Semester-Long Internship Report

On

Creation of Spoken Tutorial in Scilab

Submitted by

Utkarsh Anand

Department of Electrical and Electronics
Manipal Institute of Technology

Under the guidance of

Prof.Kannan M. Moudgalya

Chemical Engineering Department

IIT Bombay

Mentors
Ms. Vineeta Gharvi
Ms. Rashmi Patankar
Mr. Rupak Rokade

September 2, 2021

Acknowledgment

The internship opportunity I had with the FOSSEE Team, IIT BOMBAY, was an excellent learning and professional development opportunity. Being only in my 1st year, it was the first professional experience in my life and, I consider myself a fortunate individual as I was provided with an opportunity to be a part of it. I am also grateful for having a chance to meet so many wonderful people and professionals across the country who led us through this internship period. I am using this opportunity to express my deepest gratitude and special thanks to **Prof. Kannan M. Moudgalya**, head of the FOSSEE team, IIT Bombay, for allowing me to be a part of this project. It is my radiant sentiment to place on record my best regards, the most profound sense of gratitude to my mentors, **Ms. Vineeta Gharvi**, **Ms. Rashmi Patankar**, and **Mr. Rupak Rokade**, for forbearing and correcting my mistakes and showing their continuous support, which was extremely valuable for my work and helping me to learn a lot many things. I perceive this opportunity as a significant milestone in my career development. I will strive to use gained skills and knowledge in the best possible way, and I will continue to work on their improvement to attain my desired career objectives. I hope to continue cooperation with all of you in the future.

Contents

Chapter 1

Introduction

1.1 Overview

The internship task was divided into four parts. The first part involved updating the script and the slides for the spoken tutorial about **Textbook Companion Project** in **Scilab**, which were already created by the FOSSEE team. After updating the script and the slides, the recording of the spoken tutorial was to be done.

The second part of the internship involved creating the scripts and the slides for two spoken tutorials from scratch as part of a new spoken tutorial series by FOSSEE on **Graphical User Interface (GUI)**.

The third part of the internship involved creating the scripts and the slides for two spoken tutorials from scratch as part of the ongoing spoken tutorial series by FOSSEE on **Xcos**.

The fourth part involved performing Novice Checks.

1.2 Aim of this Internship

I participated in this internship so that I can gain work experience, working in a professional environment and inculcate professional etiquettes inside myself. This internship also helped me to learn about the Scilab software and its various extent of uses.

1.3 About FOSSEE & its Aim

FOSSEE (Free and Open Source Software in Education) project promotes the use of free and open-source tools to improve the quality of education in our country. They aim to reduce dependency on proprietary software in educational institutions. They encourage the use of FOSS tools through various activities to ensure that commercial software is replaced by equivalent FOSS tools. They also develop new FOSS tools and upgrade existing tools to meet requirements in academia and research.

Incorporated to FOSSEE program, this fellowship's main aim is to introduce students to the FOSS in various engineering fields and to become a part of this big community.

1.4   What is Spoken Tutorial project ?

The **Spoken Tutorial** project is the initiative of the "Talk to a Teacher" project of the National Mission on Education through Information and Communication Technology, launched by Ministry of Education (previously MHRD), Govt of India. Here you will find a variety of tutorials on various Free and Open Source Software (FOSS) in several Indian regional languages.

The main objective of this project is to promote IT literacy for education and improve the employment potential of learners in India, using FOSS (free and open source software).

1.5   What is Scilab ?

Scilab is free and open source software for numerical computation providing a powerful computing environment for engineering and scientific applications. Scilab includes hundreds of mathematical functions. It has a high level programming language allowing access to advanced data structures, 2-D and 3-D graphical functions.

A large number of functionalities is included in Scilab:

- **Maths & Simulation**
  For usual engineering and science applications including mathematical operations and data analysis.

- **2-D 3-D Visualization**
  Graphics functions to visualize, annotate and export data and many ways to create and customize various types of plots and charts.

- **Optimization**
  Algorithms to solve constrained and unconstrained continuous and discrete optimization problems.

- **Statistics**
  Tools to perform data analysis and modeling

- **Control Systems**
  Standard algorithms and tools for control system study

- **Signal Processing**
  Visualize, analyze and filter signals in time and frequency domains.

