Faculty of Engineering & Applied Science

Experiment Name: Integrating Sensors to a Microcontroller Board

Experiment date: 09/21/2022

Group Number*: 4*

Section CRN:

Course Instructor: *Ramiro Liscano*

Lab TA: *Sifatul Mostafi*

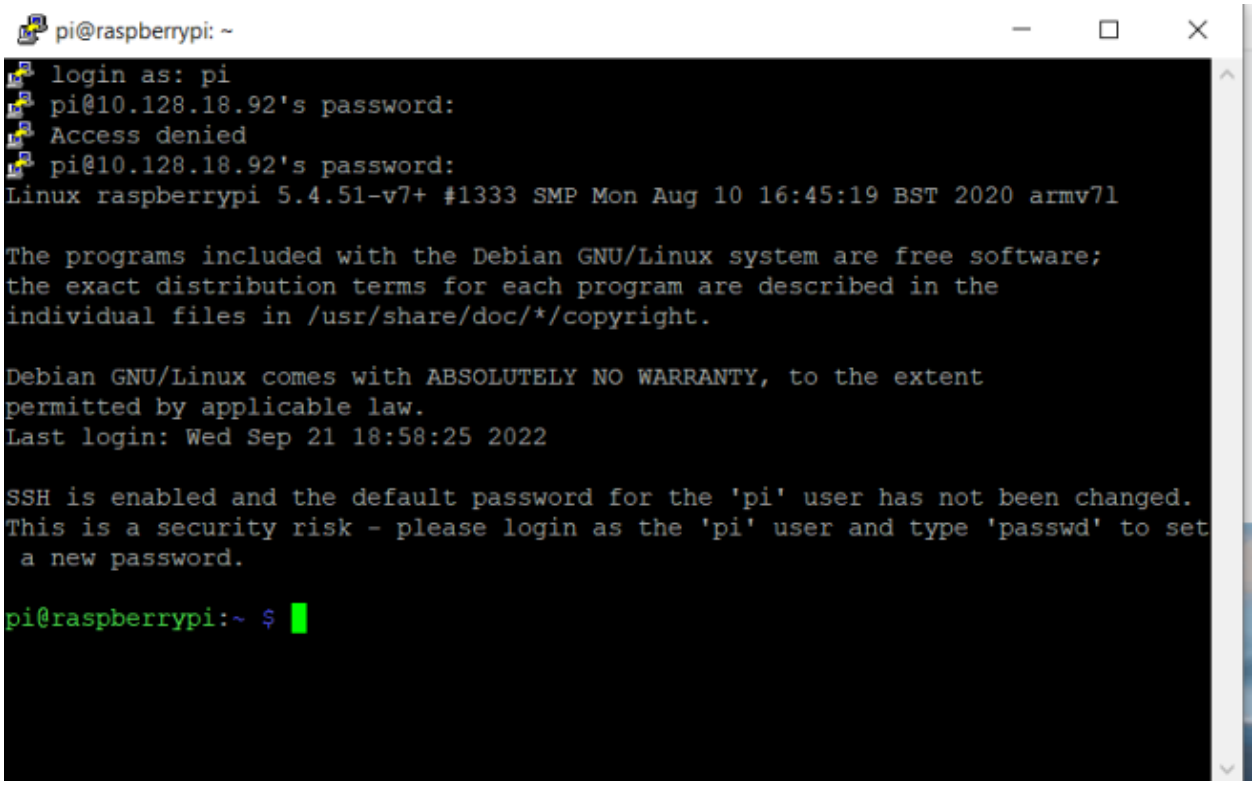
Student Name	**Student Id**
Preet Patel	*100708239*
Tiwaloluwa Ojo	*100700622*
Waleed El Alawi	*100764573*

Learning Objectives

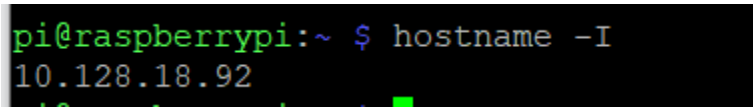
The objective of this lab was to get introduced to working with the Raspberry Pi 3. We learned how to set up the Raspberry Pi OS image setup onto the Raspberry Pi 3, and we also learned how to set up the network on the Raspberry Pi 3 so it can be connected with a host machine using SSH from Linux and Putty (also SSH) from windows. We gained experience working with Linux and the Raspberry Pi 3, we learned how to compile code to a x86-64 executable file and transfer the file between a host machine and the Raspberry Pi 3.

