SU-Disc-2016-0023

STELLENBOSCH UNIVERSITY

INNOVUS

DISCLOSURE FORM

The purpose of this form is to disclose information on a new business idea or innovation to the University. This will enable the University to support the initiative of the party concerned and to ensure that all possible intellectual property rights (including expertise) are sufficiently protected on behalf of both the individual and the University. Such disclosure of information by the individual concerned and support by the University will enable the individual and the University to commercially exploit such ideas in partnership and to protect the rights of the entrepreneur(s).

1. Name of the innovation

2. Background to the innovation

2.1 Which known technology (prior art) relevant to this innovation already exists?

Atmospheric correction of satellite imagery: the use of (usually lower resolution) satellite imagery relating to atmospheric conditions (e.g. water vapour) to correct atmosperic influences on (usually higher resolution) satellite imagery.

Methods of correcting aerial imagery for atmospheric and bidirectional reflectance distribution function (BRDF) effects that require explicit modelling and inversion of these effects and can also require spectral measurements to in the field or placement of targets of known reflectance.

2.2 Of which publications or patents concerning the known technology are you aware? Please attach.
None.

3. The innovation

Type of innovation (please tick box)			
Invention	✓	Multi-media	
Business idea		Written work	
Plant breeders' rights		Procedural	
Intellectual property in research contract		Registration	
Software		Diagnostic	
Therapeutic		New species	

Please indicate in which category your technology falls (✓):

AGRI SCIENCES		MEDICINE AND HEALTH	
Agronomy		Diagnostics	
Aquaculture		Health Biotechnology	
Integrated Pest Management		Medical Devices	
Food Science		Services	
Wine Biotechnology		Therapeutics and Pharmaceutics	
ENGINEERING		PHYSICAL SCIENCES	
Electrical Engineering	✓	Chemistry and Polymer Science	
Marine Engineering		Nanotechnology	
Mechanical Engineering		Software and Models	✓
Process Engineering		[illegible]	
[illegible]		[illegible]	
Biochemistry		Biofuels	
Cultivars		Power Generation	
Industrial Biotechnology		Renewable Energy	
Plant Biotechnology		Solar Energy	
Plant Biotechnology		Wave Energy	
		Wind [illegible]	

Shortly describe the innovation here, but attach a complete [illegible] possible, sketches etc., including equipment used, procedure [illegible]

The innovation makes use of (usually lower resolution) wide swath width (i.e. wide extent) satellite imagery to correct radiometric inconsistencies (see explanation in next section) in (usually higher resolution) narrow swath width aerial and unmanned aerial vehicle images. The procedure is explained in attached manuscript, but in very basic terms it fits a model that relates the digital numbers of pixels within an aerial image to those of a satellite image acquired at more or less the same time as the aerial imagery. The satellite image should have similar spectral bands to the aerial image. The model is fitted inside a small region (sliding window) for each pixel location in the satellite image, so that local (spatially varying) inconsistencies can be corrected. Once fitted, the model is inverted and applied to the aerial image at its original spatial resolution. This effectively changes the digital numbers of the aerial images to more closely match those of the satellite image. By applying the procedure to each band in a multi-spectral image, a type of "colour matching" is perfomed.

Which **problems associated** with the existing technology does this innovation solve?

An aerial survey campaign normally involves the acquisition of a series of images taken from an aerial platform (e.g. aeroplane, helicopter or unmanned aerial vehicle). The images are often acquired over several hours (even days), during which the illumination (e.g. angle of the sun) and atmospheric conditions (e.g. weather) can vary dramatically. This results in radiometrically inconsistent images i.e. images with inconsistent colour tones, uneven grey etc. Inconsistencies can occur between and within individual images. When the aerial images are mosaicked, the result appears unnatural and is difficult to interpret. It also makes the imagery unsuitable for quantitative remote sensing applications.

Which other **benefits** does the innovation offer?

Apart from the advantage of removing the radiometric inconsistencies in aerial images, if the reference satellite image has been radiometrically corrected (i.e. represents surface reflectance values), the resulting aerial images will also represent (modelled) surface reflectance values. This effectively means that the aerial images can be used for quantitative analyses (e.g. image classification) similar to expensive very high resolution satellite imagery (e.g. WorldView-3).

There is no requirement for time-consuming and costly field measurements of surface reflectance or for the placement of calibration targets of known reflectance that are sometimes necessary for other radiometric correction methods.

Has the idea been disclosed either in writing (whether by email or publication) or verbally and, if so, where and to whom?

