Matthew Field

Contact Information

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Education

- **University of Wollongong, Australia**
  - **Ph.D.** 2015.
  - **B.Eng. Electrical** (First Class Honours), December 2006.

Professional Experience

- **Director - AI Medicine & Engineering, 2023 - current**.
  Consultancy for engineering and medical applications.
- **Adjunct Research Fellow - University of New South Wales, 2023 - current**
- **Lecturer - University of New South Wales, 2021 - 2023**
- **Postdoctoral research fellow - University of New South Wales, 2017 - 2020.**
- **Postdoctoral research fellow - University of Wollongong, 2016 - 2017.**
- **Associate research fellow - University of Sydney, 2014 - 2015.**
- **Research Assistant - University of Wollongong, 2011 - 2014.**
- **Engineer - BHP Billiton Illawarra Coal, Australia, 2006.**

Grants

- **Cancer Institute NSW Travel Grant 2023 ($5k)**
- Australian Research Data Commons (ARDC) Platforms project - "Australian Cancer Data Network: distributed learning from clinical data" 2021-2023 ($957k)
- Ingham Institute for Applied Medical Research - Data and Cancer Research Grant 2020 ($40k)
- **Cancer Institute NSW Early Career Researcher Fellowship - "Improving lung cancer outcomes with data-driven prognostic imaging biomarkers in a collaborative medical imaging network" 2019-2022 ($420k)**

Additional Training

- Good Clinical Practice (GCP) training refresher course V2.0 - Issued: 2023-04-28

Publications

Under preparation or review (not a complete list)

- S. Theophanous, P. Lonne, A. Choudhury, M. Berbee, C. Deijen, A. Dekker, **M. Field**, *et al.*, "Federated Learning with Real-World Data: An International Multi-Centre Study to Develop and Validate Prognostic Models for Anal Cancer", (submitted, under review).

- S.P. Ang, M. Beavan, L. Holloway, M. Lee, S.L. Phung, M. Schira, T. Young, **M. Field**, "MR-to-CT image synthesis using the APS deep learning framework for head-and-neck cancer radiotherapy treatment planning", , (under preparation).

- F.I. Alam, **M. Field**, P. Chlap, S. Kumar, A. Haidar, D. Al Mouiee, J. Cui, S. Ashworth, J. Sykes, V. Ahern, K. Stuart, V. Chin, S. Vinod, G. Delaney, L. Holloway, "Transformer-guided Multi-Modal Feature Learning to Standardize Thorax Radiotherapy Structure Nomenclature", (under preparation).

- A. Anees, **M. Field**, L. Holloway, "Development of Federated Learning Neural Networks with Combined Horizontal and Vertical Data Partitioning", Applied Soft Computing, (under review).

- L. Holloway, A. Anees, D. Al Mouiee, **M. Field**, *et al.*, "Factors influencing the use of federated learning in healthcare: a literature review and guideline", Artificial Intelligence Reviews, (under preparation).

- C. Brink, C. R. Hansen, **M. Field**, G. Price, N. Sarup, D. Thwaites, U. Bernchou, L. Holloway, "Distributed learning optimisation of Cox models can leak patient data: Risks and solutions", https://arxiv.org/abs/2204.05856, (available on archive)

Journal

- A. Anees, **M. Field**, L. Holloway, "A neural network-based vertical federated learning framework with server integration", Engineering Applications of Artificial Intelligence, 2024, doi: 10.1016/j.engappai.2024.109276.

- X. Huang, H. Ball, V. Batumalai, **M. Field**, S. Vinod, P. Keall, L. Holloway, "Radiotherapy protocol compliance in routine clinical practice for patients with stages I–III non-small-cell lung cancer", Journal of Medical Imaging and Radiation Oncology, 2024, doi: 10.1111/1754-9485.13727.

- P. Chlap, H. Min, J. Dowling, **M. Field**, *et al.*, L. Holloway, "Uncertainty Estimation using a 3D Probabilistic UNet for Segmentation using Limited Radiotherapy Clinical Trial Datasets", Computerized Medical Imaging and Graphics, 2024, doi: 10.1016/j.engappai.2024.109276.