Deliverables:

Connecting windows localhost with Raspberry Pi 3:



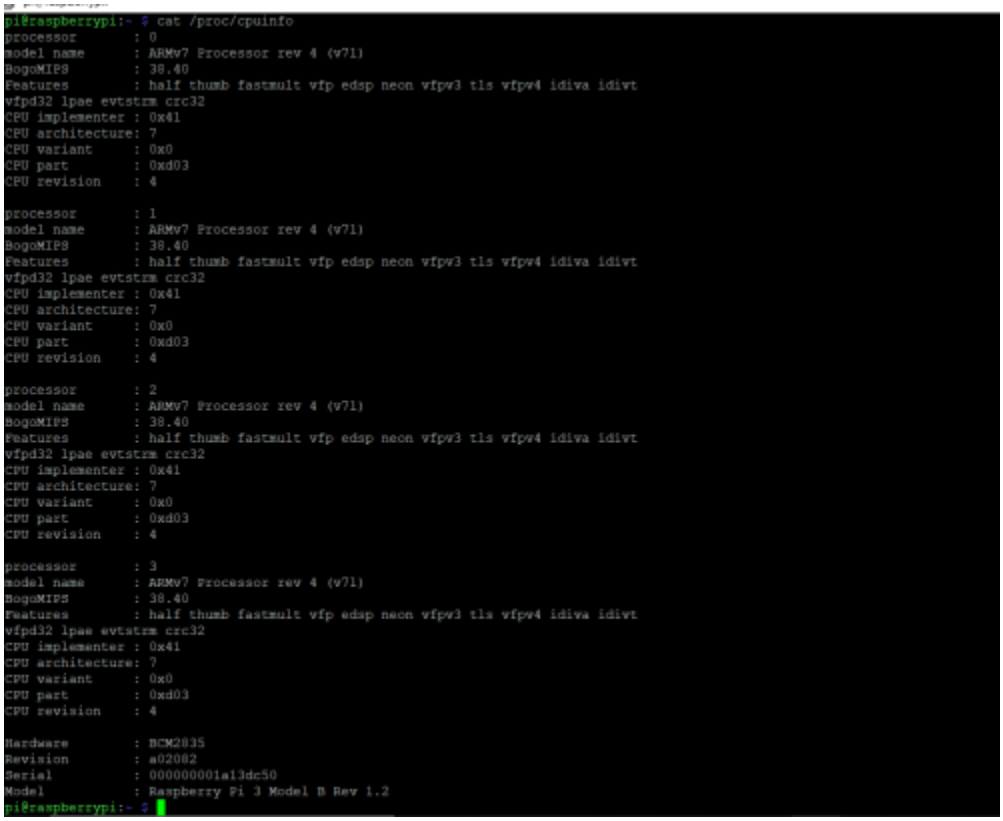
IP address used for putty connection:



Checking Raspberry Version:

```
pi@raspberrypi:~ $ cat /etc/os-release
PRETTY_NAME="Raspbian GNU/Linux 10 (buster)"
NAME="Raspbian GNU/Linux"
VERSION_ID="10"
VERSION="10 (buster)"
VERSION_CODENAME=buster
ID=raspbian
ID_LIKE=debian
HOME_URL="http://www.raspbian.org/"
SUPPORT_URL="http://www.raspbian.org/RaspbianForums"
BUG_REPORT_URL="http://www.raspbian.org/RaspbianBugs"
```

Checking Raspberry Pi CPU Version:

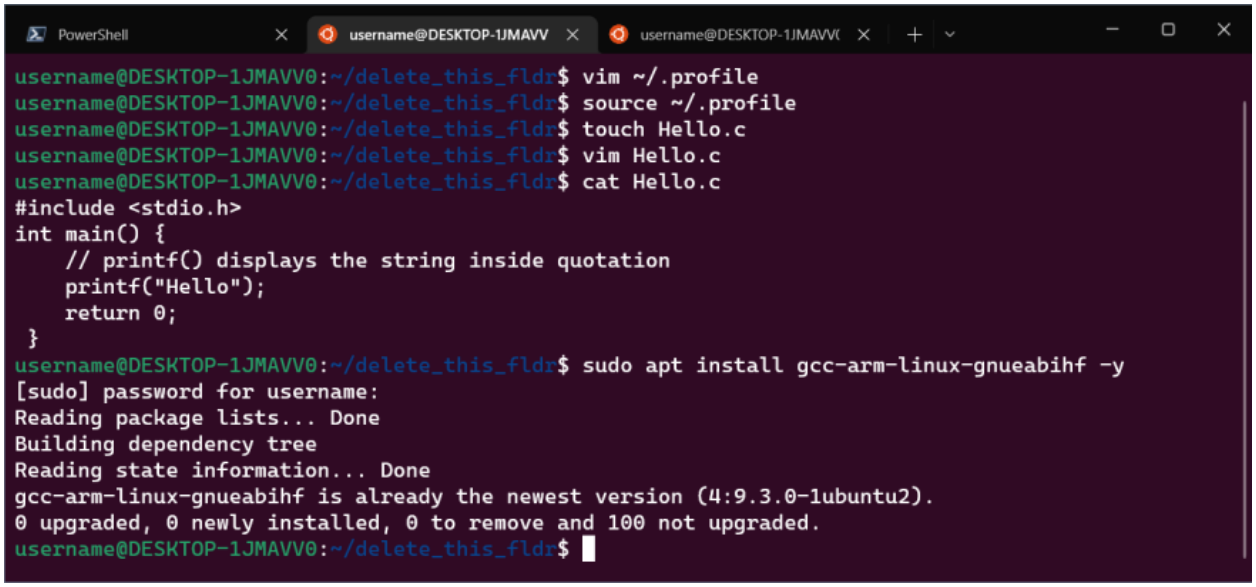


```
pi@raspberrypi:~ $ cat /proc/cpuinfo
processor       : 0
model name      : ARMv7 Processor rev 4 (v7l)
BogoMIPS        : 38.40
Features        : half thumb fastmult vfp edsp neon vfpv3 tls vfpv4 idiva idivt
vfpd32 lpae evtstrm crc32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x0
CPU part        : 0xd03
CPU revision    : 4

processor       : 1
model name      : ARMv7 Processor rev 4 (v7l)
BogoMIPS        : 38.40
Features        : half thumb fastmult vfp edsp neon vfpv3 tls vfpv4 idiva idivt
vfpd32 lpae evtstrm crc32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x0
CPU part        : 0xd03
CPU revision    : 4

processor       : 2
model name      : ARMv7 Processor rev 4 (v7l)
BogoMIPS        : 38.40
Features        : half thumb fastmult vfp edsp neon vfpv3 tls vfpv4 idiva idivt
vfpd32 lpae evtstrm crc32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x0
CPU part        : 0xd03
CPU revision    : 4

processor       : 3
model name      : ARMv7 Processor rev 4 (v7l)
BogoMIPS        : 38.40
Features        : half thumb fastmult vfp edsp neon vfpv3 tls vfpv4 idiva idivt
vfpd32 lpae evtstrm crc32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x0
CPU part        : 0xd03
CPU revision    : 4

Hardware        : BCM2835
Revision        : a02082
Serial          : 000000001a13dc50
Model           : Raspberry Pi 3 Model B Rev 1.2
pi@raspberrypi:~ $
```

