UNIVERSITY OF Southampton
School of Electronics and Computer Science

Technical Writing: Specifics of Formatting

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Writing Style

Use the third person passive voice, with a neutral, informative tone

- “The transducer was calibrated…”

Create complete sentences.

- POOR: “A run-on is more than one sentence, it is often created by using a comma instead of a full stop or semi-colon, and did I remember to tell you about punctuation in general?”
- POOR: “Being as how it crashed.”

Use sentences and paragraphs!

- Sentences should not be too long – do you run out of breath reading it?
- Paragraphs are blocks of sentences that are grouped together on a similar ‘theme’
- First sentence of a paragraph announces the subject and connects with the one before

Define acronyms and abbreviations at first occurrence (for essential terms)

- “…obtained by Magnetic Resonance Imaging (MRI). The MRI scanner was 1.5 T…”

Watch for tricky subject-verb agreement:

- “The set of numbers is…”
- “These data are…”

Writing Style

Avoid colloquialisms:

- POOR: “The final design was brilliant!”
- GOOD: “The final design had the best signal-to-noise ratio”

Avoid ambiguous pronouns:

- “This was then run through the other one.”

Be concise

- Can you use a larger number of shorter sentences?
- Can you say it in fewer words

Be specific

- Avoid “small”, “very low”, “good”, “much better” etc

Writing Style

Define variables and specify units (and use SI units)

- "The energy [J] stored in an ideal capacitor is given by $E = \frac{1}{2} C V^2$, where *C* is the capacitance [F] and *V* is the potential difference [V] across it"

Use standard mathematical notation, with single-character names

- POOR: Imp = V/I
- GOOD: Z = V/I

Capitalise and space numbers and units correctly:

- 6 kHz not 6KHz
- 50 mm
- 8.3 µF
- 60 dB not 60 Db

Formal and Informal Writing

“I’ve carried out the experiment and will tell you the results as soon as I’ve analysed them.”

“The experiment has been completed and the results will be made public after analysis.”

“I must point out the anomalies found in this investigation.”

“There are anomalies in this investigation.”

Source:
J. v. Emden, *Effective Communication for Science and Technology*, Basingstoke, UK: Palgrave, 2001.

Sentence Structure

"As detailed below."

"For the following reasons."

"As more data are gathered every day."

"The decay heat, without sufficient coolant, can rapidly raise the core temperature, with the possibility of severe core damage and the possibility of meltdown and the release of radioactivity."

"The decay heat, without sufficient coolant, can rapidly raise the core temperature. This can result in severe core damage, possibly leading to meltdown and the release of radioactivity."

Source:
J. v. Emden, *Effective Communication for Science and Technology*, Basingstoke, UK: Palgrave, 2001.

Sentence Structure

"A rare orchid was seen during an otherwise uneventful field trip"

"A rare orchid was seen during an otherwise uneventful field trip"

"The field trip was uneventful apart from the sighting of a rare orchid"

Source:
J. v. Emden, *Effective Communication for Science and Technology*, Basingstoke, UK: Palgrave, 2001.

Subject-Verb Agreement

"A range of frequencies were selected"

"A range of frequencies was selected"

"A wide spectrum of frequencies were produced"

"A wide spectrum of frequencies was produced"

Source:
J. v. Emden, *Effective Communication for Science and Technology*, Basingstoke, UK: Palgrave, 2001.