- **M. Field**, S. Vinod, N. Aherne, M. Carolan, A. Dekker, G. Delaney, S. Greenham, E. Hau, J. Lehmann, J. Ludbrook, A. Miller, A. Rezo, J. Selvaraj, J. Sykes, D. Thwaites, L. Holloway, "Federated learning survival model and potential radiotherapy decision support impact assessment for non-small cell lung cancer using real-world data", Clinical Oncology, 2024, doi: 10.1016/j.clon.2024.03.008.

- D. Kotevski, **M. Field**, C. Vajdic, R. Smee. "Inter-hospital variation in data collection, radiotherapy treatment, and survival in patients with head and neck cancer: a multisite study", Radiotherapy and Oncology, 2023, doi: 10.1016/j.radonc.2023.109843.

- R. Nigam, **M. Field**, G. Harris, M. Barton, M. Carolan, P. Metcalfe, L. Holloway, "Automated detection, delineation and quantification of whole-body bone metastasis using FDG-PET/CT images", Physical and Engineering Sciences in Medicine, 2023, doi: 10.1007/s13246-023-01258-z.

- I. Paranavithana, D. Stirling, M. Ros, **M. Field**, "Systematic Review of Tumor Segmentation Strategies for bone metastases", Cancers, 2023, doi: 10.3390/cancers15061750.

- D. Kotevski, **M. Field**, R. Smee, K. Broadley, C. Vajdic. "The utility of oncology information systems for prognostic modelling in head and neck cancer", Journal of Medical Systems, 2023, doi: 10.1007/s10916-023-01907-6

- A. Haidar, **M. Field**, V. Batumalai, k. Cloak, D. Al Mouiee, P. Chlap, X. Huang, V. Chin, F. Aly, M. Carolan, J. Sykes, S. Vinod, G. Delaney, L. Holloway, "Standardising Breast Radiotherapy Structure Naming Conventions: A Machine Learning Approach", Cancers, 2023, doi: 10.3390/cancers15030564.

- D. Kotevski, R. Smee, C. Vajdic, **M. Field**. "Machine learning and nomogram prognostic modelling for two-year head and neck cancer-specific survival using electronic health record data: a multisite study", JCO Clinical Cancer Informatics, 2023, doi: 10.1200/CCI.22.00128.

- D. Kotevski, R. Smee, C. Vajdic, **M. Field**. "Empirical comparison of routinely collected electronic health record data for head and neck cancer-specific survival in machine learnt prognostic models", Head and Neck, 2023, doi: 10.1002/hed.27241.

- C.R. Hansen, G. Price, **M. Field**, N. Sarup, R. Zukauskaite, J. Johansen, J. Eriksen, F. Aly, A. McPartlin, L. Holloway, D. Thwaites, C. Brink. "Larynx cancer survival model developed through open-source federated learning", Radiotherapy and Oncology, 2022, doi: 10.1016/j.radonc.2022.09.023.

- D. Kotevski, **M. Field**, R. Smee, C. Vajdic. "Evaluation of an automated Presidio anonymisation model for unstructured radiation oncology electronic medical records in an Australian setting", International Journal of Medical Informatics, 2022, doi: 10.1016/j.ijmedinf.2022.104880.

- S. Theophanous, *et al.*, "Development and validation of prognostic models for anal cancer outcomes using distributed learning: protocol for the international multi-centre atomCAT2 study", Diagnostic and Prognostic Research, Volume 6, Issue 1, 2022, doi: 10.1186/s41512-022-00128-8.

- **M. Field**, D. Thwaites, M. Carolan, G. Delaney, J. Lehmann, J. Sykes, S. Vinod, L. Holloway. "Infrastructure platform for privacy-preserving distributed machine learning development of computer-assisted theragnostics in cancer", Journal of Biomedical Informatics, 2022, doi: 10.1016/j.jbi.2022.104181.

- C.R. Hansen, G. Price, **M. Field**, N. Sarup, R. Zukauskaite, J. Johansen, J. Eriksen, F. Aly, A. McPartlin, L. Holloway, D. Thwaites, C. Brink. "Open-source distributed learning validation for a larynx cancer survival model following radiotherapy", Radiotherapy and Oncology, 2022, doi: 10.1016/j.radonc.2022.06.009.

