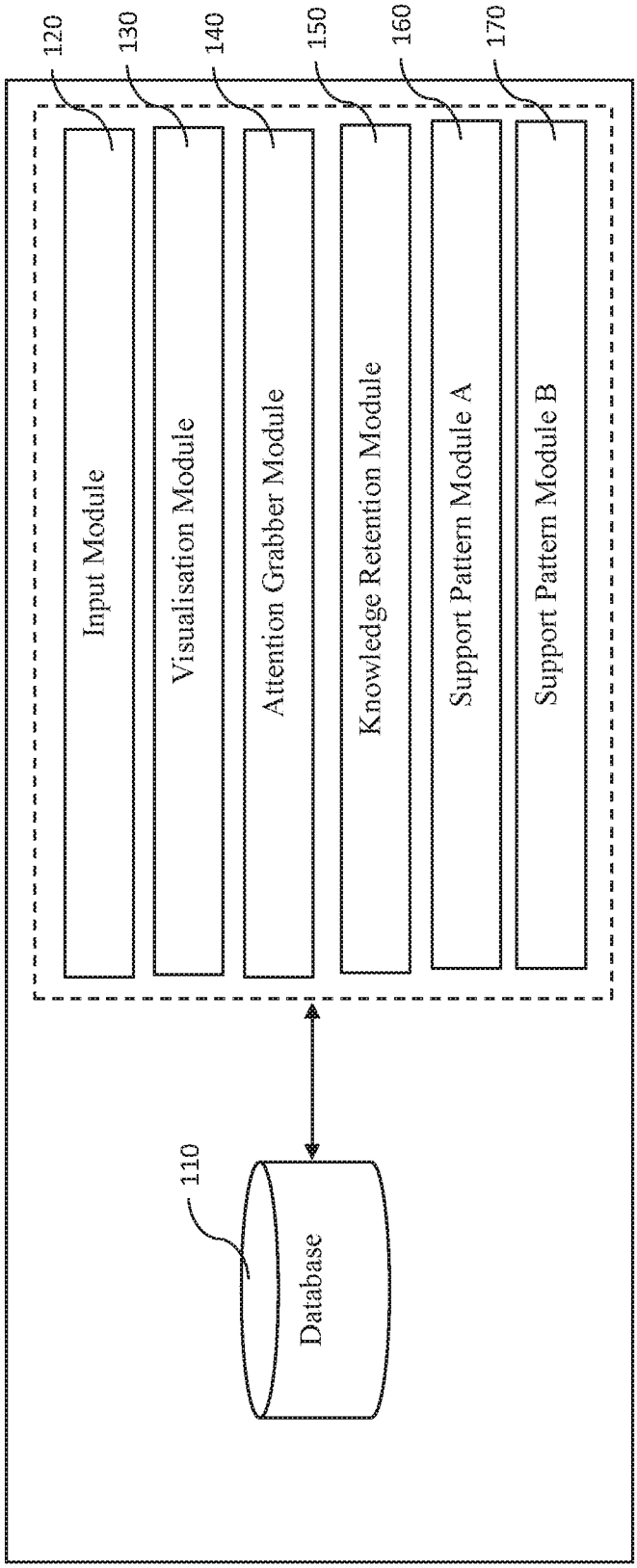
120
130
140
150
160
170
Input Module
Visualisation Module
Attention Grabber Module
Knowledge Retention Module
Support Pattern Module A
Support Pattern Module B
100
110
Database