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Formatting and Layout

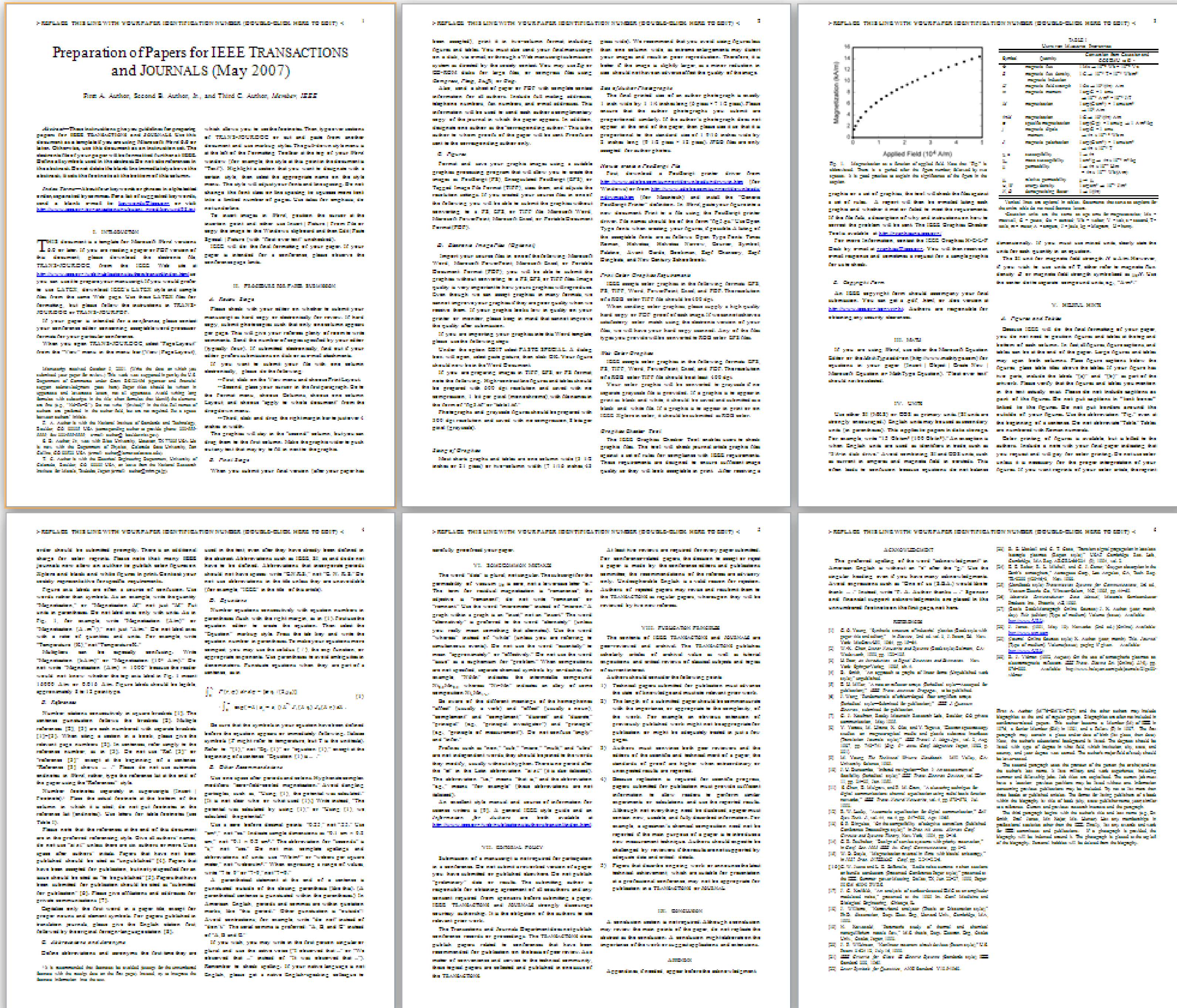
Following Templates

You will often be required to follow a particular report template

- Assignments and coursework
- Third year, IRR, IRP, GDP and MSc projects
- Industrial technical reports and white papers
- Conference/Journal papers
- Books and book chapters
- Magazine articles

These are often very detailed, and should be followed!

- Margins
- Justification of text
- Fonts, font colours, and font size
- Heading styles
- Line spacing
- Headers, footers and page numbering
- Figure and table captions
- References
- Paragraph indentation


Preparation of Papers for IEEE TRANSACTIONS and JOURNALS (May 2007)
First A. Author, Second B. Author, Jr., and Third C. Author, Member, IEEE
Magnetization (kA/m)
Applied Field (10⁴ A/m)

ELEC1032 Format Specification for Written Assignments (Times New Roman, 22pt)

(1 18 pt line space)

(Your name, centred, 14 pt)
(Your email)
(Your course)
Tutor: (your tutor's name)

(insert two 12 pt blank lines before abstract)

Abstract: The abstract to the report should be indented, both left and right, by ½ inch or 1.27 cm. It should not exceed the number of words specified in the assignment. Use bold Times New Roman 12 pt for the word 'Abstract', and non-bold Times New Roman for the body of the abstract.

