Concept Note for FOSSEE Summer Fellowship 2019

Name of the Institution: IIT Bombay

Title of the project: FOSSEE Summer Fellowship 2019

Context: The FOSSEE Summer Fellowship 2019 is an ambitious scheme initiated by the FOSSEE project. FOSSEE Summer Fellowship is a scheme that is to be carried out at IIT Bombay and a few sister institutions, for a period of 6–8 weeks, during the summer of 2019. FOSSEE stands for Free/Libre and Open Source Software for Education.

To publicise this, we are sending postal kits containing a poster on this scheme to Heads of Departments of 30,000+ College Departments across India, requesting to display the poster on the notice boards, which could result in a viewership of about 30 lakh students. We are also sending more than a lakh emails invites to students and faculty of colleges across the country. We have also sent letters to the 723 District Collectors of India informing them about this scheme. The copy of the letter and the poster are given in the Annexure.

Students to be selected for this Fellowship can be from any college, pursuing any degree, and at any stage of their graduation/ post graduation. The only criterion for selection is the successful completion of a useful project. Students desirous of getting selected for this Fellowship will have to learn a Free/Libre and Open Source Software (FLOSS) and complete some screening tasks. These tasks can involve programming/ scientific computing/ conducting awareness workshops/ collecting data that will be of use to the community. These screening tasks are not very complicated, and can be done over a period of two to four weeks.

The screening tasks can be broadly classified as 1) Tasks which require submitting a proposal and acceptance 2) Tasks that require a test and possibly a small activity. Following is the list of projects and the respective screening tasks that are available under the FOSSEE Summer Fellowship 2019. A student has to do only one of the tasks listed below. A few more tasks may be added to this list in the near future.

- Tasks that require submitting a proposal and acceptance, resulting in collaborative content creation

1. eSim: Create circuit simulations
2. Xcos: Develop nontrivial examples in Xcos
3. CFD: Create case studies using OpenFOAM
4. DWSIM: Create Chemical process flowsheets
5. OpenModelica: Create flowsheets in OpenModelica
6. FOSSEE Optimization Toolbox: Develop Scilab examples to test functions available in FOSSEE Optimization Toolbox
7. Osdag: Solve steel design examples as per Indian Code
8. OpenPLC: Make functional block diagrams for OpenPLC using 4Diac
9. Koha: 1,000 Metadata/catalogue of books and other collections from a public library
10. Health and Nutrition: Organise training sessions on breastfeeding and complementary feeding
11. R: Collection of data and do statistical analysis, possibly for local governments and DC
12. QGIS: Data collection and analysis using QGIS, possible for local governments and DC
13. Places of Worship: Create a video on places of worship of all faith

- Tasks that require a test and possibly a small activity (no collaborative content creation, however)

1. Arduino: Make circuits using Arduino and simulate it
2. Blender: Create animations using Blender
3. Blockchain: DApp Development on the Ethereum Blockchain
4. Collaborative Communities: Create a portal to upload images/ slides using Django
5. FOSSEE Optimization Toolbox: Develop the Ecos function for FOSSEE Optimization Toolbox
6. LaTeX: Create predefined documents in LaTeX
7. OpenModelica: Interface OpenModelica with external C functions / Implement Embedded Applications on Arduino Uno
8. Python: Create an application in Python/ Django
9. Web Development: Develop a simple functional website
10. Xcos: To solve at least one of the python/javascript problems in Xcos

The students have to upload the completed screening tasks before the deadline through Moodle, an open source course management system. The evaluation is done in two stages. The first stage of evaluation is peer review. In this method, each student has to evaluate three submissions of other students. The assignment of submissions is random and blind (students do not know whose submissions they are evaluating). This method was introduced as we receive a large number of submissions. In the second stage, the domain experts from the FOSSEE Team will look at the submissions and grade them. The grade is awarded according to the correctness and quality of the submissions. The successful candidates will be offered FOSSEE Summer Fellowship 2019.

Last year's (Summer Fellowship 2018) statistics are as follows: 20,000 students registered. 2,000 completed the assignments. About 300 completions were of acceptable quality. Out of this, we could offer the Fellowship to only 50, owing to the shortage of accommodation at IIT Bombay. The remaining 250 students received an "Internship Certificate", which said that the work they completed was equivalent to 6 weeks of training at IIT Bombay. Selected FOSSEE Fellows did an advanced work at IIT Bombay. They received a Fellowship Certificate at the end of the training.

