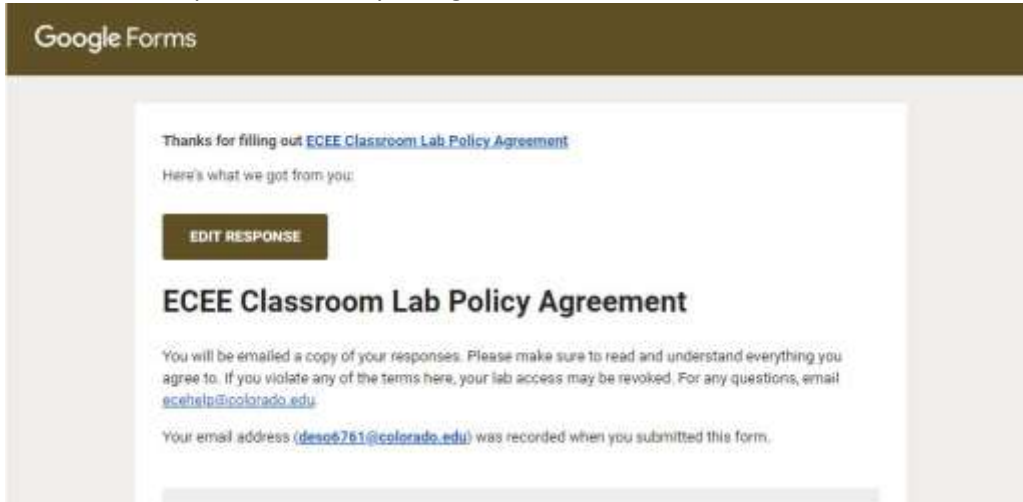


Name - Deepesh Sonigra
Subject - Advanced Embedded System Design

Assignment 1

Problem Set

Problem 1- Complete the Surveys & Agreements



The screenshot shows a Google Forms confirmation page. At the top, it says "Thanks for filling out [ECEE Classroom Lab Policy Agreement](#)". Below that, it says "Here's what we got from you:". There is a button labeled "EDIT RESPONSE". The title of the form is "ECEE Classroom Lab Policy Agreement". The text below the title says: "You will be emailed a copy of your responses. Please make sure to read and understand everything you agree to. If you violate any of the terms here, your lab access may be revoked. For any questions, email eeehelp@colorado.edu". At the bottom, it says "Your email address (deso6761@colorado.edu) was recorded when you submitted this form."

[Problem 2] Go To Canvas and get familiar with the site Completed

[Problem 3 - 5 pts] Set up your Slack account



Deepesh Sonigra 4:19 PM

Hello Everyone! I am Deepesh Sonigra, a first-year Master's student in Embedded Systems and I am very excited to learn about kernel development, Device Drivers and FreeRTOS. I plan to use the fingerprint sensor in my final project.

[Problem 4] Find a partner for the projects and acquire the development Kits

Project Partner- MADHUMITHA TOLAKANAHALLI

[Problem 5] Setup your environment

```
deep60@Deepesh-VirtualBox:~$  
deep60@Deepesh-VirtualBox:~$ ls  
deepesh Desktop Documents Downloads examples.desktop Music Pictures Public snap Templates Videos  
deep60@Deepesh-VirtualBox:~$ cd Shared  
deep60@Deepesh-VirtualBox:~/Shared$ ls  
deep60@Deepesh-VirtualBox:~/Shared$ cd APES  
deep60@Deepesh-VirtualBox:~/Shared/APES$ ls  
deep60@Deepesh-VirtualBox:~/Shared/APES$ cd Assignments/  
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments$ cd Prac1/  
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1$ ls  
2019-ECEN5013-Homework1.pdf MELP-Chapter02.tar  
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1$ cd MELP  
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP$ ls  
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP$ cd Chapter02  
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02$ ls  
list-libs set-path-arm-cortex_a8-linux-gnueabi set-path-arm-unknown-linux-gnueabi  
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02$
```

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[Problem 6 - 10 Pts] Create a System Info Script

BASH SCRIPT

```
#!/bin/bash
echo -e "OPERATING-SYSTEM-INFORMATION \n" > OSinfo.txt

echo "USER INFORMATION :" >> OSinfo.txt
echo -e "$USER \n" >> OSinfo.txt

echo "OPERATING SYSTEM TYPE :" >> OSinfo.txt
echo -e "$OSTYPE \n" >> OSinfo.txt

echo " OPERATING SYSTEM: " >> OSinfo.txt
echo -e "$(lsb_release -i) \n" >> OSinfo.txt

echo "OPERATING SYSTEM VERSION:" >> OSinfo.txt
echo -e "$(lsb_release -r)\n" >> OSinfo.txt

echo "KERNEL VERSION:" >> OSinfo.txt
echo -e "$(uname -r)\n" >> OSinfo.txt

echo "GCC BUILD VERSION" >> OSinfo.txt
echo -e "$(gcc --version)\n" >> OSinfo.txt

echo "KERNEL BUILD TIME:" >> OSinfo.txt
```

OUTPUT

OPERATING-SYSTEM-INFORMATION

USER INFORMATION :
deep60

OPERATING SYSTEM TYPE :
linux-gnu

OPERATING SYSTEM:
Distributor ID: Ubuntu

OPERATING SYSTEM VERSION:
Release: 18.04

KERNEL VERSION:
4.15.0-29-generic

GCC BUILD VERSION
gcc (Ubuntu 7.3.0-27ubuntu1~18.04) 7.3.0

Name - Deepesh Sonigra
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KERNEL BUILD TIME:

#31-Ubuntu SMP Tue Jul 17 15:39:52 UTC 2018

ARCHITECTURE:

x86_64

FILE SYSTEM INFO:

	total	used	free	shared	buff/cache	available
Mem:	5057	1017	3391	13	648	3803
Swap:	2047	0	2047			

[Problem 7 - 10pts] Let's build natively! Shared and Static Libraries

- Execute each compiled application and screenshot the results

```
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$ ls
hello-arm.c hello-arm.o hello-arm-shared hello-arm-static Makefile
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$ ./hello-arm-static
Hello from ARM
add_ints
4 + 5 = 9
multiply_ints
4 * 5 = 20
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$ ./hello-arm-shared
./hello-arm-shared: error while loading shared libraries: libtest.so: cannot open shared object file: No such file or directory
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$ LD_LIBRARY_PATH=./shared ./hello-arm-shared
Hello from ARM
add_ints
4 + 5 = 9
multiply_ints
4 * 5 = 20
```

- Record the difference in the size each by screenshot capturing the result

```
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$ ls -l hello-arm-s*
-rwxrwxrwx 1 root root 8408 Jan 24 15:46 hello-arm-shared
-rwxrwxrwx 1 root root 847688 Jan 24 15:46 hello-arm-static
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$
```

- Verify and record (screenshot) the shared library use of each executable using the `readelf` command on each executable

```
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$ ./list-libs hello-arm-shared
[Requesting program interpreter: /lib64/ld-linux-x86-64.so.2]
0x0000000000000001 (NEEDED)      Shared library: [libtest.so]
0x0000000000000001 (NEEDED)      Shared library: [libc.so.6]
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$ ./list-libs hello-arm-static
readelf: Warning: [ 3]: Link field (0) should index a symtab section.
readelf: Warning: [ 3]: Link field (0) should index a symtab section.
deep60@Deepesh-VirtualBox:~/Shared/APES/Assignments/Prac1/MELP/Chapter02/library/hello-arm$
```