Engineering Capstone Project (OENG1167) PROJECTNAME

Oliver Patterson (S3723206), Alec Harbis (S3661092), Ahad Abdul (S3791936)

> Supervisor: Dr Katrina Neville

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RMIT School of Engineering

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1 Summary

- 2 Statement of problem
- 3 Background and literature review
- 4 List of design/research questions
- 5 Methodology
- 6 Risk assessment and ethical considerations

7 References

- [1] T. T. P.Å. Öberg and F. Spelman, Sensors Applications Volume 3, Sensors in Medicine and Health Care. Wiley-VCH, 2004, ISBN: 3-527-29556-9.
- [2] A. M. Nazeem, *Oeng1167 project proposal and risk assessment*, https://rmit.instructure.com/courses/90555/files/22993180, Accessed: 2022-03-10, 2022.
- [3] B. Alsunaidi *et al.*, "A review of non-invasive optical systems for continuous blood glucose monitoring," 2021. DOI: 10.3390/s21206820.
- [4] P. Avari *et al.*, "Is it possible to constantly and accurately monitor blood sugar levels, in people with type 1 diabetes, with a discrete device (non-invasive or invasive)?," 2019. DOI: 10.1111/dme.13942.
- [5] J. W. Amay J. Bandodkar, "Non-invasive wearable electrochemical sensors: A review," 2014. DOI: 10.1016/j.tibtech.2014.04.005.
- [6] A. Chinthoju et~al., "Iot aided non-invasive nir blood glucose monitoring device," 2020. DOI: $10.1007/978-3-030-24322-7_11$.
- [7] V. Dantu *et al.*, "Non-invasive blood glucose monitor based on spectroscopy using a smart-phone," 2014. DOI: 10.1109/EMBC.2014.6944425.
- [8] M. Donelli *et al.*, "Wearable non-invasive blood glucose monitor system based on galvanic skin resistance measurement," 2021. DOI: 10.1049/ell2.12315.
- [9] EDN, "Non-invasive blood glucose monitoring using near-infrared spectroscopy," 2013.
- [10] D. S. Tedesse Waktola Gamessa, "Non-invasive blood glucose monitoring using visible laser light," 2018. DOI: 10.5958/0974-360X.2019.00144.6.
- [11] T. N. Gia *et al.*, "Iot-based continuous glucose monitoring system: A feasibility study," 2018. DOI: 10.5958/0974-360X.2019.00144.6.
- [12] M. Goodarzi and W. Saeys, "Selection of the most informative near infrared spectroscopy wavebands for continuous glucose monitoring in human serum," 2015. DOI: 10.1016/j.talanta. 2015.08.033.
- [13] E. Hadar *et al.*, "Noninvasive, continuous, real-time glucose measurements compared to reference laboratory venous plasma glucose values," 2018. DOI: 10.1080/14767058.2018. 1463987.
- [14] R. I. R. Javier *et al.*, "Portable non-invasive glucometer using near-infrared sensor and raspberry pi," 2020, ISSN: 978-1-7281-8870-6//20.

- [15] C. G. Juan et al., "Feasibility study of portable microwave microstrip open-loop resonator for non-invasive blood glucose level sensing: Proof of concept," 2019. DOI: 10.1007/s11517-019-02030-w.
- [16] D. R. Kavitha et al., "Detecting glucose level using ir sensor," 2019, ISSN: 2231-2803.
- [17] J. Kim *et al.*, "Wearable non-invasive epidermal glucose sensors: A review," 2017. DOI: 10.1016/j.talanta.2017.08.077.
- [18] S. Kurasawa *et al.*, "Verification of non-invasive blood glucose measurement method based on pulse wave signal detected by fbg sensor system," 2017. DOI: 10.3390/s17122702.
- [19] T. Lin *et al.*, "Non-invasive glucose monitoring: A review of challenges and recent advances," 2017. DOI: 10.19080/CTBEB.2017.06.555696.
- [20] L. Lipani *et al.*, "Non-invasive, transdermal, path-selective and specific glucose monitoring via a graphene-based platform," 2018. DOI: 10.1038/s41565-018-0112-4.
- [21] R. Liu *et al.*, "Next step of non-invasive glocose monortor by nir technique from the well controlled measuring condition and results," 2006. DOI: 10.1007/s11082-005-4201-x.
- [22] L. Malinin, "Development of a non-invasive blood glucose monitor based on impedance measurements," 2012.
- [23] S. M. Lundsgaard-Nielsen *et al.*, "Critical-depth raman spectroscopy enables home-use non-invasive glucose monitoring," 2018. DOI: 10.1371/journal.pone.0197134.
- [24] A. E. Omer *et al.*, "Low-cost portable microwave sensor for non-invasive monitoring of blood glucose level: Novel design utilizing a four-cell csrr hexagonal configuration," 2020. DOI: 10.1038/s41598-020-72114-3.
- [25] D. Rodin *et al.*, "Comparative accuracy of optical sensor-based wearable system for non-invasive measurement of blood glucose concentration," 2019. DOI: 10.1016/j.clinbiochem.2018. 12.014.
- [26] F. Sanai *et al.*, "Evaluation of a continuous blood glucose monitor: A novel and non-invasive wearable using bioimpedance technology," 2021. DOI: 10.1177/193229682110541.
- [27] L. Tang *et al.*, "Non-invasive blood glucose monitoring technology: A review," 2020. DOI: 10.3390/s20236925.
- [28] M. J. Tierney *et al.*, "Clinical evaluation of the glucowatch biographer: A continual, non-invasive glucose moniotor for patients with diabetes," 2000.
- [29] H. K. Wardana *et al.*, "Measurement of non-invasive blood glucose level based sensor color tcs3200 and arduino," 2018. DOI: 10.1088/1757-899X/336/1/012019.
- [30] M. Zhao *et al.*, "Research based on non-invasive blood glucose monitoring equipment," 2018. DOI: 10.1088/1742-6596/1069/1/012012.
- [31] Y. Zhao *et al.*, "Highly stretchable and strain-insensitive fibre-based wearable electrochemical biosensor to monitor glucose in the sweat," 2019. DOI: 10.1021/acs.analchem.9b00152.
- [32] P. Narkhede *et al.*, "Nir based non-invasive blood glucose measurement," *Indian Journal of Science and Technology*, vol. 9, Nov. 2016. DOI: 10.17485/ijst/2016/v9i41/98996.
- [33] J. Yadav et al., "Near-infrared led based non-invasive blood glucose sensor," 2014 International Conference on Signal Processing and Integrated Networks (SPIN), 2014. DOI: 10.1109/spin. 2014.6777023.

8 Appendix

8.1 Group Work Member Contribution Table

Section

Person(s) Responsible and Percentage

Summary

Statement of Problem

Background and Literature Review

List of Design Research Questions

Methodology

Risk Assessment and Ethical Considerations

Appendix