Figure 1

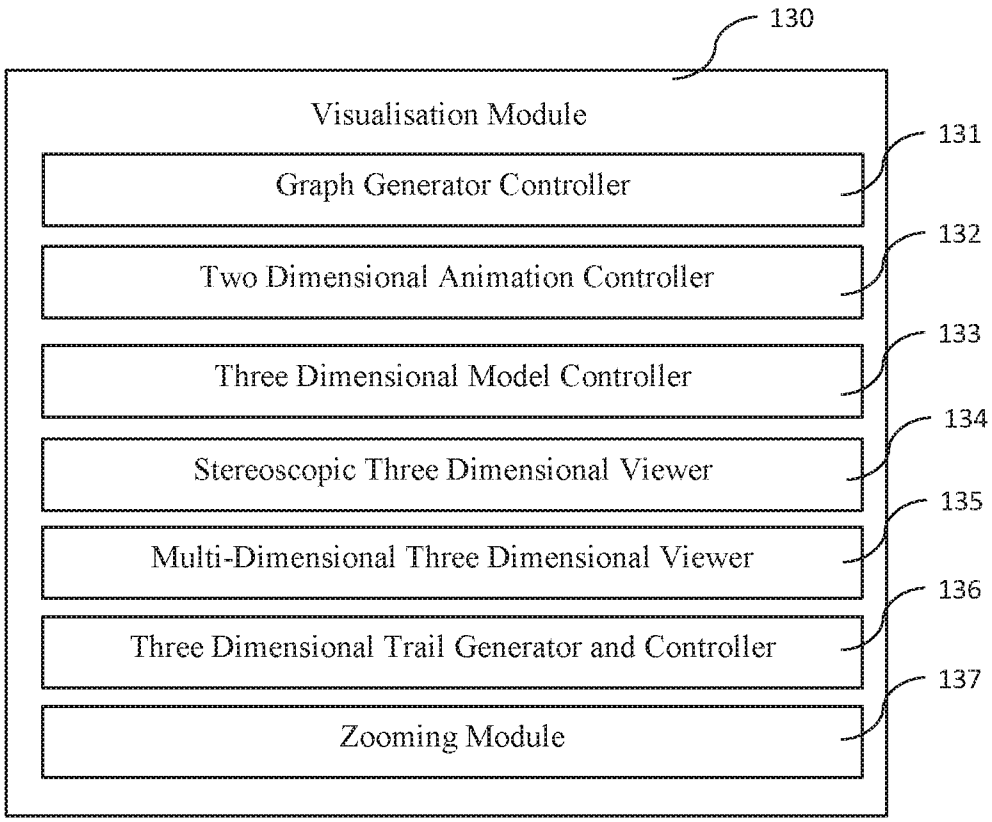

Figure 2

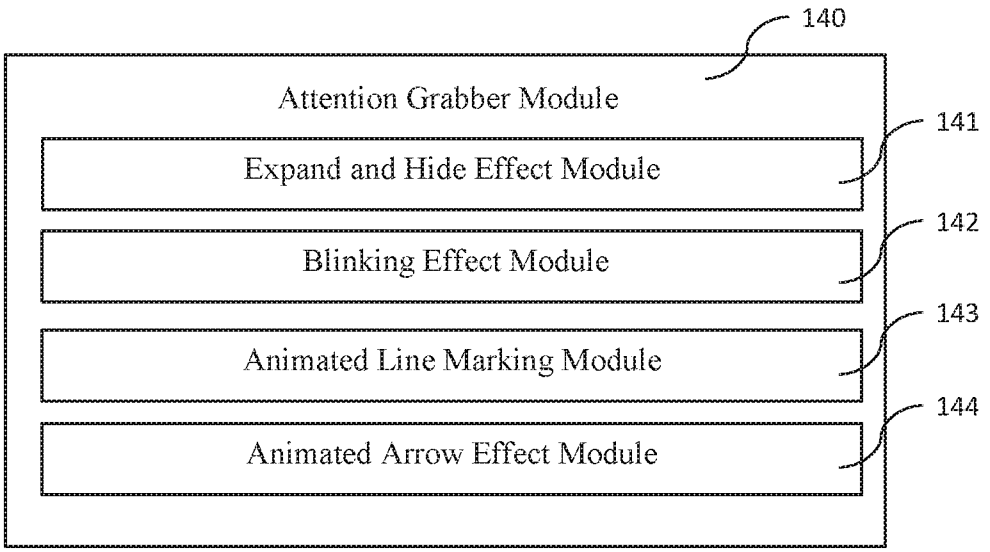

Figure 3

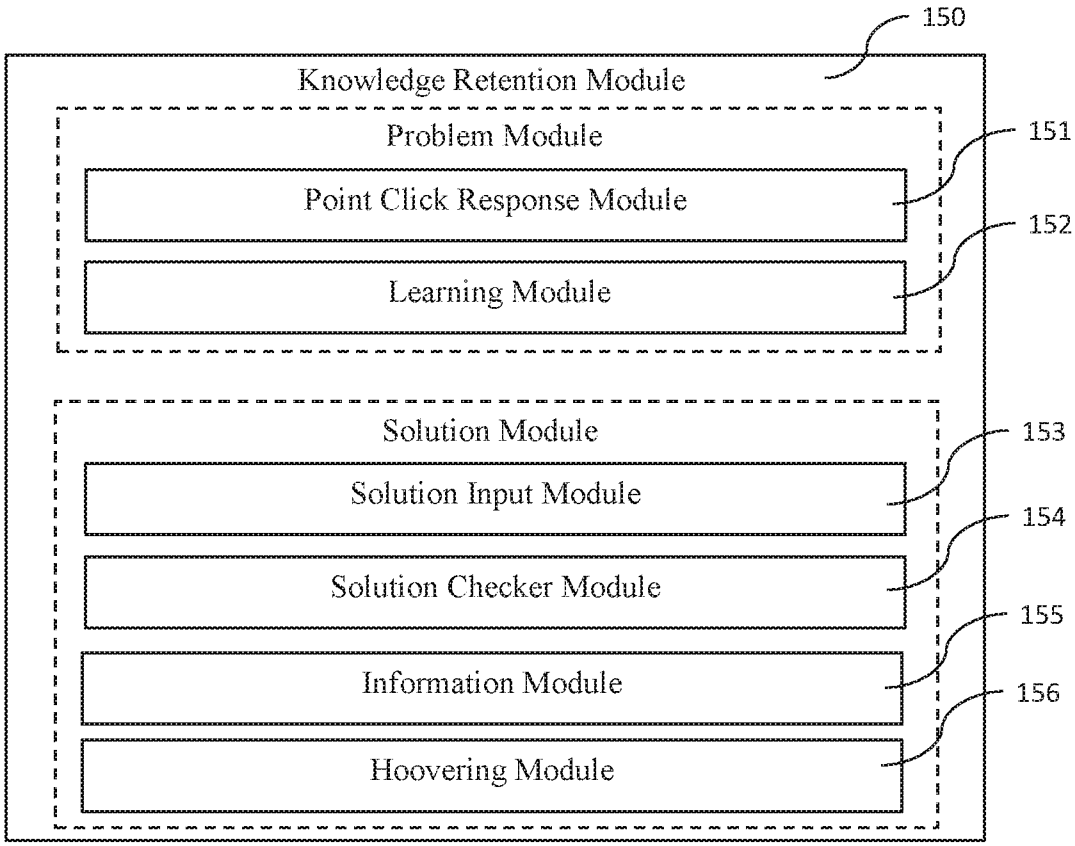

Figure 4

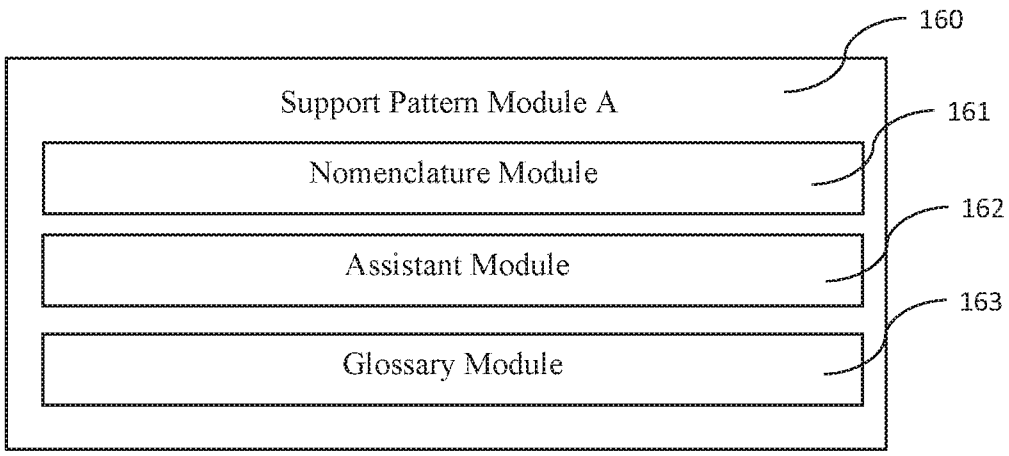

Figure 5

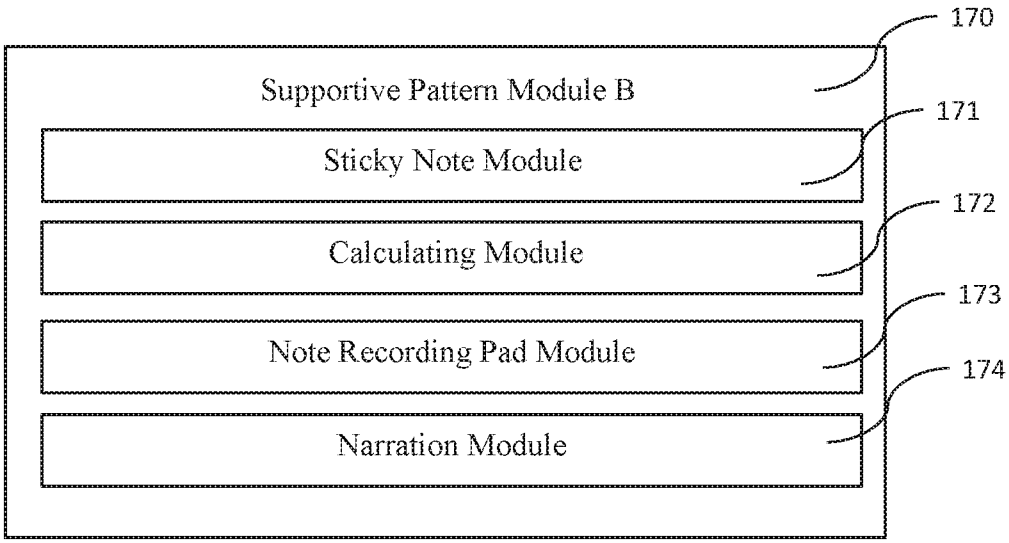
170
Supportive Pattern Module B
171
Sticky Note Module
172
Calculating Module
173
Note Recording Pad Module
174
Narration Module

Figure 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MY2019/050103

A. CLASSIFICATION OF SUBJECT MATTER

G06F 30/00 (2020.01) G06T 19/00 (2011.01) G06F 30/20 (2020.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PATENW: IPC/CPC marks G06F30/00, G06T19/00; keywords system, solve, problem, engineering, previous solution, database, support, focus, highlight, description, calculate, motion dynamics, three dimensional, two dimensional, computer aided design, virtual reality, minimum cost, animate, zoom and like terms.

Google Scholar/Google Patents: keywords solve, engineering problem, previous solutions, technology assisted, simulate, motion dynamics, description, three dimensional, animate, focus, calculate, graph, trail, zoom, hide, expand, blink and like terms.