(insert two 12 pt blank lines after abstract)

1. Introduction (14 pt Bold)

Start all headings and paragraphs under section or subsection headings without indentation. Headings are as shown above; subheadings should be numbered 1.1, 1.2, … and should be 12 pt bold. All text should be in 12 pt Times New Roman and fully justified, with single line spacing. All sentences within a paragraph should be separated from one another by two spaces (note LaTeX will do this automatically).

A single 12 pt blank line should be left between paragraphs, and two blank 12 pt lines just before a new section heading.

2. Page Layout and Margins

A4 paper should be used and the margins should be set to 1 inch or 2.54 cm all around. If a

Word or LaTeX?

Two most common tools for document preparation are:

- Microsoft Word
- LaTeX

LaTeX has a higher initial learning curve. But…

- It produces documents with correct formatting of mathematics and text
- has a in-built system for referencing
- Free and available for virtually all computing platforms

LaTeX is not a WYSIWYG system

- You edit your document (with a .tex extension) in a text editor and run it through the LaTeX program to generate your final document
- You can then view your document as a pdf
- There are good Integrated Development Environments for which combine the editor and drive the compiler and viewers

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Figures, Tables and Equations

Figures, Tables and Equations

Figures…

- Graphs
- Photos
- Diagrams

…or Tables

- grid of rows and columns

Figures present information in a way that is easy to read, compare and understand

- If done correctly!
- A picture does not always “say 1000 words”
- Also segment the text and increase visual appeal. However, make points and not decoration

Don’t distort figures

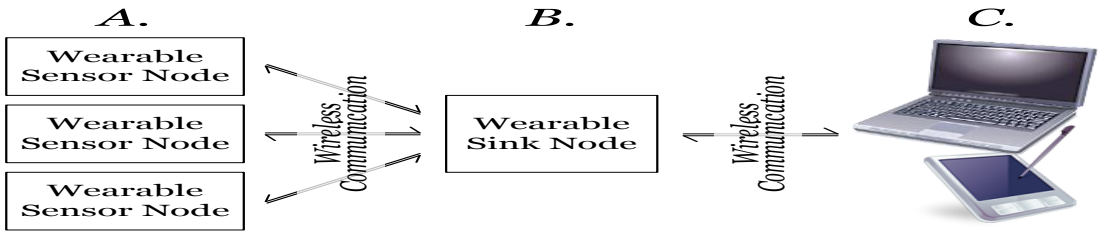


Figure and Table Captions

Figures and tables are there for a reason

- Referred to them in the text: “as shown in Figure 1”, “see Figure 1”, (Figure 1) etc
- Explain the key points that they show

A figure or table should always have a caption

- Describes what the figure/table contains
- Allows the figure/table to be understood on its own
- Captions should be numbered: “Figure 3”, “Fig. 3”, “Table IV” etc

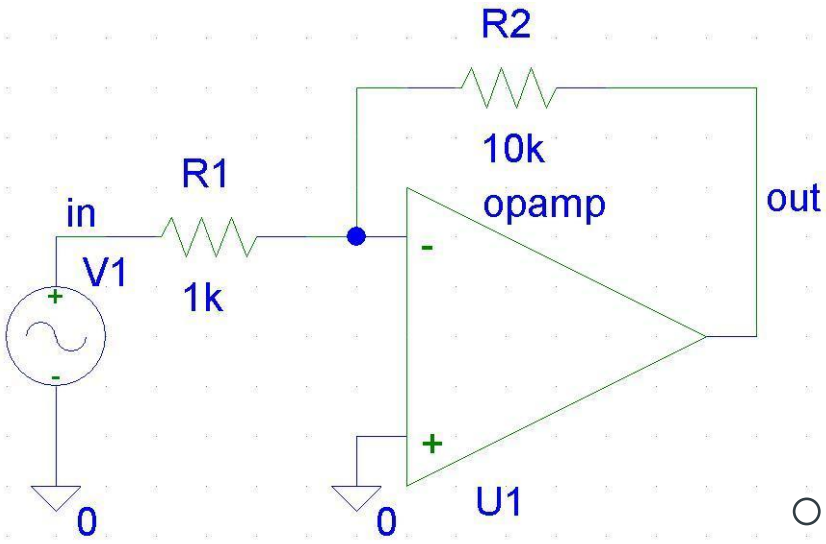
If the figure/table is not your own…

- Must be cited!!! (covered later on)

Refer to figures by number, not by pronoun

- BAD: “As shown in the figure above”
- GOOD: “As shown in Figure 1”

Figure Captions



So what exactly is figure 1?

