

## Dyson School of Design Engineering

### DE 2.3 Electronics 2 Laboratory Oral Examination Guidelines

*Peter Cheung, version 1.2*

Assessment of Lab 0 to Lab 4 will be in the form of a 15-minute oral examination for each student with one of three Lab Demonstrators on Wednesday 12<sup>th</sup> of February 2020, 9.00 to 13.00. I have scheduled some oral exams beyond the 12 noon time-table slot due to the large number of students being assessed. If you do sports on Wednesday afternoon, please find someone in the morning to swap with you and inform me via email. A schedule for the examination is shown below. **This is a formal assessment and you are REQUIRED to be present at the allotted time.**

The purpose of the Oral examination is to establish how much you have learned in respect to the learning outcomes of these Lab Sessions. Questions will be asked which aim to establish your level of understanding and how effectively you have conducted the experiments including the effective use of your logbook. Your electronic or paper logbook **MUST BE** available during the oral examination, so that you can refer to its contents. The Oral Examination will take place in EEE Lab, Level 1 EEE Building.

The learning outcomes for each Lab are summarized below. It is helpful if you consider to what extent you have understood with respect to this list of learning outcomes.

#### **Lab 0: Matlab basics**

Learn to use basic Matlab features, e.g. plotting graphs; understanding of the time domain and frequency domain views of signals.

#### **Lab 1: Signal Processing with PyBench & Matlab**

How Pybench board communicate with Matlab programming environment; generation and capture of signals on the board; spectral domain analysis of sound captured by microphone; effect of under sampling and its consequence; interpretation of results returned by the `fft(.)` function in Matlab; frequency resolutions of spectrum; strength of harmonic components for periodic signals such as square waves and triangular waves; manipulation of sound files stored as .WAV files on a computer; signal segmentation using instantaneous energy; beat extraction of musical sound.

#### **Lab 2: System Characterization and Transfer Function**

DC response of a non-linear system; understand of system modeling in mathematics (in s-domain); meaning of transfer functions; how to obtain frequency response from the transfer function of a "black-box" system; step-response of a system; using Matlab to do the above; difference between the measured and predicted frequency response of the bulb box.

#### **Lab 3: IMU and OLED Display**

How to interpret the signals from the accelerometer and the gyroscope; how to derive tilt angles (pitch and roll angles) from the gyroscope readings; limitations of each type of measurements; how to combine the two types of measurement in order to obtain better estimate of pitch (and roll) angles; what is a driver program and how such a program can help a design engineer; how to use the OLED driver program in Python; understanding of the Python code on using the IMU and the OLED display to do useful things.

#### **Lab 4: Motor drive, polling and interrupt**

The use of dual motor driver chip to drive the motor; how PWM signal determine speed of motor; use of potentiometer to control speed; detecting speed of rotation with magnet and hall effect devices; interpretation of the waveforms from the two hall effect detectors; how to determine speed of rotation using polling; how to do the same with interrupt; advantage of interrupt over polling; what is a interrupt service routine (ISR).

DE2.3 - Lab Oral Schedule - 12 Feb 2020

Seq	Surname	Given name	Time	Assessor
1	Polturak	Jack	9.00 - 9.15	1
2	Ritz	Coline	9.00 - 9.15	2
3	Ali	Shafae	9.00 - 9.15	3
4	Ji	Ta	9.00 - 9.15	4
5	Arekat	Hind	9.00 - 9.15	5
6	Alexander	Grace	9.15 - 9.30	1
7	Leclercq	Oscar	9.15 - 9.30	2
8	Lai	Pei-Han	9.15 - 9.30	3
9	Lu	Hsinhua	9.15 - 9.30	4
10	Berkovic	Alexandre	9.15 - 9.30	5
11	Kane	Theo	9.30 - 9.45	1
12	Tang	Emily	9.30 - 9.45	2
13	Thavanesan	Kanya	9.30 - 9.45	3
14	Morrell	Molly	9.30 - 9.45	4
15	Laganier	Colin	9.30 - 9.45	5
16	Hale	Megan	9.45 - 10.00	1
17	Taskin	Kerim	9.45 - 10.00	2
18	Veal	Oliver	9.45 - 10.00	3
19	Langbridge	Abigail	9.45 - 10.00	4
20	Mcmeeking	Alfie	9.45 - 10.00	5
21	Sespattanachai	Saksorn	10.00 - 10.15	1
22	Yao	Xu	10.00 - 10.15	2
23	Ding	Ke	10.00 - 10.15	3
24	Walters	Sam	10.00 - 10.15	4
25	Severi	Emilio	10.00 - 10.15	5
26	Woodburn	Madeleine	10.15 - 10.30	1
27	Bradley	Jemima	10.15 - 10.30	2
28	Ng	Jia	10.15 - 10.30	3
29	Shan	Zheyu	10.15 - 10.30	4
30	Alexander-Ikwue	Eneh	10.15 - 10.30	5
31	Wong	Harvey	10.30 - 10.45	1
32	McGuckian	Patrick	10.30 - 10.45	2
33	Montemiglio	Alberto	10.30 - 10.45	3
34	Ryan	Matthew	10.30 - 10.45	4
35	Horrell	Louis	10.30 - 10.45	5
36	Higgins	Maria	10.45 - 11.00	1
37	Serghides	Christina	10.45 - 11.00	2
38	Knupp	Kabir	10.45 - 11.00	3
39	Tan	Brandon	10.45 - 11.00	4
40	Lin	Xinran	10.45 - 11.00	5