Applicant/inventor name searches were performed in Google Scholar, Google Patents, Espacenet and internal databases provided by IP Australia.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 February 2020	26 February 2020

Name and mailing address of the ISA/AU	**Authorised officer**
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INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/MY2019/050103**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 5901068 A (BATCHILO et al.) 04 May 1999 whole document, especially: abstract, columns 1, 4, 6-8, 10, 13 whole document, especially: abstract, columns 1, 4, 6-8, 10, 13	1, 5, 7, 11 2-4, 6, 8-10, 12
X A	US 5297057 A (KRAMER et al.) 22 March 1994 whole document, especially: title, columns 4-6, 25, 48, 65	1, 7
X A	US 2016/0125338 A1 (SERAGELDIN et al.) 05 May 2016 whole document, especially: [0002], [0005], [0014], [0112], [0129], [0145], [0150]	1, 7
Y A	SIDHU, M. S., 'Technology-Assisted Problem Solving for Engineering Education: Interactive Multimedia Applications', IGI Global, 2009. whole document, especially: pages 91, 93, 95, 101, 106, 107, 110, 114, 142	2-4, 6, 8-10, 12
A	WO 2018/017626 A2 (BAUDISCH) 25 January 2018	
A	WO 2014/026171 A2 (COMSOL AB et al.) 13 February 2014	
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INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/MY2019/050103**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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		CA 2305588 A1	15 Apr 1999
		EP 1049999 A1	08 Nov 2000
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		CN 104919459 B	06 Feb 2018
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		EP 3474166 A1	24 Apr 2019
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		HK 1215089 A1	12 Aug 2016
		IN 1227DEN2015 A	26 Jun 2015
		JP 2015525937 A	07 Sep 2015
		JP 6298055 B2	20 Mar 2018
		JP 2016509285 A	24 Mar 2016

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/MY2019/050103**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
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		US 2014047407 A1	13 Feb 2014
		US 9098106 B2	04 Aug 2015
		US 2015293749 A1	15 Oct 2015
		US 9454625 B2	27 Sep 2016
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		US 7389212 B2	17 Jun 2008

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.