Figure 1

Graphs and Charts

What's best?

- Table
- Scatter Plot
- Bar Chart
- Pie Chart

Axes must be labelled with

- Entity being measured and the units of measurement, for example:
  - Amplitude (Volts)
  - Frequency (Hertz)
  - Number of Errors
  - Time (seconds)
  - Energy Saving (%)
- Values along the axis

Meaning of curves or symbols must be shown

- use legends, labels and/or a caption

Describe the important features in your results section. Explain them if direct comparison with background material is possible without analysis.

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A single 12 pt blank line should be left between paragraphs, and two blank 12 pt lines just before a new section heading.

2. Page Layout and Margins

A4 paper should be used and the margins should be set to 1 inch or 2.54 cm all around. If a total word length is specified in the assignment, it should be adhered to. Pages should be numbered sequentially with the number in Times New Roman size 10, right-justified at the bottom of each page.

3. Figures, Tables and Equations

Figures (graphs, diagrams, photographs, etc.) can be computer generated, scanned in from any source (which should be credited in the caption), or photocopied onto the page. They should be centred between left and right margins, and a centred caption should appear below the figure in Times New Roman 10pt, beginning with the word Figure and followed by the figure number. Figures should be numbered sequentially with Arabic numerals. The caption should give a general description of what the figure is (e.g. Voltage across resistor 13 vs. time), explain any symbols or line densities concisely (e.g. The solid line is the predicted curve using Eq. 2; triangles are observed data points), and give other essential information pertaining to the figure. All figures should be referred to in the text, for example (Figure 1).

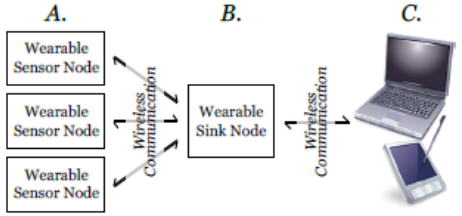

Figure 1: System architecture of the proposed Body Sensor Network

Tables should be self-contained, clearly labelled and accompanied by a sequentially numbered caption that appears above the table in Times New Roman 11pt. All tables should be referred to in the text, for example (Table I). Roman numerals should be used (Table I, Table II, etc.).

Table I: Example table

Column 1	Column 2	Column 3	Column 4	Column 5
Row 1	a	b	c	d
Row 2	e	f	g	h
Row 3	i	j	k	l

Variables appearing in the text and in equations should be in italics. If an equation is complex, display it centred with 1 line of 12 pt spacing above and below it; displayed equations should be numbered sequentially, with an Arabic numeral placed in brackets right-justified, as shown in (1).

$$1 + x^{\,n} = 1 + \frac{nx}{1!} + \frac{n\,n-1\,x^2}{2!} + \cdots \qquad (1)$$

4. Citing and Listing References

4.1 When and How to Cite (Subsection heading, 12 pt bold)

Information that you obtained from other works needs to be identified within your paper, and full bibliographic data given for it. Within the text, use a brief way of *citing* the reference so that the reader can find the complete bibliographic details in the *list of references* at the end. There are several standard systems for citing references and for ordering the information in the list of references; the following specifies the system you should use either for your ELEC1032 assignment.

When citing references within the text (or in a figure caption), number these sequentially using square brackets e.g. [9]. Then, list all cited references at the end of the report, under the heading References, again, in numerical order.

If a figure is copied from another source, state at the end of its caption, "(reprinted from [9])" If a figure from another source is used but you have substantially adapted it for your own purposes, state at the end of its caption, "(adapted from [9])"