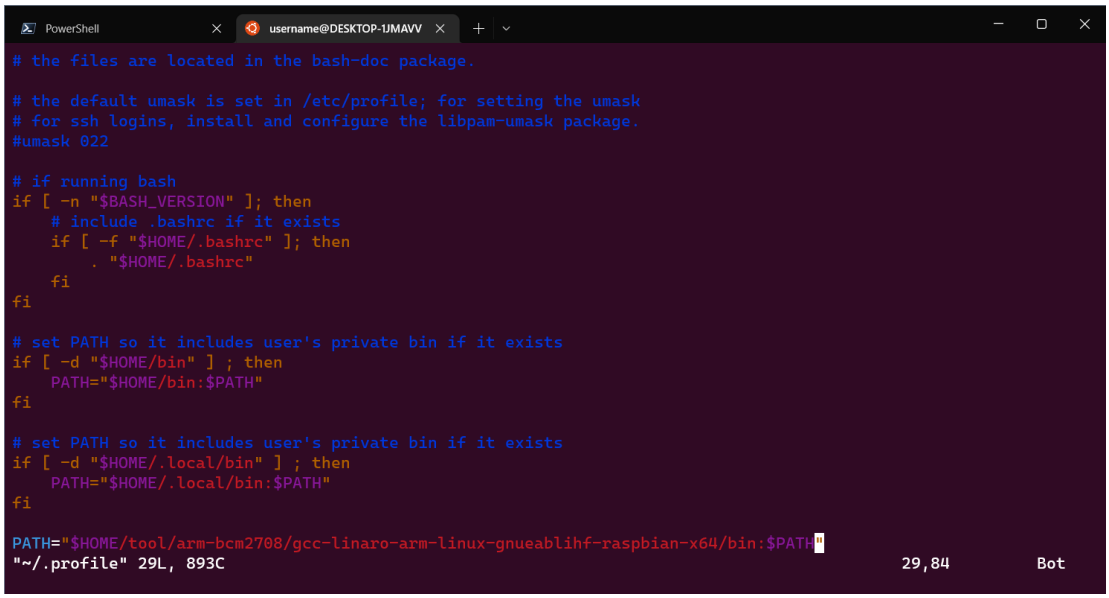
```
pi@raspberrypi:~ $ cat /proc/device-tree/model
Raspberry Pi 3 Model B Rev 1.2pi@raspberrypi:~ $
```

Download the toolchain on Ubuntu and adding path to the environment:

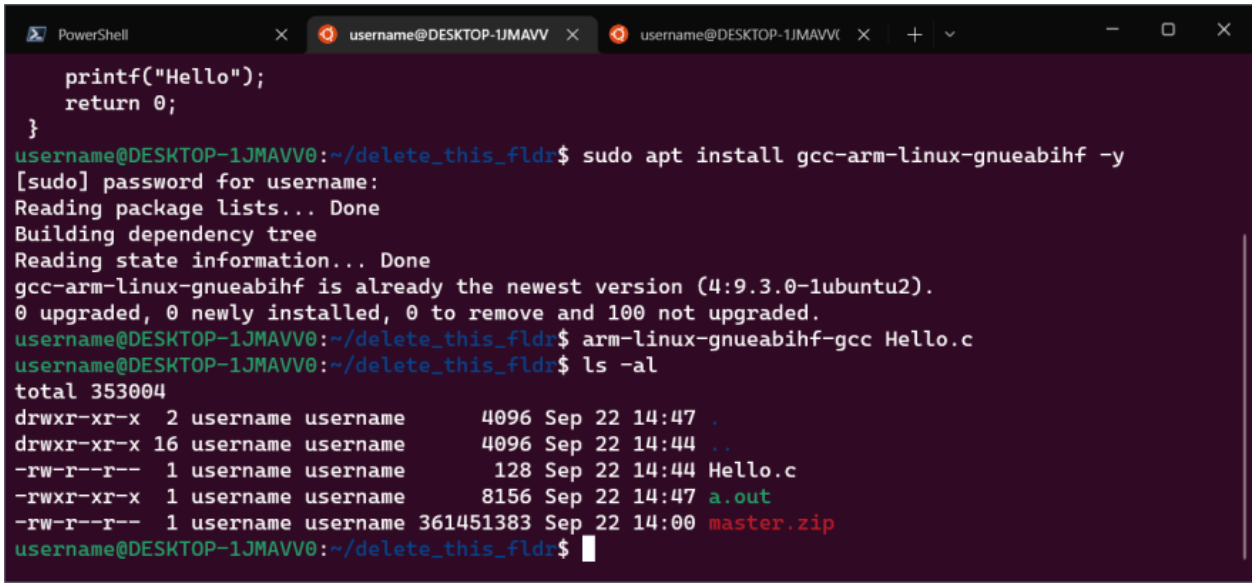
Creating Hello.c file and installing arm toolchain for compiling Hello.c:



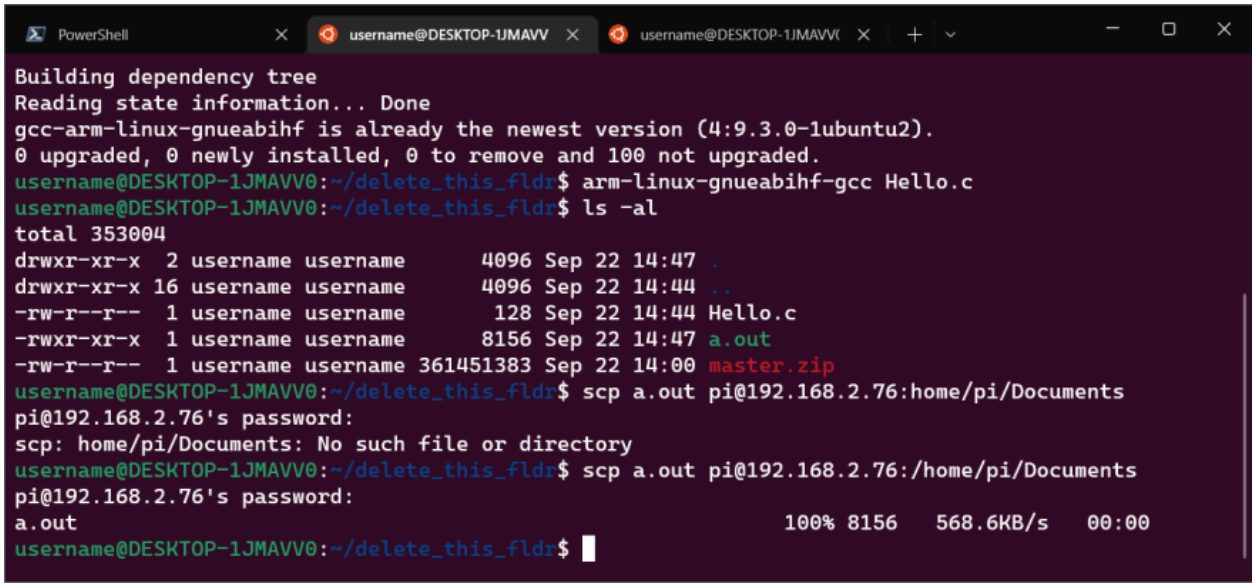
Updating profile path variable



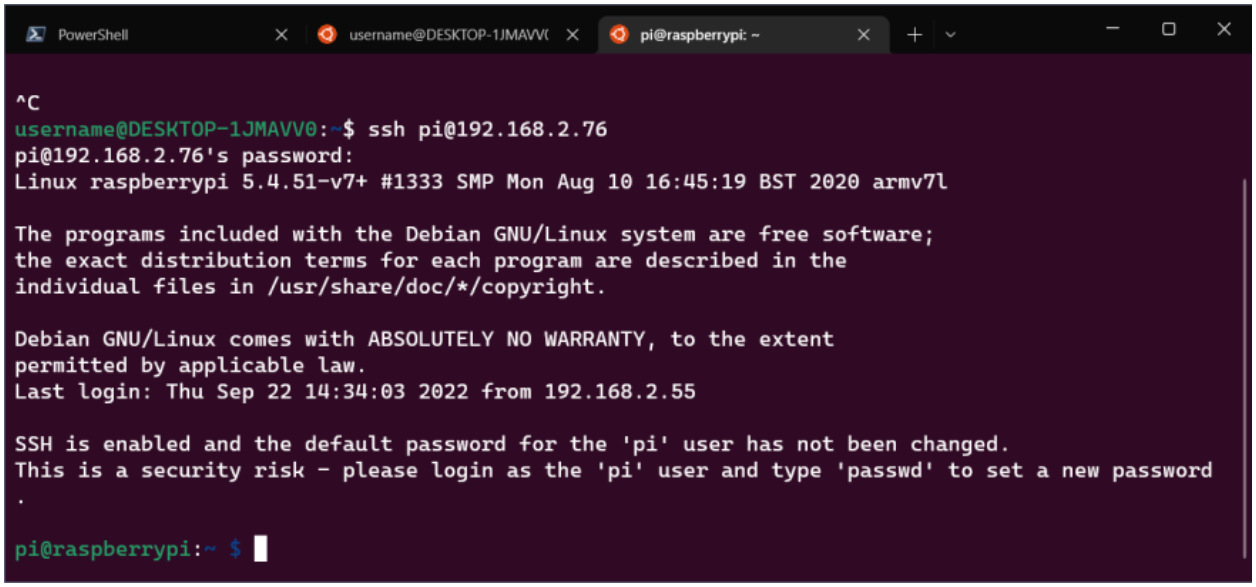
Compiling Hello.c:

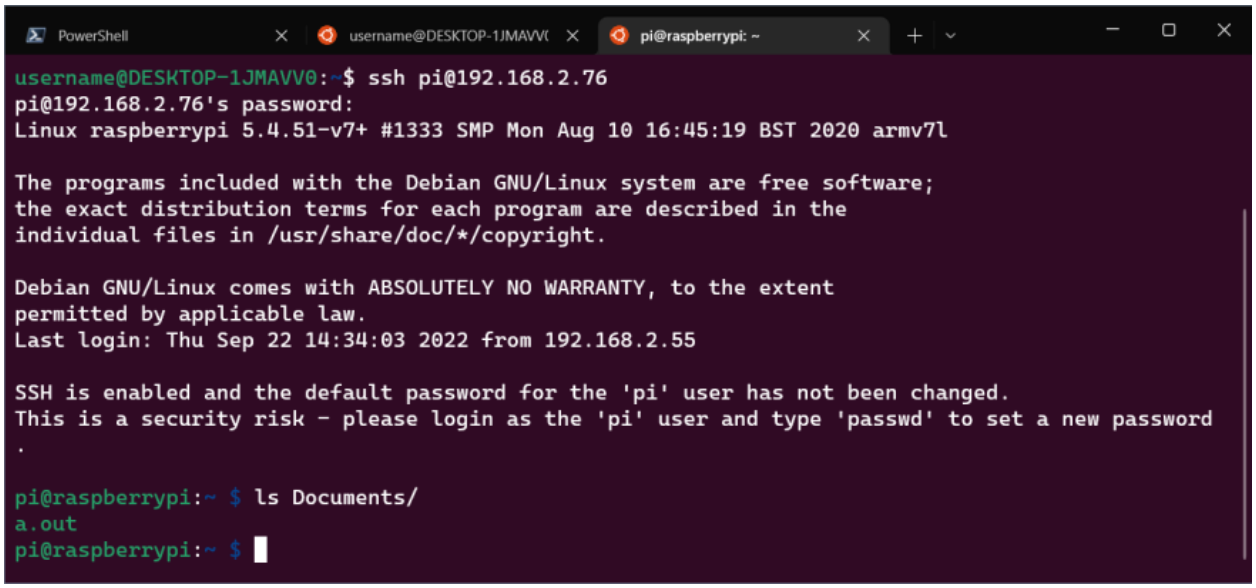


Command executed to send a.out file to Pi: “scp a.out pi@192.168.2.76:home/pi/Documents”:



Command to ssh to the Pi: “ssh pi@192.168.2.76”:





Please describe the difficulties you run into and explain how you tackle the problems and resolve them

We had difficulties connecting with the Raspberry Pi through SSH using Putty. We kept running into a “connection refused” error. We hypothesized we had used the wrong IP address. We used Google to search for a solution in which we found out that one of the possible causes of the problem could be the Raspberry Pi 3 configuration. So we checked the configuration of the Raspberry Pi from preferences and saw that the settings for SSH, and other important network settings were turned off. We turned on those settings and rebooted the Raspberry Pi which then allowed us to connect to it using Putty from our windows environment. We also tried connecting to it from our Ubuntu VM environment which allowed us to directly connect to the Raspberry Pi using SSH.