- N. Lee, J. Shafiq, **M. Field**, C. Fiddler, S. Varadarajan, S. Gandhidasan, E. Hau, S. Vinod. "Predicting 2-year survival in stage I-III non-small cell lung cancer: the development and validation of a scoring system from an Australian cohort", Radiation Oncology, 2022, doi: 10.1186/s13014-022-02050-1.

- S. Pang, **M. Field**, J. Dowling, L. Holloway, S. Vinod, A. Sowmya. "Training radiomics-based CNNs for clinical outcome prediction: challenges, strategies and findings", Artificial Intelligence in Medicine, 2022, doi: 10.1016/j.artmed.2021.102230.

- W. Ghandourh, L. Holloway, V. Batumalai, P. Chlap, **M. Field**, S. Jacob. "Optimal and actual rates of Stereotactic Ablative Body Radiotherapy (SABR) utilisation for primary lung cancer in Australia", Clinical and translational radiation oncology, doi: 10.1016/j.ctro.2022.03.001.

- **M. Field**, S. Vinod, N. Aherne, M. Carolan, A. Dekker, G. Delaney, S. Greenham, E. Hau, J. Lehmann, J. Ludbrook, A. Miller, A. Rezo, J. Selvaraj, J. Sykes, L. Holloway, D. Thwaites. "Implementation of the Australian Computer Assisted Theragnostics (AusCAT) network for radiation oncology data extraction, reporting and distributed learning", Journal of Medical Imaging and Radiation Oncology, Volume 65, Issue 5, August 2021, doi: 10.1111/1754-9485.13287.

- G. Samarasinghe, M. Jameson, **M. Field**, J. Dowling, S. Vinod, L. Holloway. "Deep Learning for Segmentation in Radiation Therapy Planning", Journal of Medical Imaging and Radiation Oncology, August 2021, doi: 10.1111/1754-9485.13286

- **M. Field**, N. Hardcastle, M. Jameson, N. Aherne, L. Holloway, "Machine learning applications in radiation oncology", Physics and Imaging in Radiation Oncology, Volume 19, pp 13-24, June 2021, doi: 10.1016/j.phro.2021.05.007.

- A. Haidar, **M. Field**, J. Sykes, M. Carolan, L. Holloway. "PSPSO: A package for parameters selection using particle swarm optimization", SoftwareX, Volume 15, 2021, doi: 10.1016/j.softx.2021.100706.

- R. Rai, L. C. Holloway, C. Brink, **M. Field**, R. L. Christiansen, Y. Sun, M. B. Barton, G. P. Liney. "Multicenter evaluation of MRI-based radiomic features: A phantom study", Medical Physics, Volume 47, Issue 7, April 2020, doi: 10.1002/mp.14173.

- A. Vial, D. Stirling, **M. Field**, M. Ros, C. Ritz, M. Carolan, L. Holloway, and A.A. Miller. "The Role of Deep Learning and Radiomic Feature Extraction in Cancer-Specific Predictive Modelling: A Review." Translational Cancer Research 7, no. 3 (July 6, 2018). DOI: 10.21037/21823.

- A. Jochems, I. El-Naqa, M. Kessler, C. S. Mayo, S. Jolly, M. Matuszak, C. Faivre-Finn, G. Price, L. Holloway, S. Vinod, **M. Field**, M. S. Barakat, D. Thwaites, D. de Ruysscher, A. Dekker, P. Lambin, "A prediction model for early death in non-small cell lung cancer patients following curative-intent chemoradiotherapy", Acta Oncologica, October 2017, pp 1-5, doi: 10.1080/0284186X.2017.1385842.

- M. S. Barakat, **M. Field**, A. Ghose, D. Stirling, L. Holloway, S. Vinod, A Dekker, D. Thwaites, "The effect of imputing missing clinical attribute values on training lung cancer survival prediction model performance", Health Information Science and Systems, December 2017, Volume

5:16, doi: 10.1007/s13755-017-0039-4.