We expect all numbers to be higher this year. We also plan to follow up with the registrants and get more of them complete the assignment. We also have many more projects this year. For example, we are contacting the District Collectors for the first time. Through them or otherwise, we hope to get students attempt problems of interest to local governments.

We sent the 1,00,000 emails starting from 8 Feb. 2019, over a period of a few days - if we sent them in one go, they would have gone to the spam folder. We started sending the printed posters starting from 11 Feb., and completed the mailing of all 30,000 posters by 20 Feb., the printing capacity of the L1 vendor being the limitation. Perhaps we should give the order to two vendors the next time. The printed posters were sent by Professional Couriers, the L1 vendor chosen by IIT Bombay for official snail mails. We will send the printed posters to District Collectors in a day or two. We have already informed them by emails.

The total cost of sending all the posters is less than Rs. 10 lakh. This includes the cost of (1) cover letter (2) A2 size poster (3) A4 size printed envelope (4) Folding the poster and putting it inside the envelope, along with the cover letter (5) Sealing the envelope (6)

Sticking the address label using the address list given by us (7) Delivering it to the office of Professional Couriers. The cost of all of the above plus Professional Courier charges for one envelope works out to about Rs. 25. We have verified that this process is 10 to 100 times more effective than newspaper/magazine advertisements. This optimised process is one of the successful outcomes of the FOSSEE project.

At the time of writing this Concept Note on 21 Feb. 2019, a total of 2,000 students have registered for the Fellowship, about 500 of them having been informed through our printed posters displayed on their college notice boards. As the posters are received and displayed by Heads of Departments, we expect many more students to register in the near future. As this is the second time we are running this scheme, we are doing a better job now. We expect more than 20,000 students to register. As we plan to hand hold with the students, we expect to have more than 350 students complete the assignment satisfactorily. We hope to accommodate 100 Fellows this year (we have asked for so many seats in IIT Hostels). If our sister institutions can also pitch in, we should be able to accommodate many more.

Rationale for the Proposed Project: The motivation to float such an activity is to involve the young student force to do useful tasks. While completing the tasks they will become proficient in at least one Free/Libre and Open Source Software, which can enhance their skill set. Some of the screening tasks that are available are useful to the local administration. Through these tasks the community also benefits, by the availability of capable and young workforce at the disposal of local governments.

Project Goals and Objectives: Through this activity, FOSSEE aims to

1. Train a huge number of college students in FLOSS and also enhance their skill set
2. Put student force to work on tasks that are of interest to local administration

List of activities: A complete list of topics is available at https://fossee.in/fellowship/2019. We will be happy to add more topics to this list, if found suitable. A partial list is given in the Annexure.

Expected Results: At the end of this activity FOSSEE will be able to train a number of students on FLOSS. The students who attempt the screening tasks will be learning a FLOSS while also applying his/ her domain knowledge. This will enhance the skill set and in turn increase the employability of the students.

Local Government can also benefit from this scheme as we are putting the student force to work for them through the District Collector's office.

ANNEXURE

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पीठासीन प्राध्यापक
रासायनिक अभियांत्रिकी विभाग
भारतीय प्रौद्योगिकी संस्थान मुंबई
पवई, मुंबई 400 076, भारत.

February 13, 2019

Dear District Collector,

I am writing this letter to inform you about a FOSSEE Summer Fellowship scheme, to be carried out at IIT Bombay and a few sister institutions, for a period of 6–8 weeks, during the summer of 2019. FOSSEE stands for Free/Libre and Open Source Software for Education.

Students to be selected for this Fellowship can be from any college, pursuing any degree, and at any stage of their graduation. The only criterion for selection is the successful completion of a useful project. At the back of this letter, I have given samples of projects that can be undertaken at the district level.

Students desirous of getting selected for this Fellowship will have to learn a Free/Libre and Open Source Software, using which, solve a problem of utility to the community. These problems are not very complicated, and can be done over a period of two to four weeks. Moreover, self learning audio-video tutorials, called Spoken Tutorials, are available on most of the software proposed for this work. These tutorials are typically dubbed in many languages of our country, available free of cost, and can be used without Internet.

Both FOSSEE and Spoken Tutorials are projects carried out at IIT Bombay, with funding from the National Mission on Education through ICT, MHRD, Govt. of India.

