



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : ABDALGANIY KEBEDE WAKJIRA

Roll Number : 156101023

Programme of Study : Ph.D.

Thesis Title: **STUDENT ENGAGEMENT AWARENESS DASHBOARD IN ASYNCHRONOUS E-LEARNING ENVIRONMENT**

Name of Thesis Supervisor(s) : **Dr. Samit Bhattacharya**

Thesis Submitted to the Department/ Center : **Computer Science and Engineering**

Date of completion of Thesis Viva-Voce Exam : **09 December 2021**

Key words for description of Thesis Work : **student engagement, engagement awareness, engagement dashboard, asynchronous e-learning, behavioral states, collaborative states, emotional states, Non-linear regression**

SHORT ABSTRACT

The most important activity in life is to acquire and be equipped with knowledge. It is generated and acquainted through learning and trainings. Often there are adult learners who face competing demands, including family and work responsibilities. These competing demands hinder them from attending their lesson from a typical physical classroom. E-learning technology is unique and represents a new era of distance learning, which is categorized as a fourth generation distance learning technology. Asynchronous e-learning has a disadvantage as students feel isolated. The feeling of the isolation leads to drop-out. In the e-learning environment, where the teacher is not physically present, monitoring a student for interest or engagement is a challenge. To solve these problems, we have accomplished the following objectives: (a) We set up an experiment involving 12 participants to collect data from behavioral, collaboration and emotional features for detecting student engagement status in an asynchronous e-learning environment. We identified the most important features affecting student engagement levels out of the total of 13 features from three factors: behavioral, collaboration and emotional factors using Pearson correlation analysis and Pratt's index. (b) We built student engagement prediction model from three factors: behavioral, collaboration and emotional factors across micro level time scale such as 5 minutes. We applied the features that correlated significantly with the levels of engagement from three factors: behavioral, collaboration and emotional factors to build the student engagement prediction model using non-linear regression techniques. We also validated the student engagement prediction model through empirical study and found high accuracy. (c) We built a student engagement visualization dashboard that visualizes the instantaneous engagement levels every minute, visualizes trends of student engagement levels and filters and displays the least engaged learner. The dashboard is based on a student engagement prediction model, which we also developed. We also performed the validation of these proposed visualizers in controlled experiment. The validation indicated that the users' satisfaction of the visualizers was high. This helps a teacher to gain insight about the engagement levels of all students at a glance. This will also allow the teacher to take immediate action.