Seq	Surname	Given name	Time	Assessor
41	Ferdinand	Andy	11.00 - 11.15	1
42	Guez	Emilie	11.00 - 11.15	2
43	Li	Rui	11.00 - 11.15	3
44	Beddoe	Rhiannon	11.00 - 11.15	4
45	Gibson	Alexander	11.00 - 11.15	5
46	Speechley	Matthew	11.15 - 11.30	1
47	Paul-Ebiai	Emma	11.15 - 11.30	2
48	Gal-Shohet	Idan	11.15 - 11.30	3
49	Seidler	Frederick	11.15 - 11.30	4
50	Regojo	Claudia	11.15 - 11.30	5
51	Xu	Zhifan	11.30 - 11.45	1
52	Zainal Abidin	Farzana	11.30 - 11.45	2
53	Colebourne	Oliver	11.30 - 11.45	3
54	Taylor	Kirstie	11.30 - 11.45	4
55	Wang	Dinghui	11.30 - 11.45	5
56	Vail	Christopher	11.45 - 12.00	1
57	Bai	Xinyu	11.45 - 12.00	2
58	Djanogly	Ethan	11.45 - 12.00	3
59	Mu	Leihe	11.45 - 12.00	4
60	Gonda	Patrick	11.45 - 12.00	5
61	Ali	Noor	12.00 - 12.15	1
62	Duran	Pablo	12.00 - 12.15	2
63	Reyburn	Mimi	12.00 - 12.15	3
64	Bagaria	Shefali	12.00 - 12.15	4
65	Oyenuga	Adedunke	12.00 - 12.15	5
66	Jones	Oscar	12.15 - 12.30	1
67	Engelmann	Anais	12.15 - 12.30	2
68	Castle	Samuel	12.15 - 12.30	3
69	Moussa	Nour	12.15 - 12.30	4
70	Cross	Oliver	12.15 - 12.30	5
71	Tang	Jonathan	12.30 - 12.45	1
72	Sayegh	Alexandre	12.30 - 12.45	2
73	Cowan	Natasha	12.30 - 12.45	3
74	Gadhia	Premal	12.30 - 12.45	4
75	Chow	Ethan	12.30 - 12.45	5

**DE2.3 Electronics 2 – Oral Examination Feedback Sheet (12 Feb 2020)**

Name of Student:

**Oral Grade:**

Names of Assessors:

**Conduct of the Experiment**

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**1. Logbook Quality and Effectiveness**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Highly effective Excellent	Effective Good	Acceptable Acceptable	Contrived Poor	Unreal V. Poor

**2. Ability to answer questions from logbook**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excellent	Good	Acceptable	Poor	V. Poor

**3. Effort in completing the experiment**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fully engaged Strong evidence	Good engagement Good evidence	Acceptable Engagement	Below expectation	V. Poor Engagement

**Understanding and Learning Outcomes**

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**4. Explanation on the Experimental setup including the PyBench board and the Matlab environment**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excellent	Good	Acceptable	Poor	V. Poor

**5. Explanation on theories behind experiments**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excellent	Good	Acceptable	Poor	V. Poor

**6. Examiner's opinion on candidate's depth of understanding in general**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broad and Deep	Good	Average	Less than average	Poor

**FEEDBACK TO STUDENT:**

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