This project involved the design and development of a web-based result computation system for Niger State Polytechnic, Zungeru (System that allows 5 user access roles to replace the existing manual system). The primary aim of this project was to design and develop such system which functioned to successfully input students records, courses records and exam scores by importing the data through an excel file in .cvs file format, then generate a result in broadsheets including visual or graphical analysis of the results.

Initially, the system was design to have three user roles (Coordinator, Students, and Teaching staff). It was decided to add two more roles (System Manager, and Exams & records), taking off some duties off the coordinator. Sketches were created through a drafted plan and discussion were held regarding the proposed function of the features and the overall system.

Following the development of these designs, some features were created to get a tangible representation of the concept and feel for the design layout. Early prototype of these features include low technology implementation using materials like pen and paper to sketch the look and feel of the proposed system and high technology implementation using a prototyping software called indigo studio to develop a functional prototype of the proposed system, including interaction, and dynamic features like navigational links and buttons.

After evaluating the prototype, some ideas were introduced to add and modify some features in the system to improve efficiency and overall functionality. Some of the ideas include creating a backup, adding visualisation to the analysis and using a light and less colourful interfaces and background colours.

In developing the final system, agile methodology was used, every piece of code was tested using Test-Driven Development (TDD) approach. Decision were made to improve the reliability, effectiveness and security. Similarly, to build the final system programming language and database connection language (PHP, CSS, JavaScript, and MYSQL) were used. In the front end; user logs was added to have proper account of the activities on the system, menu control was included to have control over user access of the navigation menus, creating blank .csv file format for importing records to avoid the use of incorrect file format. In the back end the structure of the database was modified by adding more tables. More decisions were made, these include the use of persona to create better user experience, and the use of “use cases and misuse cases” to detect and mitigate possible threat or attack on the system. The final testing was done with 5 participant working with system to perform all users task, responds to questions and making suggestion about the overall functionality of the system based on their experience.

The system was finally tested for accessibility and ease of use, using some online tools (Accessibility Checker (AChecker) survey Monkey and Nasa-TLX). These series of tests conducted on the final system yield a consistent result in terms of functionality of the system. The results of the test shows that it was not frustrating, but less demanding in terms of mental, physical and efforts required to perform the tasks of computing student result. In less that 10minutes they were able to import scores and generate results including the results analysis.

As such, the performance of the system during formal assessment is expected to be successful, and of a similar time, providing no frustration through the use.

Overview and project aim

This project involved the design and construction of a Rube Goldberg device - an excessively complex system of chain reactions engineered to complete a relatively simple task. The primary aim of the task was to design and construct such a device which functioned to successfully trigger a party popper after exactly sixty seconds of operation, including a range of energy transfers between components of the device.

Outline of Process and Planning stage

Initially, individual components of the device were designed separately. Team members brainstormed and integrated ideas for components. Sketches were created and discussions were held regarding the proposed function of the components and the overall device.

Outline of initial design stage and prototype testing

Following development of these designs, some components were constructed and tested both individually and in combination with other components. Early prototypes of these components included the use of pendulums, pulleys and marbles on ramps.

Outline of evolution of the device and modifications

After testing of prototypes, the device was modified to improve efficiency and overall functionality. Some components were removed and replaced by more efficient processes, such as the swapping of the 'Marble Roll Device' for a 'Magnetic Device'. In order to meet the time criterion and to include a sufficient number of energy transfers, additional components were added during early testing of the prototype device, such as the inclusion of dominos and a spiral ramp.

Outline of construction and testing of final device (including issues and changes)

Statements about final state of device

In construction of the final device, some changes were made to improve stability, reliability and effectiveness. Supportive timber structures were added to the final device to provide a rigid, stable frame for components, while a stable wooden board was used as a base. Similarly, some materials used in the prototype were replaced with stronger, longer lasting materials. A number of existing components were arranged on and around this frame. The method of triggering the popper was also altered in the final device, with a weighted trapdoor attached to the string of the popper.

Summary of results

The average operating time in testing of the final device was 54.37 seconds. Tests conducted on the final device also yielded consistent results in terms of functionality and time taken for the party popper to be triggered effectively.

Outline of predicted competition result

As such, the performance of the device during formal assessment is expected to be successful, and of a similar time, providing no damage or unknown alterations occur prior to the final competition.