

Sibin Mohan's Teaching Statement

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1 Introduction

I enjoy teaching at all levels. I have actively sought out opportunities to teach at the University of Illinois¹. I am interested in teaching the following advanced courses since they align well with my research interests. In addition, the requisite materials are readily available to me.

1. *Cyber-Physical Systems* – iterations of this course that I co-taught (in Fall 2014 and Spring 2012) were recognized among the highest rated courses on campus.
2. *Real-Time and Embedded Systems* and
3. *Operating Systems*.

I can handle the following Computer Science courses with ease (at the graduate level): *advanced operating systems, security and computer architecture*. I am also confident about teaching most *introductory computer science* or *computer engineering* courses at the undergraduate level.

I would also like to design *new courses* on the following topics:

1. Secure Cyber-Physical Systems
2. Internet-of-Things (IoT)
3. Design of Safe Autonomous Systems²

I have experience teaching complete courses (both graduate and undergraduate) and have been guest lecturer for various graduate/undergraduate courses. I have graduated four students (one Ph.D. and three M.S.) and currently supervise³ multiple Ph.D. and Masters students.

2 Philosophy

According to Henry Brooks Adams, “a teacher affects eternity, as he can never tell where his influence ends.” I think this statement is a good representation of the influence an effective teacher can wield. Having been taught by some exceptional teachers, I hold similar beliefs. Considering the long-lasting effects of teaching, I believe that it is very important to be good and effective. In my experience, students learn best when their minds are actively engaged – be it inside the classroom, or outside it. I appreciate the active and student-oriented learning techniques which ensure that students stay focused in classrooms and on the subject matter. I intend to incorporate these techniques in the classroom. I will also create hands-on assignments so that students not only learn the theoretical aspects of the course but also gain a deep understanding on how to translate that knowledge into practical scenarios. In fact, many of my courses will focus on how to *build systems* and potentially break them.



Fig. 1: Various testbeds (Traxxas Rover, Custom Quadcopter and the Fischertechnik Manufacturing Testbed).

One of advantages of being a researcher in the field of computer systems is that my students and I have built multiple drones, rovers and other testbeds for various research projects. We actively use Raspberry

¹Even though my responsibilities did not require me to.

²I am currently in the process of designing such a course, to be taught either in Spring or Fall 2019.

³As Research Assistant Professor in the Dept. of Computer Science at UIUC, I have full advising rights.

PIs, network switches, other embedded platforms and FPGAs. The students who attend my courses will be exposed to these systems and also insights gleaned from my research projects. I also intend to use these and other similar testbeds to create machine problems and assignments for my courses. In fact, the design, programming and use of such drones and rovers will be an intergral part of the new course on Autonomous Systems that I am currently designing.

I will make a sincere effort to challenge students at an intellectual level – to increase their understanding of the class material. Futher, I am also invested in developing their understanding of the practical, philosophical, social and ethical implications of the material being taught.

3 Teaching Experience

Cyber-Physical Systems (UIUC CS 598): In Spring 2012 and Fall 2014, I *co-taught an advanced graduate course* in the Computer Science department here at UIUC. I had equal participation in developing the course content, the design of projects and assignments, working with students on developing their projects and of course, class lectures. The course was well received by the students and led to the development of very interesting projects. Both iterations of this course were *listed among the highest rated courses on campus*.

Introduction to Systems and Security (PES Univ.): During the summers of 2016 and 2017, I *designed and taught an undergraduate course* in the Computer Science department at PES University (Bangalore, India). This course provided an overview on topics such as real-time and embedded systems, cloud computing, software-defined networks and security. The content was targeted at Junior and Senior undergraduate students and included class lectures, lab time and various programming assignments and paper reading. The *class was well received by the students* and I continue to remotely advise some of them on various research projects.

C and Programming Tools (NCSU CSC 230): In spring 2008, I *taught a complete undergraduate course* in the Computer Science department at North Carolina State University. It was aimed at introducing C, systems programming and related tools to students at the junior level. I used the following technique to teach them a new programming language – put forth a problem statement and devise the solution *during the lecture* with the collaboration of the class. This was coupled with interesting programming assignments that helped the students gain an intricate knowledge of the memory management mechanism of C. The students really liked my teaching style & the assignments. *I received very good reviews for the course*.

Guest lectures and Miscellaneous: In UIUC, I have filled in as guest lecturer for multiple courses: (a) Graduate Real-Time Systems (CS 598RTS), (b) Computer Security I (ECE 422) during Fall 2013 and Spring 2014 and (a) Embedded Systems Architecture and Software (CS 431).

As a graduate student at NC State, I was a teaching assistant and guest lecturer for graduate real-time systems (NCSU CSC 714), operating systems (NCSU CSC 501), graduate Parallel Systems (NCSU CSC 548) and undergraduate Operating systems (NCSU CSC 244). I also tutored undergraduate students in Java, FORTRAN, Physics and Mathematics. I have attended basic and advanced tutoring classes at NCSU. During my undergraduate years, I volunteered to be a teaching assistant for a course in C++ and OO Design.

4 Outreach – Urbana Middle School

In Fall 2017 and Spring 2018, I taught a five week course on computer programming to *middle school students* in Urbana⁴ as part of the SPLASH after-school program⁵. This program used the Scratch programming language (designed at MIT) and a curriculum designed by faculty in the UIUC Computer Science department. I am planning on continuing to teach this course in 2019.

5 Mentoring

I am currently *advising seven Ph.D. students*, one Masters student and a visiting scholar. I have graduated four students: one Ph.D. and three M.S.

Diversity: I have worked with many female students – both, at the graduate and undergraduate levels. I am currently advising one female Ph.D. Student and have, over the past three summers, advised *four* female undergraduate students. The middle school program included nearly 40% girls as well as Black and Hispanic participants.

⁴<https://csl.illinois.edu/news/inspiring-future-programmers>

⁵<http://usd116.org/programs/splash/>

6 Fellowships, Awards and Workshops

During the 2007 – 2008 academic year, I was the recipient of the *Preparing the Professoriate (PTP) fellowship* from the graduate school at NCSU. Only a handful of applicants (around 10) are selected each year from the university-wide community of doctoral candidates. It involves attendance at various teaching-focused workshops and seminars and ends with the participant teaching a complete course guided by a faculty mentor.

I was awarded a *Virtual TA* fellowship by the NCSU CS department for three consecutive years as well as the *Mentored Teaching Assistantship (MTA)* from the College of Engineering – both very competitive awards.

My commitment towards teaching leads me to be constantly engaged in programs that (a) give me insights into the teaching profession and (b) help hone my skills. During 2006 – 2008 I was enrolled in the Certificate of Accomplishment in Teaching (CoAT) program at NCSU. I attended the Academic Careers workshop conducted by CRA in Washington DC where I learned about teaching styles, good methods to guide/advise students, etc. from experienced faculty members. I have also attended the *Preparing for a Faculty Career* workshop conducted by the NCSU College of Engineering. From such workshops, I learned about ABET, Bloom's taxonomy, importance of Course Objectives and various teaching styles.