- **Application Development**
  Increase Scilab native functionalities and manage data exchanges with external tools.

- **Xcos - Dynamic systems modeling**
  Modeling mechanical systems, hydraulic circuits, control systems...

1.6 Process of creating a Spoken Tutorial

- At first, the **Learning Objectives** for the Spoken Tutorial are created.

- A demo of the tutorial is then performed which gives the author an idea about the steps which are going to be undertaken while writing the script.

- Using the demo and the learning objectives, an **Outline** of the tutorial is formulated which makes it easier while writing the script and ensures that none of the topics are skipped.

- Next, the **Script** of the tutorial is written following the ST-norms given in the ST checklist.

- Alongside the script, the **Slides** for the tutorial are also prepared using Latex-Beamer.

- After the script and the slides are completed, the tutorial is given for **Domain** check to ensure that the content written in the script and the slides are technically correct.

- After the domain check, the tutorial is given for **Novice** check in which a person who doesn't have any knowledge about the topic on the which the tutorial has been created, practises the tutorial using the script and the slides and provides a feedback whether he / she is able to follow the tutorial easily. Upon receiving feedback, comments provided by the novice are addressed and accordingly changes are made in the script and the slides.

- After the novice check, the tutorial is gone for **FOSSEE** check to ensure that the tutorial was created according to the ST-norms and the checklist was followed properly.

- After the FOSSEE check, the tutorial is finally given for **ST-Admin** check who reviews the tutorial and ensures that all the comments given in the previous checks were addressed and provides additional feedback if any other changed needs to be made.

- Upon a Go Ahead given by the ST-Admin, the tutorial is recorded and reviewed by the creator.

- After recording, the tutorial Video is given to the **ST-Editing** team with the edits that needs to be made in the recording.

- After the edited video is received from the editing team, it is reviewed once again and if everything is alright, the tutorial is given for publishing on the **Spoken Tutorial** website.

Chapter 2

Textbook Companion Project

2.1 About Textbook Companion Project

The Textbook Companion Project (TBC) aims to port solved examples from standard textbooks using an open source software system, such as Scilab or Xcos. Any standard textbook can be used for this purpose.

2.2 ST:- An amazing resource in Scilab, Textbook Companion

2.2.1 Learning Objectives

- The FOSSEE project

- FOSSEE activities

- What is Scilab Textbook Companion?

- Features of Textbook Companion (TBC)

- How to contribute to TBC and

- Benefits of TBC.

2.2.2 Task

This tutorial gives an introduction about **FOSSEE** and their projects. Then we explain about the **Scilab Textbook Companion** project, how can we use them and finally how one can contribute to the **TBC** project. The Script and the Slides for the spoken tutorial were already created by the **FOSSEE** team. The task involved updating the script and the slides according to the latest information from the Scilab website and then recording the Spoken Tutorial so that it could be published by the ST team.

Chapter 3

Graphical User Interface (GUI)

3.1 About GUI

A **Graphic User Interface (GUI)** is a graphical display, which comprises devices, or components, to make the user enable to perform interactive tasks. The GUI components include menus, toolbars, push buttons, radio buttons, list boxes, sliders, etc.

3.2 ST:- Building a GUI for plotting 2D parametric curves

3.2.1 Learning Objectives

- Plot the Parametric equation of a circle using GUI.

