Computer Games: Design and Implementation

Games are known to exist as essential components of all cultures. Computer games of a vast variety are newer incarnations of this timeless method of interaction. The role of a game designer is to create a set of rules within which there are means and motivation for the participants to engage in play. Creating a good game is a challenging task, which requires a playful approach but demands a systematic solution. The role of a game designer is a combination of an engineer, entertainer, mathematician, and a social director. Computer games are a unique combination of technology, art, and entertainment that have always pushed the boundaries of algorithms and computational resources and have inspired generations of programmers by the challenge of creating new types interactive media. Developing computer games demands a comprehensive knowledge of the principles of game design together with a good grasp over hardware platforms, software tools and technology.

There is a wide range of topics that are covered in the course. All the essential topics are grouped under two main headings, viz. game design and game implementation. The course offered in lectures plus lab format and it is also programming intensive. Students are required to be proficient in computer programming (C++ / Java / Python) and very well versed with all the topics in computer graphics (preferably should have taken IT441 beforehand).

The course consists of two one and half hour lectures and one two hour lab per week. There are weekly lab assignments and weekly home assignments. The assignments need to be submitted within a week. There is a term project which is introduced halfway during the course. All the term exams are given and surprise quizzes maybe given as and when necessary. Attendance in lectures and labs is mandatory.

Course topics:

A. Game Design
   1. History of games and computer games
   2. Types of games and Taxonomy
   3. Principles of game design
   4. Formal elements and structure of games
   5. The dramatic elements
   6. System Dynamics
   7. Conceptualization, Prototyping and testing
   8. Functionality, Completeness, Balance
   9. Stages of development and design brief
   10. Team structures
   11. The Game industry

B. Games implementation
   1. Overview of development platforms and game engines
   2. Geometric Modelling
   3. Modelling surfaces and terrains
   4. Texturing
   5. Spatial Data structures
   6. Character Modelling
   7. Animation and Motion Capture
   8. Basic physics, Collision detection
   9. Lighting and Shading
   10. Particles modelling
   11. Camera control
   12. Audio
   13. AI, Path finding, Flocking, Swarms
   14. Simulations and Physically based modelling
   15. Networking, Massively multiplayer games
   16. User interfaces and Virtual reality