



axiom  
the self defined  
ALUMNUS TALK

# ADITYA MURALI

Gold Medalist, BITS-Pilani Hyderabad  
Graduating Batch of 2017

## GOING BEYOND DEEP LEARNING

- Data-driven deep learning has provided us with many amazing technologies in recent years. However, these techniques are unable to perform well at intelligence tasks that require learning higher-level concepts and abstractions like reasoning about analogies. In contrast, symbolic entities such as logical formulae or programs represent knowledge in ways that can be combined and adapted to different applications. Is a marriage between the two worlds possible? Can we learn interpretable, robust, and composable concepts from data?
- Yes! I will present two applications from the emerging area of neuro-symbolic learning that seeks to combine deep learning with symbolic learning. I will focus in particular on learning logical formulas and illustrate how to build intelligent systems that go beyond the capabilities of deep learning. Students of mathematics can understand how their knowledge of mathematical objects and techniques is useful and important in building emerging technologies.

## SPEAKER BIO

Adithya Murali is a PhD student at the University of Illinois at Urbana-Champaign. He works on building trustworthy software systems and is particularly interested in those that integrate classical algorithms with components whose behaviour is learned from data. He employs techniques and works on applications across the areas of program verification, program synthesis, and machine learning.

14 DECEMBER 2022



ROOM F102



STARTS 12:30 PM



Alumni Talk

# Ahana Ghosh

AFFILIATION: 4TH YEAR PHD STUDENT,  
MACHINE TEACHING GROUP,  
MAX PLANCK INSTITUTE FOR  
SOFTWARE SYSTEMS, GERMANY



19 November, 2022

At 06.00 PM

<https://meet.google.com/htr-ckvf-eps>

## ADAPTIVE SCAFFOLDING IN BLOCK-BASED PROGRAMMING VIA SYNTHESIZING NEW TASKS AS POP QUIZZES

**Abstract:** Block-based programming environments are increasingly used to introduce computing concepts to beginners. However, novice students often struggle in these environments, given the conceptual and open-ended nature of programming tasks. To effectively support a student struggling to solve a given task, it is important to provide adaptive scaffolding that guides the student towards a solution. We introduce a scaffolding framework based on pop quizzes presented as multi-choice programming tasks. To automatically generate these pop quizzes, we propose a novel algorithm, PQuizSyn. More formally, given a reference task with a solution code and the student's current attempt, PQuizSyn synthesizes new tasks for pop quizzes with the following features: (a) Adaptive (i.e., individualized to the student's current attempt), (b) Comprehensible (i.e., easy to comprehend and solve), and (c) Concealing (i.e., do not reveal the solution code). Our algorithm synthesizes these tasks using techniques based on symbolic reasoning and graph-based code representations. We show that our algorithm can generate hundreds of pop quizzes for different student attempts on reference tasks from "Hour of Code:Maze Challenge" and Karel. We assess the quality of these pop quizzes through expert ratings using an evaluation rubric. Further, we have built an online platform for practicing block-based programming tasks empowered via pop quiz based feedback, and report results from an initial user study.

axiom  
-the self defined

**axiom**

Mathematics Dept.

BITS-Pilani, Hyderabad Campus

**Alumni Talk**

**TALK ON MAXIMIZING  
RESEARCH OPPORTUNITIES  
DR. PRATISHTHA SHUKLA**



-MSc in Mathematics  
from BITS Pilani,  
Hyderabad Campus

-Current affiliation:  
Postdoctoral Research  
Associate, Oak Ridge  
National  
Lab, Tennessee, US

The talk focuses on discussing the immense scope of opportunities in the varied fields of research and engineering following multi-interdisciplinary learning. Mathematics contributes to the core of engineering and serves as a source of knowledge from which engineering students can draw from.

**Date: 19-09-2022**

**Time: 6:30 PM**