- **M. Field**, D. Stirling, Z. Pan, F. Naghdy, "Learning trajectories for robot programming by demonstration using a coordinated mixture of factor analyzers", IEEE Transactions on Cybernetics, Online First, March 2015, pages 1-12, doi: 10.1109/TCYB.2015.2414277.

- **M. Field**, D. Stirling, Z. Pan, M. Ros, F. Naghdy, "Recognition of human motions through mixture modeling of inertial data", Pattern Recognition, Volume 48, Issue 8, August 2015, Pages 2394-2406, ISSN 0031-3203, doi: 10.1016/j.patcog.2015.03.004.

- L. Chan, F. Naghdy, D. Stirling, **M. Field**, "Nonlinear bilateral teleoperation using extended active observer for force estimation and disturbance suppression", Robotica, pp 1-26, 2014, doi: 10.1017/S0263574714000101.

- **M. Field**, D. Stirling, Z. Pan, F. Naghdy, "Human motion capture sensors and analysis in robotics.", Industrial Robot, Volume. 38 Issue: 2, pp.163 - 171, 2011, doi: 10.1108/01439911111106372.

Conference articles

- S.P. Ang, S.L. Phung, **M. Field**, M.M. Schira, "An improved deep learning framework for MR-to-CT image synthesis with a new hybrid objective function", IEEE 19th International Symposium on Biomedical Imaging (ISBI), 2022, doi: 10.1109/ISBI52829.2022.9761546.

- H. Clifton, A. Vial, A. Miller, C. Ritz, **M. Field**, L. Holloway, M. Ros, M. Carolan, D. Stirling, "Using machine learning applied to radiomic image features for segmenting tumour structures", Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA) 2019, DOI: 10.1109/APSIPAASC47483.2019.9023077.

- A. Vial, D. Stirling, **M. Field**, M. Ros, C. H. Ritz, M. G. Carolan, L. C. Holloway, A. A. Miller, "Assessing the prognostic impact of 3D CT image tumour rind texture features on lung cancer survival", IEEE GlobalSIP Symposium on Signal Processing & Machine Learning in Large Medical Datasets, November 2017.

- **M. Field**, D. Stirling, M. Ros, Z. Pan "Inertial Sensing for Human Motor Control Symmetry in Injury Rehabilitation", IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), Wollongong, Australia, 2013, pp. 1470-1475.

- D. Stirling, F. Naghdy, G. Naghdy, **M. Field**, R. Arunglabi, D. Kilpatrick, "Objective Functional Capacity Assessment Using Inertial Sensor", Healthcare Informatics, Imaging and Systems Biology (HISB), 2011 IEEE International Conference on , pp.272-277, 26-29 July 2011.

- **M. Field**, D. Stirling, F. Naghdy, Z. Pan, "Motion capture in robotics review", IEEE International Conference on Control and Automation (ICCA) December 2009, pp. 1697-1702.

- **M. Field**, D. Stirling, F. Naghdy, Z. Pan, "Motion segmentation for humanoid control planning", Proc. Australasian Conference of Robotics and Automation Conference (ACRA 2008), December 2008, Canberra, Australia, Pages 1-6.

- **M. Field**, D. Stirling, F. Naghdy, Z. Pan, "Mixture Model Segmentation for Gait Recognition", ECSIS Symposium Learning and Adaptive Behaviour in Robotic Systems (LAB-RS), August 2008, Edinburgh, Scotland.

- **M. Field**, D. Stirling, F. Naghdy, Z. Pan, "Empirical Modelling of Human Gaits for Bipedal Robots", Proc. Australasian Conference of Robotics and Automation Conference (ACRA 2007), December 2007, Brisbane, Australia, Pages 1-7.

Conference abstracts (not an exhaustive list)

- **Field M**, Holloway LC, Carolan M, Miller A, Sykes J, Hau E, Vinod S, Dekker A, Bailey M, Lehmann J, Thwaites DI, "Radiomics model of overall survival from non-small lung cancer using a distributed learning platform", International Conference on the use of Computer in Radiotherapy (ICCR), July 2019, Montreal, Canada.