The idea was verbally disclosed to Inventor 2 (PhD student), who have now implemented (and improved) the idea programatically. Inventor 2 did present the idea to a small group of staff and students of the Department of Geography & Environmental studies (during a progress report session), but not in any detail.

The idea was also presented in brief overview at the Thicket Forum 2013 (again not in any detail).

When will the invention first be disclosed to the public? Whether through publication; sale or use.

A manuscript (attached) is ready for submission to a scientific journal. It will be submitted as soon as the patent application has been filed.

Do you have a working prototype of the product and are test results available?

Yes, see attached manuscript.

Can the technology be demonstrated?

Yes, see attached manuscript.

Who will typically be the clients who will acquire this technology?

Software companies such as ESRI (www.esri.com), PCI Geomatics (www.pcigeomatics.com), Trimble (www.trimble.com), Hexacon Geospatial (www.hexagongeospatial.com).

Providers of aerial imagery such as Google Maps, Microsoft Bing, Chief Directorate: National Geo-spatial Information (NGI).

4. Third parties

Is this innovation the result of a research contract? If so, please provide more information.

No.

Who financed the research?
Inventor 2 received funding from the Gamtoos Irrigation Board during the time the work relating to the invention was done.

Inventor 2 recently received a bursary from NRF, but the work relating to this invention was done prior to receiving the grant.

5. Inventor(s) and non-inventors(s) (personal and employment details)

IMPORTANT: Please provide us with your complete and latest personal and employment details. This is required in order to process your disclosure and to prepare the report and distribution of income that might occur. Please keep us informed of changes in addresses and contact details, particularly

you undertake t

commercialisation of the idea/invention.

1. Inventor / non-inventor:

Full name of inventor (as displayed on ID or Passport)	Adriaan van Niekerk
Full name of non-inventor (as displayed on ID or Passport)	

Definition of inventor:
Any and all persons who made an inventive contribution to the invention that is the subject of the patent application. For the sake of clarity, only those aspects of the described subject matter that are both new and inventive in light of the prior art, and as such qualify for patent protection, qualify as inventive contributions.

Definition of non-inventor:
Any and all persons, other than those that fall within the definition of "inventor", who made a substantial contribution to the project and who, by agreement between the parties, will share in the benefits derived from it.

Contact particulars:	
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Fax number	0218083109
Email address	avn@sun.ac.za
Physical home address	41 Belladonna Street, Welgevonden, Stellenbosch

% Contribution distribution	50
Disclosure date	6 June 2016
Signature	
Employment details:	
Position at SU	Associate Professor
Faculty	Arts and Social Science
Department	Geography & Environmental Studies
SU number	11425938
2. Inventor / non-inventor:	
Full name of inventor (as displayed on ID or Passport)	Dugal Jeremy Harris
Full name of non-inventor (as displayed on ID or Passport)	
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Disclosure date	6 June 2016
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Employment details:	
Position at SU	PhD student
Faculty	Arts and Social Science
Department	Geography & Environmental Studies
SU number	17447585
3. Inventor / non-inventor:	
Full name of inventor (as displayed on ID or Passport)	
Full name of non-inventor (as displayed on ID or Passport)	
Contact details:	
Telephone number	
Fax number	
Email address	
Physical home address	

The following sections must be signed by your <u>Departmental Head and Dean</u>. This is necessary to process your disclosure.

6. Completed by the Departmental Head

"I recommend that this business idea or innovation be exploited commercially."

Name: Leanne Donaldson	[signature]	14/6/16
Chairperson: Department	Signature	Date

7. Completed by the Dean

"I recommend that this business idea or innovation be exploited commercially."

Name: PROF AJ LEYSENS	[signature]	21.6.2016
Dean	Signature	Date

8. Completed by the Senior Director: Research and Innovation

"I acknowledge receipt of this disclosure and from a research management perspective I have no objection to its possible commercial exploitation"

Name: [illegible]	[signature]	[illegible]
Senior Director: Research and Innovation	Signature	Date

Please return the <u>signed disclosure</u> form to:

Stellenbosch University
[illegible]
[illegible] Beer Street
[illegible]
Tel: 021 808 3910
Email: [illegible]

(*) [illegible] ... die beurs sonder enige medewerker van (befondsing) die Gamtoos Irrigation Board aanvaar het, dan is hier IP-implikasies wat uitgesorteer moet word deur InnovUS. ANO en InnovUS het in 2012 vir Adriaan van Niekerk aangedui dat die beurs kontrak met Gamtoos teenstydig is met IPR wet en nie geteken kan word nie. [signature] 29/6/2016.

Kontak Sc02865.