- Use a Slider to vary the radius of a circle and
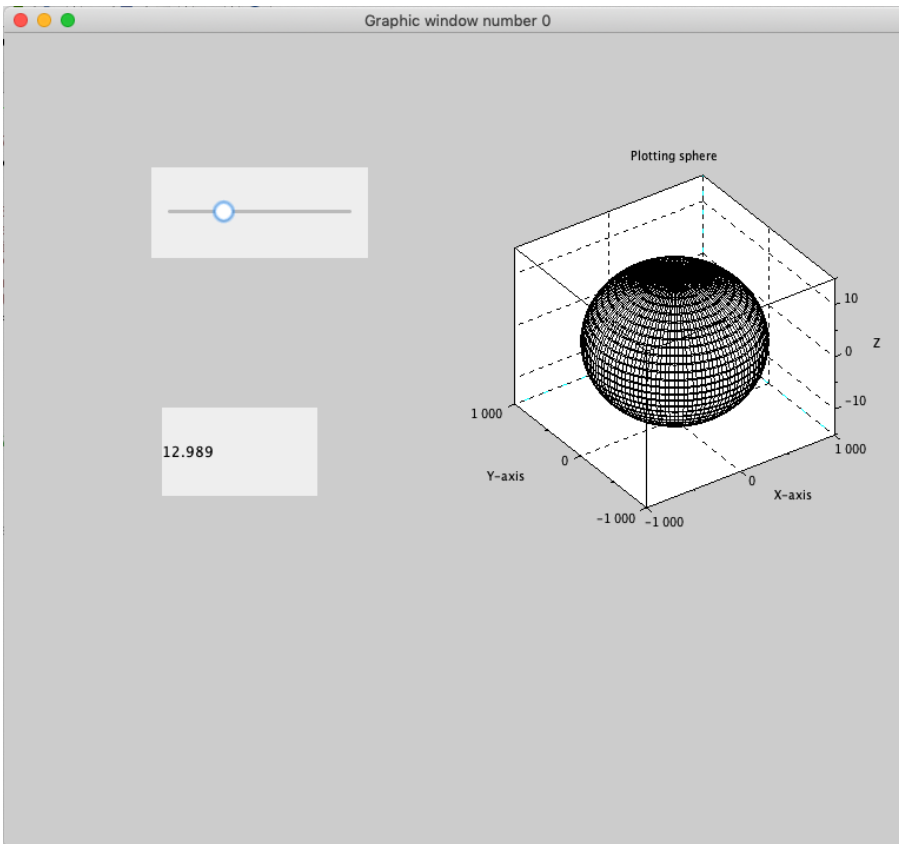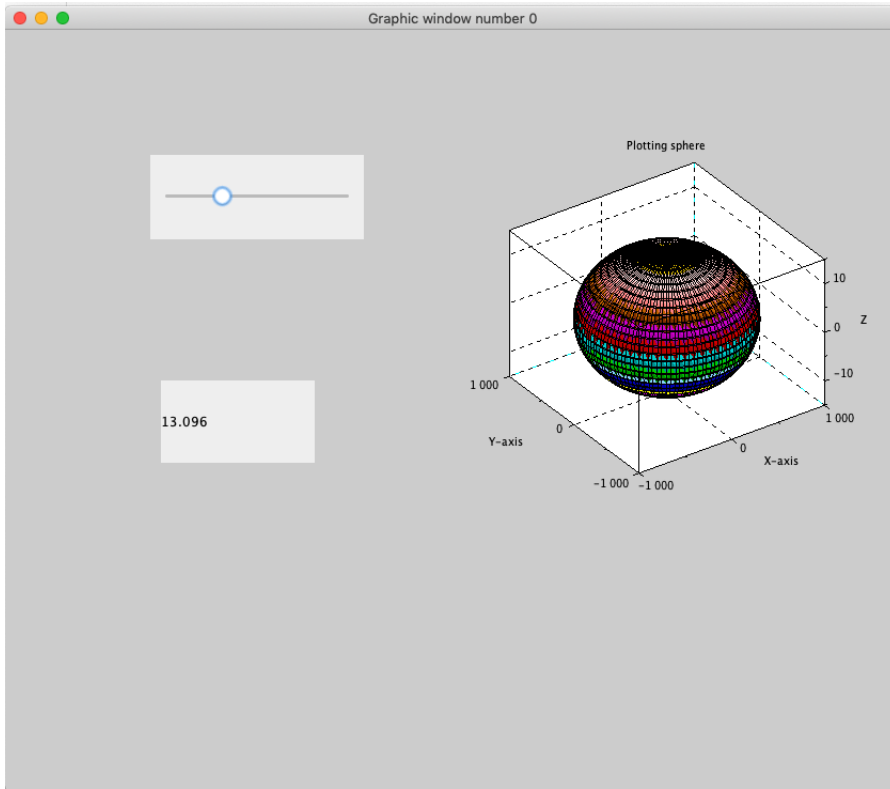
- Use the delete function.
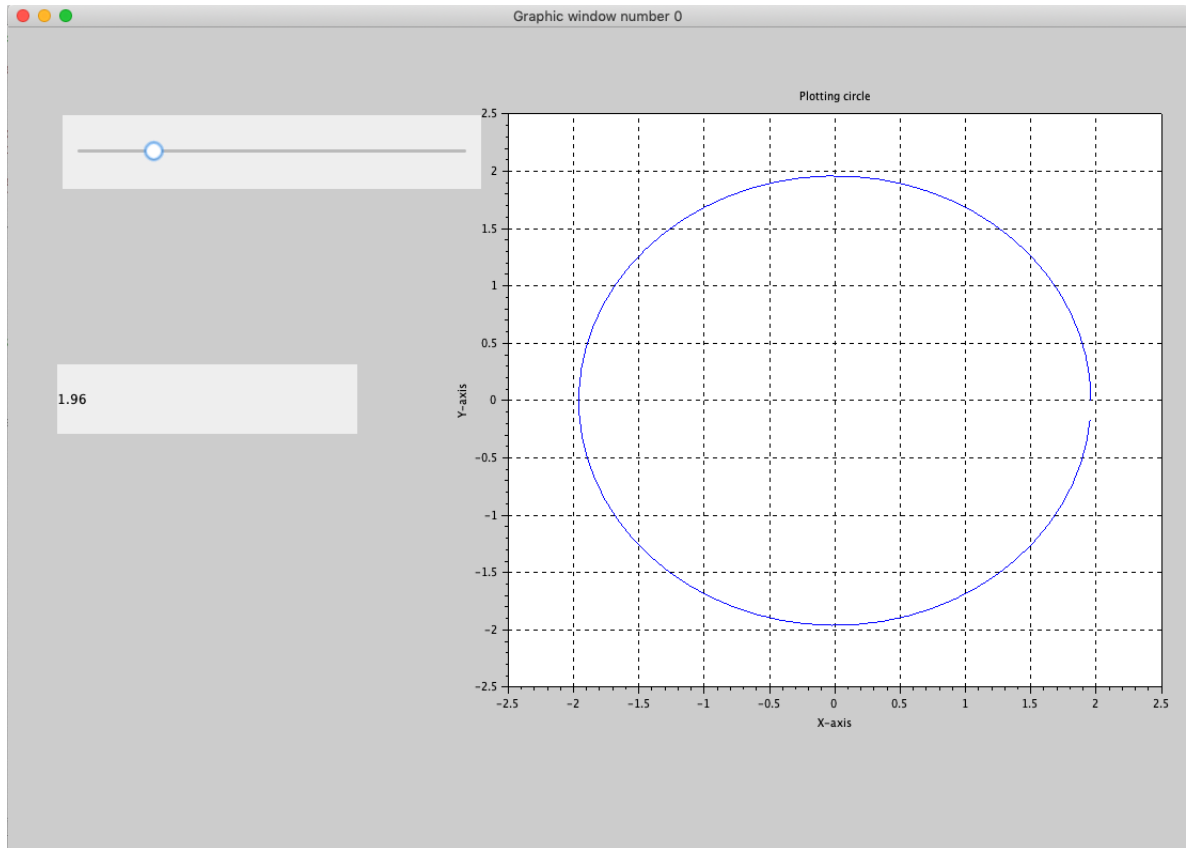
3.2.2 Task

