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## FASTER, MORE ACCURATE CANCER TREATMENT

Faster, more accurate radiation treatment for cancer is Luke Mason's goal for his PhD research at Deakin University's School of Information Technology.

Nowadays many cancers are precisely mapped with the assistance of computer-generated three-dimensional images. The mapping ensures that high doses of radiation can be accurately delivered to the tumour while sparing surrounding healthy tissue. This is called intensity modulated radiation therapy (IMRT).

The radiation is targeted by a multileaf collimator (MLC), a device which uses rows of movable 'leaves' to block areas where radiation isn't wanted. This is important, particularly for head and neck cancers, where nearby tissues like the spinal cord and oesophagus need to be protected.

"However, this is complex," says Luke. "The radio oncologist needs to create a leaf sequence that will deliver the desired radiation. Since there are a vast number of possible leaf sequences, it is hard to design the optimal solution."

"It is easy to come up with a leaf sequence but not to come up with a good one," he says. To be good, a sequence must be generated quickly and use the minimum number of shapes, to reduce the time taken by the leaves moving and the new shape being checked.

A multileaf collimator used to modulate the radiation beam.  
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A linear accelerator used to deliver radiation at different angles.  
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"I want to improve the quality of the 'leaf shape' and speed up its creation," he says. This not only allows patients to be treated with greater accuracy but also means more patients can be treated on a single machine.

So far, Luke has created an algorithm that minimises the number of shapes needed. He is now working on another to tackle larger areas in finer detail. He will need multiple computers running in parallel to process his results. He hopes his work will lead to a practical solution for use in hospitals.

### FURTHER INFORMATION:

School of Information Technology  
Principal supervisor: Dr Vicky Mak  
E: [vicky.mak@deakin.edu.au](mailto:vicky.mak@deakin.edu.au)  
[www.deakin.edu.au/scitech/it](http://www.deakin.edu.au/scitech/it)