- **Field M**, Holloway LC, Vinod S, Barakat MS, Ahern V, Bailey M, Carolan M, Delaney G, Ghose A, Hau E, Lehmann J, Lustberg T, Miller AA, Stirling D, Sykes J, van Soest J, Walsh S, Dekker A, Thwaites DI. "A non-small lung cancer decision support system model based on a multicenter cohort using distributed learning", in ESTRO37 2018, Barcelona, Spain (poster).

- **Field M**, Holloway LC, Vinod S, Barakat MS, Ahern V, Bailey M, Carolan M, Delaney G, Ghose A, Hau E, Lehmann J, Lustberg T, Miller AA, Stirling D, Sykes J, van Soest J, Walsh S, Dekker A, Thwaites DI . "Non-linear radiomic signatures characterizing overall survival from non-small cell lung cancer", in ESTRO37 2018, Barcelona, Spain (poster).

- Holloway LC, Brink C, **Field M**. "Understanding variation in CT radiomics features – a potential method to reduce feature space", in ESTRO37 2018, Barcelona, Spain (poster).

- Satchithanandha A, Hopkins A, Otton J, Kiely B, Tang S, Field M, Batumalai V, Holloway LC, Delany G, Koh ES. "Cardiovascular sequelae in breast cancer patients receiving adjuvant radiotherapy", in ESTRO37 2018, Barcelona, Spain (poster).

- R. Rai, **M. Field**, M. Heinke, G. Liney, M. Barton, L. Holloway, "Assessment of the stability of radiomic features in rectal cancer using test-retest MRI", MR in RT symposium 2018, Utrecht, Netherlands.

- **M. Field**, M. S. Barakat, D. Thwaites, A. Ghose, D. Stirling, A. Dekker, M. Carolan, S. Vinod, L. Holloway, "The impact of incorporating radiomic features in a NSCLC two-year survival model for radiotherapy decision support", Engineering and the Physical Sciences in Medicine (EPSM), November 2016.

- **M. Field**, M. S. Barakat, M. Bailey, M. Carolan, A. Dekker, G. Delaney, M. Ebert, A. Ghose, G. Goozee, L. Holloway, J. Lehmann, T. Lustberg, A. Miller, J. van Soest, D. Stirling, J. Sykes, S. Vinod, S. Walsh, D. Thwaites, "Distributed rapid learning for decision support down under and around the world", International Conference on the use of Computer in Radiotherapy (ICCR), July 2016, London, UK.

- **M. Field**, M. S. Barakat, M. Bailey, M. Carolan, A. Dekker, G. Delaney, G. Goozee, L. Holloway, J. Lehmann, T. Lustberg, J. van Soest, J. Sykes, S. Walsh, D. Thwaites, "A distributed data mining network infrastructure for Australian radiotherapy decision support", Engineering

and the Physical Sciences in Medicine (EPSM), November 2015.

- Thwaites D; Holloway L; Bailey M; Barakat S; Carolan M; Delaney G; Field M; Dekker A; Lustberg T; Miller A; van Soest J; Vinod S; Walsh S, 2015, "A Developing Australian Network for Datamining and Modelling Routine Radiotherapy Clinical Data and Radiomics Information for Rapid Learning and Clinical Decision Support", 57th Annual Meeting and Exhibition of the American-Association-of-Physicists-in-Medicine (AAPM), July 2015.

- D. Govan, S. A. Palmisano, R. S. Allison, **M. Field**. Effects of Realistic Simulated Linear and Rotary Viewpoint Jitter on Vection. In 38th Australasian Experimental Psychology Conference (2011).