This tutorial gives an introduction about plotting **2D** curves in **Scilab** using **GUI** through the example of a circle. We introduce the **Slider**, and how we can use it to vary the radius of the circle. We also see the use of the **delete** function, and how we can use it to delete the subplots in GUI. The first part of the task consisted of creating the Script and the Slides for the spoken tutorial from scratch. After the script and the slides were frozen by the FOSSEE team, the Spoken Tutorial was recorded and later published by the ST team. An assignment was also provided along with its Solution for the learner to practise the tutorial.

3.3 ST:- Building a GUI for plotting 3D parametric curves

3.3.1 Learning Objectives

- To plot the Parametric equation of a sphere using GUI.

- Use of surf command.

- Use of mesh command.

- Use of meshgrid command.

3.3.2 Task

This tutorial gives an introduction about plotting **3D** curves in **Scilab** using **GUI** through the example of a sphere. We introduce the **surf** & the **mesh** commands, and how we can use them to plot different types of 3D plots. We also introduce the **meshgrid** command which can be used to create matrices. The first part of the task consisted of creating the Script and the Slides for the spoken tutorial from scratch. After the script and the slides were frozen by the FOSSEE team, the Spoken Tutorial was recorded and later published by the ST team. An assignment was also provided along with its Solution for the learner to practise the tutorial.