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Referencing

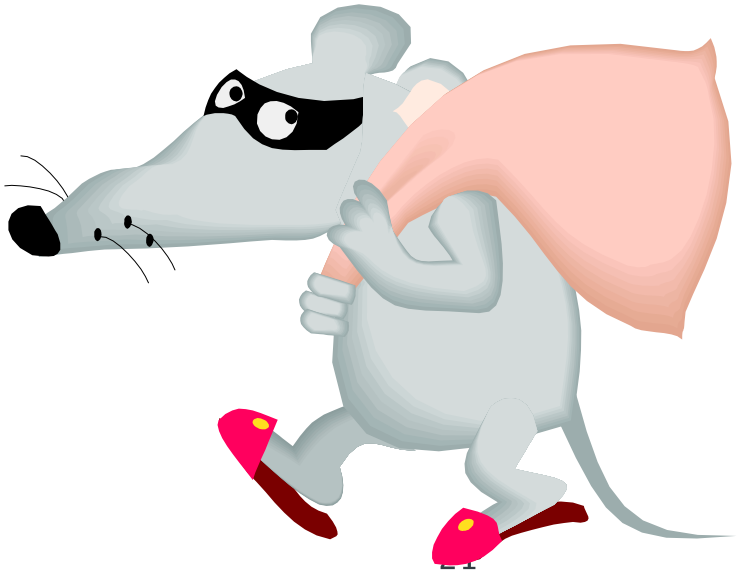
"Give credit where credit is due"

Academic Integrity and Plagiarism

In some countries/cultures students may expect to copy; teachers may want students to repeat exactly what is in text books or lecture notes

At the University of Southampton all work you submit for marking must be your own original creation.

- There are academic conventions to acknowledge sources
- Presenting another's work as if it was yours is "**plagiarism**" and is wrong.



Academic Integrity Lecture

You will shortly be receiving a lecture on Academic Integrity

This covers a lot in detail, and answers questions including:

- “What is academic integrity?” (It’s more than just plagiarism!)
- “What happens if I am caught plagiarising, both while at University or in my future career?”
- “How can I avoid plagiarism and maintain my academic integrity?”
- “Does … count as a breach of academic integrity?” (There are some not-so-obvious cases)
- “Will you really catch me?”

Effectively, a lecture on how to avoid losing marks, or even your degree!

In this lecture, “how can I avoid plagiarism in my technical writing?

How to Avoid Plagiarism

1) **Quoting**: Any material directly copied from elsewhere

2) **Paraphrasing**: Describing material in your own words

3) **Citing**: Follow the quotation or paraphrased material with a citation

4) **Bibliography**: Put a bibliography at the end of your report

<u>You must do this for all sources</u>

Quoting

The easiest and clearest way to identify a quotation is with quote marks "…"

> …while not as well known, it is generally accepted that "the other pre-eminent name in British Computing, Maurice Wilkes, arguably contributed rather more than Turing, certainly in practical terms" [1]. However, Turing's contribution towards…

An alternative is to indent, or display, the quoted material, which is usually in italics

> *The other pre-eminent name in British Computing, Maurice Wilkes, arguably contributed rather more than Turing, certainly in practical terms.* [1]
>
> While the above quote is generally accepted, Turing's contribution towards…

Paraphrasing

Copyright law only allows you to copy small amounts of text (one or two line)

- Longer quotes require the author to give permission
- A sequence of quotations can make your report hard to read and confuse your reader

In such cases you should paraphrase the source by commenting on, evaluating, and summarising the key points of the source in your own words.

> While not as well known, Wilkes, though not as famous as Turing, perhaps made greater practical contribution [1]. However, Turing's contribution towards...

You are still plagiarising if…

- You just replace some of the words with synonyms
- You simply swap words or phrases round to make the sentence look different

Citing reference sources

Immediately after each quotation, or piece of paraphrased material

- Include a citation tag: e.g. Harvard system“(Halley, 2005)” or Vancouver system “[3]”

IEEE articles use the Vancouver system:

- The citation tag is a number in square brackets, placed in the text; e.g. [1] or [11]
- In one document, the same number should be used for every reference to the same source
- Each citation should be in the same sentence as the text, before punctuation, and separated by from the text by a space:
  - "...end of the line for my research [13]."
  - "The theory was first put forward in 1987 [1]."
  - "Scholtz [2] has argued that....."
  - "Several recent studies [3, 4, 15, 16] have suggested that..."
  - "For example, see [7]."
- When citing more than one reference at a time, you can use:
  - [1, 3, 27] (for multiple references)
  - [2 -5] (for a range of references, i.e. 2, 3, 4 and 5)

Source:
Gina Bush, RIT Libraries. (2008). *IEEE Citation and Writing Guide* [online document]. Available: http://library.rit.edu/userservices/pubschol/IEEEGuidelines.pdf

actively involved during the sensing activity (e.g., taking the phone out of the pocket to collect a sound sample or take a picture); that is, should the user actively participate, known as *participatory sensing* [15], or, alternatively, passively participate, known as *opportunistic sensing* [17]? Each of these sensing paradigms presents important trade-offs. In what follows we discuss different sensing scales and paradigms.