As the problems proposed to be solved are from the local community, they are realistic, which benefits the students. The community also benefits, by the availability of capable and young work force at the disposal of local governments. A possible partial list of topics a student desiring to be selected as a FOSSEE Fellow is given at the back of this letter. A complete list of topics is available at `https://fossee.in/fellowship/2019`. We will be happy to add more topics to this list, if found suitable.

We are displaying a poster on this scheme in 30,000 College Departments, through their Heads, which could result in a viewership of about 30 lakh students. It is likely, however, that our poster may not reach a large cross section of students, as our country is a lot bigger. I seek your help in bringing the content of this letter to nearby colleges. Please encourage students who contact you to work on a topic that is of interest to your district.

A soft copy of this letter is available at the URL given above. We look forward to your enthusiastic participation in this nation building project.

Yours sincerely,

Prof. Kannan Moudgalya

cc: The Education Secretary,
with a request to help promote this scheme through all official channels

A **partial list** of projects that can be executed by students for their District Collector's office is given below. More details are available at `https://fossee.in/fellowship/2019`.

I Collect any few variables relevant to your district suggested by your District Collector, and use the statistical software R to study possible correlations between them. A small sample set is given at the end of this page, and many more are possible.

II This is similar to the previous problem statement, with the additional information on geographic location using the QGIS software. For a block in your District, collect data for relevant variables (eg. dengue incidence and water levels in ponds) in spreadsheet (CSV) format, and analyse the correlation between them using QGIS maps and the analysis tools that come with QGIS.

III Enter catalog/metadata information of 1,000 books from a nearby public library using Koha, and create a virtual library.

IV Using the Lokavidya App and your mobile phone, create a five minute video of any place of worship of any faith, or a public monument, etc., in your district. Emphasis should be on architectural beauty/uniqueness or special customs, etc. Selfies and controversial speeches that hurt sentiments of people are not permitted.

A partial list of variables for tasks I and II mentioned above is listed below:

1. Gross District Domestic Product (GDDP) in value terms
2. Below Poverty Line Households - number of households
3. Fair Price Shops - Ration shops; availability and the number of it.
4. Storage:
   (a) Cold Storage - number and availability
   (b) Godowns - number and availability
5. Natural Calamities: (drought /flood /hailstorm /wind /fire etc.)
   (a) Property damage (value or numbers by type) due to natural calamities
   (b) Human damage due to natural calamities-death/injury
6. Court:
   (a) Number of Judges in District courts
   (b) Number of cases open in District courts
7. Fire incidents number and magnitude
8. Electricity:
   (a) Total electricity Consumption (urban /rural) in appropriate units
   (b) Total electricity consumption (agriculture /commercial /domestic) in appropriate units
   (c) Number of electricity connections (urban /rural)
   (d) Number of electricity connections (agriculture /commercial /domestic)
9. Number of registered Bore-wells
10. Number of tube well connections (run by electricity using non-renewable and renewable sources of energy)
11. Number of diesel pumping sets
12. Number of MBBS Doctors
13. Tourism :
    (a) Tourist destinations number of attractions
    (b) Number of tourists in a year
    (c) Total revenue from tourism in a year
14. Swachh Bharat Mission Implementation (Very clean, Clean and Dirty areas in your locality)
15. Your College with the following: Campus boundary, Main Building, Canteen, Play/sports grounds, Main road and Inset map of your city
16. Rain Water Harvesting and Green Roof Initiative
17. Malnutrition data
18. Industry (Labour, Raw materials and Ownership)
19. Education (Schools, colleges and Higher education institutes)
20. Green coverage

Processes/Conditions to participate in the Fellowship are available at the URL given above.

Project opportunities for everyone!

All college (bachelors, masters, PhD, etc.) students of all streams (engineering, sciences, arts, commerce, etc.) are welcome to participate in the

FOSSEE Summer Fellowship 2019

This Fellowship will help you in **Internships, Jobs, Higher studies**

Selection will be based only on the quality of screening tasks submitted, and no other criterion

Schedule and Dates:

01 Feb 2019: Tasks announced & registration begins

18 Mar 2019: Last date of registration and to submit tasks

fossee better education

Promoting Free/Libre and Open Source Software

https://fossee.in

IIT Bombay

Chance to work on one of these Free/Libre and open source software tools:

For more details, visit **https://fossee.in/fellowship/2019**

The FOSSEE project is funded by the National Mission on Education through ICT, MHRD, Government of India.