Chapter 4

Xcos

4.1 About Xcos

Xcos is a graphical editor to design hybrid dynamical systems models. Models can be designed, loaded, saved, compiled and simulated using Xcos. Xcos is freely available and distributed with Scilab.

4.2 ST:- Loading and Saving data in Xcos

4.2.1 Learning Objectives

- Save Xcos simulation data values to the workspace.

- Read and write data in Xcos simulation using a C binary file
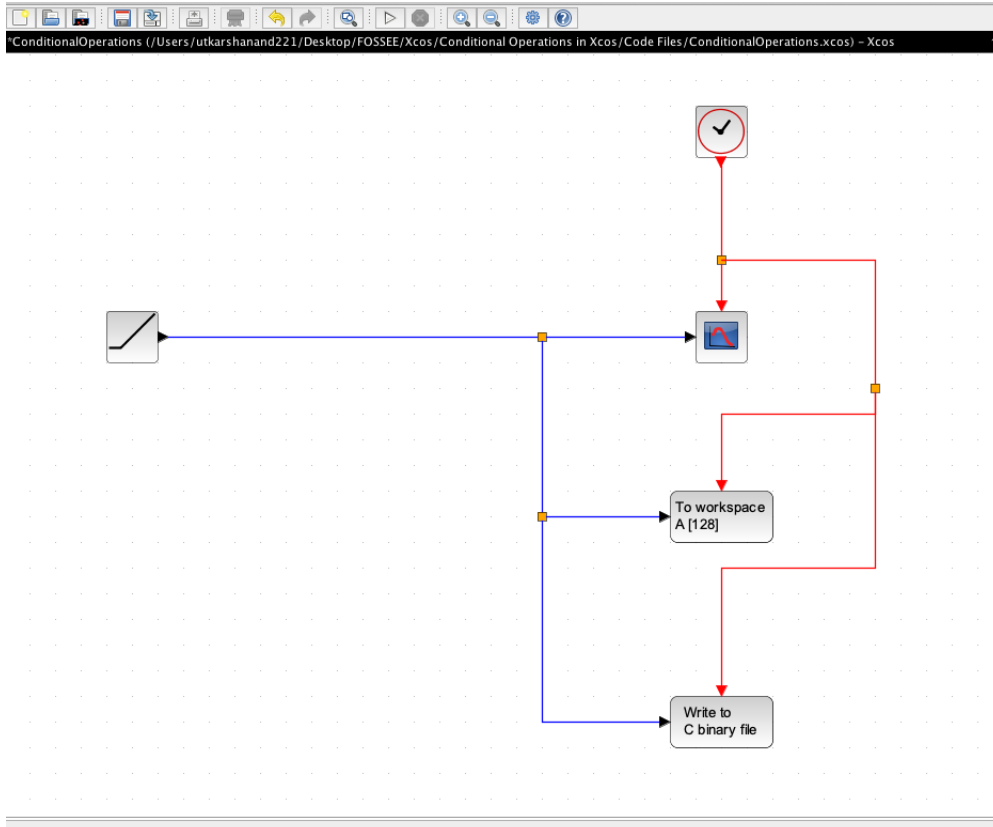
4.2.2 Task

This tutorial gives an introduction about working with data in **Xcos**. First, we learn about printing the data values generated in by the simulation to the **workspace**. Then we learn to read and write data in / from a **C binary** file so that we can share them. The first part of the task consisted of creating the Script and the Slides for the spoken tutorial from scratch. After the script and the slides were frozen by the FOSSEE team, the Spoken Tutorial was recorded and later published by the ST team. An assignment was also provided along with its Solution for the learner to practise the tutorial.

4.3 ST:- Conditional Operations in Xcos

4.3.1 Learning Objectives

- Use the If then Else conditional operator in Xcos.

- Display the output of the conditional operations.