Figure 3. *Mobile phone sensing architecture.*

Sensing Scale

Personal sensing applications are designed for a single individual, and are often focused on data collection and analysis. Typical scenarios include tracking the user's exercise routines or automating diary collection. Typically, personal sensing applications generate data for the sole consumption of the user and are not shared with others. An exception is healthcare applications where limited sharing with medical professionals is common (e.g., primary care giver or specialist). Figure 2 shows the UbitFit Garden [1] as an example of a personal wellness application. This personal sensing application adopts persuasive technology ideas to encourage the user to reach her personal fitness goals using the metaphor of a garden blooming as the user progresses toward their goals.

Individuals who participate in sensing applications that share a common goal, concern, or interest collectively represent a group. These *group sensing* applications are likely to be popular and reflect the growing interest in social networks or connected groups (e.g., at work, in the neighborhood, friends) who may want to share sensing information freely or with privacy protection. There is an element of trust in group sensing applications that simplify otherwise difficult problems, such as attesting that the collected sensor data is correct or reducing the degree to which aggregated data must protect the individual. Common use cases include assessing neighborhood safety, sensor-driven mobile social networks, and forms of citizen science. Figure 2 shows GarbageWatch [23] as an example of a group sensing application where people participate in a collective effort to improve recycling by capturing relevant information needed to improve the recycling program. For example, students use the phone's camera to log the content of recycling bins used across a campus.

Most examples of *community sensing* only become useful once they have a large number of people participating; for example, tracking the spread of disease across a city, the migration patterns of birds, congestion patterns across city roads [5], or a noise map of a city [24]. These applications represent large-scale data collection, analysis, and sharing for the good of the commu-

Source:
Lane, N.D et al., "A survey of mobile phone sensing," Communications Magazine, IEEE , vol.48, no.9, pp.140–150, Sept. 2010

Citing Figures

Reprinting someone else's figure ('quoting' a figure)

- "reproduced from …"

Figure 1: A UML communication diagram (reproduced from [5])

Redrawing and changing someone else's figure ('paraphrasing' a figure)

- "adapted from …"

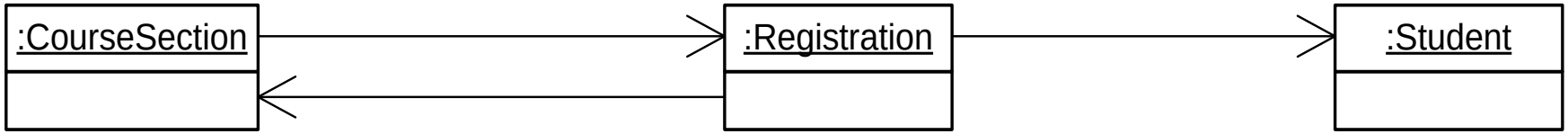


Figure 1: A UML communication diagram (adapted from [5])

Reference list or bibliography

This is where you list the sources you have cited in your document

- NOT a list of un-cited sources that you want to show you read
- Start each reference on a new line
- Include each source just once
- Order the list according to the style of your citation tags

They need to be complete and in a standard format

- Containing enough detail to locate the same source again
- Not including ISBNs or library call numbers

Some tools enable automatic formatting of citations, e.g.:

- Endnote (Microsoft Word)
- Bibtex (LaTeX)

Details on how to format your bibliography using IEEE referencing:

- http://www.ieee.org/documents/ieeecitationref.pdf

The primary obstacle to this new field is not a lack of infrastructure. Rather, the technical barriers are related to performing privacy-sensitive and resource-sensitive reasoning with noisy data and noisy labels and providing useful and effective feedback to users.

References

[1] S. Consolvo *et al.*, "Activity Sensing in the Wild: A Field Trial of Ubifit Garden," *Proc. 26th Annual ACM SIGCHI Conf. Human Factors Comp. Sys.*, 2008, pp. 1797–1806.

[2] E. Miluzzo *et al.*, "Sensing meets Mobile Social Networks: The Design, Implementation, and Evaluation of the CenceMe Application," *Proc. 6th ACM SenSys*, 2008, pp. 337–50.

[3] M. Mun *et al.*, "Peir, the Personal Environmental Impact Report, as a Platform for Participatory Sensing Systems Research," *Proc. 7th ACM MobiSys*, 2009, pp. 55–68.

