

**Indian Institute of Technology Madras
Global Initiative of Academic Network (GIAN) Programme**

Proposal for GIAN Course

1. Name and Department of Faculty from IIT Madras

(a) Host Faculty

Name: Dr.M.Manivannan
Department Applied Mechanics
Email address mani@iitm.ac.in

(b) Co-host Faculty, if any

Name Dr.Ravindran B
Department Computer Science
Email address ravi@cse.iitm.ac.in

2. Name, Designation, Affiliation and Brief Profile of International Faculty

(Note: A course can have only one International Faculty)

(Include a detailed bio-data of International Faculty at the end of this document)

Name: Steven M. Lavelle
Designation Professor
Affiliation University of Illinois

Email address: lavelle@uiuc.edu
URL of website: <http://msl.cs.uiuc.edu/~lavelle/index.html>
Brief Profile

Steve is a Professor in University of Illinois, official Corporate Adviser for the university and an Angel Investor. He is one of the inventors of Oculus, a Virtual Reality Headset device which is recently acquired by Facebook for \$2 Billions.

3. Title of the Course : Advances in Virtual Reality

Is this a Senate approved course? Yes No

4. Structure of the Course

Duration of course (1 week or 2 Weeks): 2

Number of credits (1 or 2)

Proposed total number of lectures 14 Lectures

(Around 14 for 1 week course and

Around 28 for 2 weeks course)
 Number of lectures by International Faculty 10
 (Minimum of 50% of total number of lectures should be given by International Faculty)
 Number of lectures by Host Faculty 5

Host Faculty
5. Proposed Tentative Dates for Conduct of the Course Nov 28th – Dec 2nd 2016

(Between 1st April, 2016 and 31st December, 2016)

6. Participants of the Course

Maximum number of participants to register for the Course 50

Expected number of participants from IIT Madras 30

Other Approved Institutes of GIAN (IITs, NITs, IIITs, IISc, IISERs, Central Universities) from which the participants are expected and maximum number of participants from these Institutes allowed to register for the course 20

7. Content of the Course

(a) Overview of the Course:

Rapid advances in Consumer Grade Virtual Reality gadgets are changing the way computer is used in the coming days, which is the future of Human Computer Interface. While many games and interesting applications are developed for the gadgets, this course is to prepare the students with the basic concepts and the challenges before developing such application. With the understandings of the fundamental concepts, these students will be better equipped than others. Specifically, the course is taught by an international faculty who is one of the inventors of Oculus Rift the well known gadget, the students could get an insight into developing similar gadgets themselves in the future.

(b) Objectives of the course:

The main objective of this course is to introduce the basic concepts of VR and the current research grand challenges in VR and to provide hands-on experience in programming VR.

Students are expected to be familiar with basic mathematics, including matrices, linear transformations, rotations, and calculus. They should also be comfortable with programming; however, knowledge of C++ or system-level programming is not required. Programming exercises and projects will be implemented using Unity 3D, which is a high-level game engine.

(c) Syllabus for the course:

Fundamentals of virtual reality systems, including geometric modeling, transformations, graphical rendering, optics, sensing and tracking systems, the human vision system, the vestibular system, interface design, human factors, developer recommendations, and technological issues. Grand Challenges in VR.

8. Evaluation Pattern for the Course

Weightage (in %) for Assignments	20% 4 Assignments x 5 marks
	30% for on efinal project

Weightage (in %) for Examination(s)	50%
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9. Budget(in Rupees)

Travel and Honorarium for International Faculty (US\$8000 for 1	\$8000
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week course
and US\$12000 for 2 week course)

Honorarium for Host Faculty	INR 100000
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Expenses for Preparation of Course Material	INR 100000 for Procuring Other VR gadgets
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Remuneration for other technical personnel involved in the conduct of the course (Staff who maintain the Course Management Platform, Video Recording and Broadcasting Equipment)
Contingency

Miscellaneous expenses

Total Budget (in Rupees)

10. Course Registration Fee

Student participants from IIT Madras or other approved institutes of GIAN Rs. 500 per credit

Non-student participants Rs.1500 per credit

11. Area of the GIAN Sectional Committee under which the proposal is to be reviewed

(Tick against **only one** of the following)

(i) Architecture, Design, Planning & Heritage

(ii) Chemical, Bio-Chemical & Material Sciences

(iii) Earth & Environment Sciences

(iv) Electronics, Electrical, Information & Communication Technology

(v) Humanities & Liberal Arts

(vi) Life Sciences, Medicine & Healthcare

(vii) Mathematical & Computer Sciences

(viii) Management

(ix) Mechanical Sciences & Infrastructure

(x) Physical Sciences

(xi) Social Sciences & Law

(xii) Other Category/ Interdisciplinary Categories

Annexure: Detailed Biodata of International Faculty

https://en.wikipedia.org/wiki/Steven_M._LaValle

Academics:

LaValle received his BS, MS, and PhD degrees in Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign in 1990, 1993, and 1995, respectively. From 1995 to 1997, he was a post-doctoral researcher and lecturer in the Computer Science Department at Stanford University. From 1997 to 2001, he was an assistant professor in the Department of Computer Science at Iowa State University. Since 2001 he has been on the faculty in the Department of Computer Science at the University of Illinois at Urbana-Champaign, where he is currently a full professor. In 2012 he was named "University Scholar" among six other professors at the University of Illinois, Urbana-Champaign.[2] During 2015, he is featured on displays offering expert perspective in the Robot Revolution exhibit at the Museum of Science and Industry (Chicago).[3]

Oculus VR:

During a leave of absence from the University of Illinois, LaValle started working for [Oculus VR](#) in September 2012, a few days after their [Kickstarter](#) campaign. He served as their principal scientist from March 2013[4] until the company was acquired by [Facebook](#) in July 2014,[5] addressing virtual reality challenges "including sensor fusion, magnetic drift correction, and kinematic modeling" while disseminating the company's technical achievements in a science blog.[4] He developed head tracking methods for the core software, based on IMUs and computer vision, and led a team of perceptual psychologists to provide principled approaches to virtual reality system calibration and the design of comfortable user experiences.[6] He was a coauthor of the first Oculus SDK Overview.[7] He is also a coinventor (with Peter Giokaris) on the patent for perception based predictive tracking for the Oculus Rift, which was crucial in reducing perceived tracking latency.[8]

References

- LaValle, Steven (2006). *Planning Algorithms*. Cambridge: Cambridge University Press. ISBN 0-521-86205-1. Available online at <http://planning.cs.uiuc.edu/>
 - "[Seven Urbana campus faculty members named University Scholars](#)". *University of Illinois News*.
 - "[LaValle Featured in MSI's Robot Revolution Exhibit](#)". *University of Illinois News*.
 - "[Meet Tom Forsyth and Steve LaValle, Science Blog, Nate's Talk at GDC, and Unity Trial Extensions](#)". *Oculus VR*. Retrieved 28 January 2015.
 - "[The 'big and rising area' of virtual-reality technology](#)". *Chicago Tribune*. Retrieved 28 January 2015.
 - "[Robotics Meets Virtual Reality](#)". *MIT*. Retrieved 14 June 2015.
 - "[Oculus SDK Overview](#)" (PDF). *Oculus/Facebok*. Retrieved 14 June 2015.
 - "[Perception Based Predictive Tracking for Head Mounted Displays](#)". *US Government*. Retrieved 14 June 2015.
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