- Halt the simulation after a condition is reached.
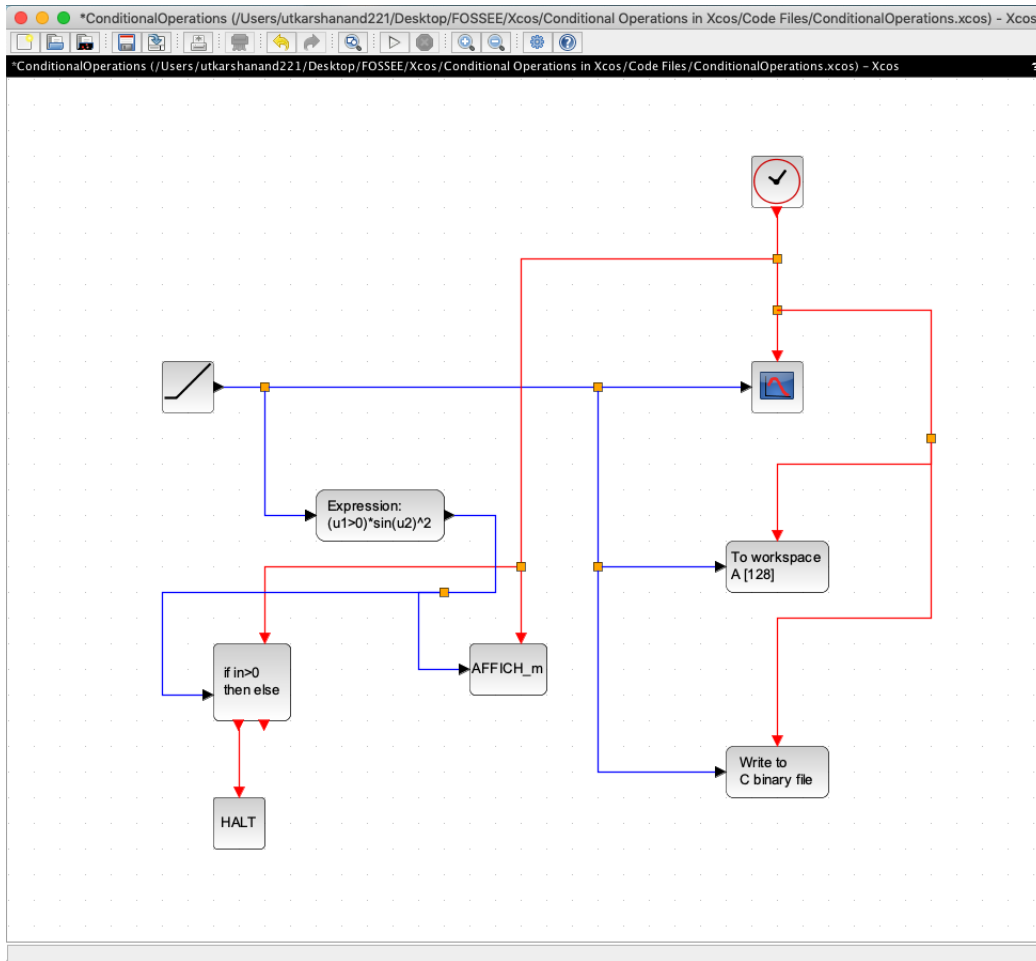
4.3.2 Task

This tutorial gives an introduction about the usage of conditional operators in **Xcos**. We learn about the **If/Else** operator and then display its output. Then we learn about the **Halt** operator which can be used to halt a simulation after a certain condition has been reached. The first part of the task consisted of creating the Script and the Slides for the spoken tutorial from scratch. After the script and the slides were frozen by the FOSSEE team, the Spoken Tutorial was recorded and later published by the ST team. An assignment was also provided along with its Solution for the learner to practise the tutorial.

Chapter 5

Novice Test

I performed Novice Checks for four tutorials in GUI:

- Object Properties and Alignment in GUI.

- Creating a GUI based exponent calculator.

- Building for graphing linear equations.

- Building a GUI for basic plotting.

Chapter 6

Useful Links

An amazing resource in Scilab: Textbook Companion

Building a GUI for plotting 2D parametric curves

Building a GUI for plotting 3D parametric curves

Loading & Saving data in Xcos

Conditional Operations in Xcos

Chapter 7

References

- `https://scilab.in/`

- `https://scilab.in/Textbook_Companion_Project`

- `https://spoken-tutorial.org/`