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[5] UC Berkeley/Nokia/NAVTEQ, "Mobile Millennium"; http://traffic.berkeley.edu/

[6] T. Choudhury *et al.*, "The Mobile Sensing Platform: An Embedded System for Activity Recognition," *IEEE Pervasive Comp.*, vol. 7, no. 2, 2008, pp. 32–41.

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[14] M.-Z. Poh *et al.*, "Heartphones: Sensor Earphones and Mobile Application for Non-Obtrusive Health Monitoring," *IEEE Int'l. Symp. Wearable Comp.*, 2009, pp. 153–54.

[15] J. Burke *et al.*, "Participatory Sensing," *Proc. ACM SenSys Wksp. World-Sensor-Web*, 2006.

[16] A. Krause *et al.*, "Toward Community Sensing," Proc.

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[32] J. Liu, "Subjective Sensing: Intentional Awareness for Personalized Services," *NSF Wksp. Future Directions Net Sensing Sys.*, Nov. 2009.

[33] B. J. Fogg, *Persuasive Technology: Using Computers to Change What We Think and Do*, Morgan Kaufmann, Dec. 2002.

[34] A. Kapadia, D. Kotz, and N. Triandopoulos, "Opportunistic Sensing: Security Challenges for the New Paradigm," *Proc. 1st COMNETS*, Bangalore, 2009.

[35] R. K. Ganti *et al.*, "Poolview: Stream Privacy for Grassroots Participatory Sensing," *Proc. 6th ACM SenSys*, 2008, pp. 281–94.

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Biographies

Nicholas D. Lane (niclane@cs.dartmouth.edu) is a Ph.D. candidate at Dartmouth College, and a member of the Mobile Sensing Group and the MetroSense project. His research interests revolve around mobile sensing systems that incorporate scalable and robust sensor-based computational models of human behavior and context. He has an M.Eng. in computer science from Cornell University.

Emiliano Miluzzo (miluzzo@cs.dartmouth.edu) is a Ph.D. candidate in the computer science department at Dartmouth College and a member of the Mobile Sensing Group at Dartmouth. His research focus is on spearheading a new area of research on mobile phone sensing applying machine learning and mobile systems design to new sening applications and systems on a large scale. These applications and systems span the areas of social networks, green applications, global environment monitoring, personal and community healthcare, sensor augmented gaming, virtual reality, and smart transportation systems. He has an M.Sc. in electrical engineering from the University of Rome La Sapienza.

Source:
Lane, N.D et al., "A survey of mobile phone sensing," Communications Magazine, IEEE , vol.48, no.9, pp.140–150, Sept. 2010

IEEE Citation Reference

IEEE Publications uses *Webster's College Dictionary*, 4th Edition. For guidance on grammar and usage not included in this manual, please consult *The Chicago Manual of Style*, published by the University of Chicago Press.

Citiation standards in this reference are provided for:

Books

Basic Format:

[1] J. K. Author, "Title of chapter in the book," in *Title of His Published Book,* xth ed. City of Publisher, Country if not USA: Abbrev. of Publisher, year, ch. *x*, sec. *x*, pp. *xxx–xxx*.

NOTE: Use *et al.* when three or more names are given.

Examples:

[1] B. Klaus and P. Horn, *Robot Vision.* Cambridge, MA: MIT Press, 1986.

[2] L. Stein, "Random patterns," in *Computers and You,* J. S. Brake, Ed. New York: Wiley, 1994, pp. 55-70.

[3] R. L. Myer, "Parametric oscillators and nonlinear materials," in *Nonlinear Optics*, vol. 4, P. G. Harper and B. S. Wherret, Eds. San Francisco, CA: Academic, 1977, pp. 47-160.

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[7] M. Gorkii, "Optimal design," *Dokl. Akad. Nauk SSSR*, vol. 12, pp. 111-122, 1961 (Transl.: in L. Pontryagin, Ed., *The Mathematical Theory of Optimal Processes*. New York: Interscience, 1962, ch. 2, sec. 3, pp. 127-135).

[8] G. O. Young, "Synthetic structure of industrial plastics," in *Plastics,* vol. 3, *Polymers of Hexadromicon*, J. Peters,

Source:
http://www.ieee.org/documents/ieeecitationref.pdf