Supervision and mentorship

Students

- Iromi Paranavithana (PhD UOW) - currently co-supervising.
- Philip Chlap (PhD UNSW) - currently co-supervising.
- Damian Kotevski (PhD UNSW) co-supervisor - **completed 2023**.
- Alanna Vial (Masters UOW) co-supervisor - **completed 2022**.
- Farhannah Aly (PhD UNSW) - co-supervised 2019-2021 (withdrew as supervisor).
- Nym Vandenburg (PhD UNSW) - co-supervised 2019-2020 (student withdrew).
- Natalie Lee (Medicine Honours UNSW) associate supervisor - **completed 2020**.
- Oliver Kerr (BEng. honours project 2013) - mentorship.
- Steve Johnson-Hill (BEng. honours project 2013) - mentorship.
- Matthew Redding (BEng. honours project 2013) - mentorship.
- Jacqueline Jezzard (BEng. honours project 2013) - mentorship.
- Alanna Vial (BEng. honours project 2012) - mentorship.
- Michael Epple (BEng. exchange student - TUM 2011) - mentorship.

Academic

- Sui Paul Ang (postdoc 2022) - supervisor.
- Amir Anees (postdoc 2022-2023) - mentorship/project advisor.
- Fahim Alam (postdoc 2022-2023) - mentorship/project advisor.
- Shuchao Pang (postdoc 2021-2022) - mentorship/project advisor.
- Xiaoshui Huang (postdoc 2019-2021) - mentorship/project advisor.
- Ali Haidar (postdoc 2018-2021) - mentorship/project advisor.
- Gihan Samarasinghe (postdoc 2018-2020) - mentorship/project advisor.
- Farhannah Aly (research associate 2018-2019) mentorship/project advisor.

Professional

- Xinyui Cui (software developer 2021-2023) - supervisor.

Reviewer

Grants

- NHMRC Ideas grants 2021.
- International expert review panel - HRB in 2023.

Journals

- IEEE Robotics and Automation Letters
- IEEE Robotics and Automation Magazine
- Pattern Recognition
- Radiotherapy and Oncology
- Journal of Medical Imaging and Radiation Oncology
- Physical Engineering Science in Medicine
- Pattern Analysis and Applications
- Artificial Intelligence in Medicine
- Sensor Review
- Sensors
- IEEE Reviews in Biomedical Engineering
- Expert Systems with Applications
- Cybernetics and Systems
- Applied Sciences
- JCO Clinical Cancer Informatics
- Frontiers in Oncology
- Communications Medicine
- Physics Medicine in Biology
- Computers in Biology and Medicine
- Scientific Reports
- Computer Methods and Programs in Biomedicine
- Cancers
- Health Informatics Journal
- Journal of Medical Internet Research
- Computer Methods in Biomechanics and Biomedical Engineering
- Medical Physics
- Tomography

Conferences

- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE International Conference on Advanced Intelligent Mechatronics (AIM)
- Australian Control Conference (AUCC)
- International Conference on Neural Information Processing (ICONIP)

Invited Talks

- ACPSEM Summer School - Data Driven Healthcare, 2020, Virtual conference.
- Innovative Technologies in Radiation Oncology, 2020, Wollongong, Australia.
- Radiation Oncology Practical Big Data Workshop, 2019, University of Michigan, USA.
- Medical Physics Machine Learning Workshop, 2019, University of Sydney.
- Medical Imaging and Computing Workshop 2019, UNSW Sydney.
- State of the Art Radiotherapy Conference (StartX) 2017, Sydney.
- NSW Branch Westmead Hospital Combined Clinical Meeting, 2016, Sydney.

Service

- Australian Research Data Commons (ARDC) Tech Talk Program Committee (Chair 2023-2024).
- Ingham Institute for Applied Medical Research Facility Equipment Committee (2020-2023).

Awards and Memberships

- NSW Cancer Institute Early Career Award, 2019.
- Affiliate member of Trans-Tasman Radiation Oncology Group (TROG).
- Member of the Institution of Electrical and Electronic Engineers (IEEE).
- Poster Prize (1st place) among research students at University of Wollongong Innovation Fair 2012.
- Ph.D. Scholarship from the University of Wollongong, Australia, 2007.
- Dean's Merit List, 2006.
- Summer Research Scholarship, University of Wollongong, December 2004 - February 2005.
- Undergraduate study scholarship for the Academic Year 2003.

Research interests

Machine learning, data-mining, medical physics, radiation oncology, biomedical engineering, control systems, medical imaging, computer vision, distributed learning, robotics, human motion capture, human-robot interaction.

Referees

Available upon request.