



Industrial Engineering is concerned with the analysis, design, improvement, installation and management of integrated systems of human resources, finances, materials, equipment, energy and information and the synergy between them  
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## Please note Acting Federal President

Sam Ghaith our Federal President is unwell, he is in hospital. Whilst Sam is convalescing he has asked me to take on the role of Acting Federal President. On behalf of all our members; "Sam get well ASAP". If I can be of assistance to any member please contact me Bob Watson. [bobwatson@westnet.com.au](mailto:bobwatson@westnet.com.au)

## From the Editor(articles and responses are definitely encouraged)

### Industrial Engineering What is the Profession evolving into?

Welcome to the 1<sup>st</sup> edition of the 2018 Newsletter. Industrial Engineering(IE) has been around since the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. Some of the early proponents included Frederick Winslow Taylor and later William Edwards Deming and HB Maynard. Today especially here in Australia IE is almost unknown as a profession. Its techniques such as kanban, critical path analysis, systems engineering, game theory, to name but a few, are in use every day in many companies.

Today many IE methodologies have evolved into the

"latest" company must implement management practices such as Six Sigma, Lean and Agile Management etc etc.

According to futurist Jeremy Rifkin, The Third Industrial Revolution with its mini grids, people connectivity, Internet of Things(IoT) etc, will bring major transformation to today's economies.

Is it not time for the Industrial Engineering profession in Australia, to take the creative high ground and advance these techniques under the Industrial Engineering banner.

David Karr Editor

## Around the traps.....

### From the Federal President

Federal President's Welcome

As a service to members the IIE is providing a newsletter. Cutting edge IE matters and news will be provided. The newsletter will be published tri monthly initially.

David Karr, a fellow of the Institute from the WA Division has volunteered his services as Chief Editor: thankyou David.

As a consequence of the expense to produce the 'New Engineer' journal, given the size of our member base, Council decided, for the time being, to postpone production. Previously many members authored first class articles. In time we hope to publish special purpose journals if an occasion or purpose so justifies.

I know you will join me in thanking Damian Kennedy our inaugural 'Heide Fellow' for his dedicated first class editorial management of the journal over the past ten years.

In recent years our relationship with Engineers Australia has prospered. Lex Clarke has been our lead with Engineers Australia(EA), wrestling many forms of challenges that a very large organisation presents to umbrella the societies, including our Institute EA has combined membership in excess of 100,000 members.

Currently, our NSW Director John Shervington is serving as our representative on the committee charged with organising and presenting the Engineers Australia September 2018 National Conference to be held in Sydney.

Before closing I wish to thank all members who contribute on a voluntary basis to the running of our institute. Our members fees are kept to a minimum, we do however reimburse EA for their clerical support.

Sam Ghaith  
Federal President  
26th February 2018

## Report from IIEAust NSW Division

All members of our NSW Division contacted early in February for the purpose of acknowledging their membership and offering them the opportunity for networking with members that are located nearby and that belong to the same industry.

Received the following feedback from members who have to-date replied to this preliminary contact: "Thanks for reaching out and for the good initiative." "I'm glad to hear about this initiative to engage and to convene its members. Looking forward to hear more activities from IIEAust."

Also, Engineers Australia, under whose umbrella we are professionally grouped, is planning the three day Australian Engineering Conference 2018 (17th September though to 19th September) at the International Conference Centre, Darling Harbour. Its title is The New Frontier: AI, Robotics and the future of Engineering. On 18 September I am hosting a group of Conference participants attending an off-site forum on Advanced Manufacturing at the University of Technology Sydney (UTS). Here, participants will be introduced to the following:

1. Data Arena: a 360 degree data visualisation facility to simplify complex information traditionally on spreadsheets. Participants stand in the middle of a large cylindrical screen using Active Shutter Glasses.

For example, on the day I was able to view "wellness" information gathered from Sydney Local Areas and its relationship to different localities in Sydney.

2. Centre of Autonomous Systems: where robotics is being applied to manufacturing processes to help improve worker outcomes and provide a competitive advantage to the enterprise that has them installed. For example, I heard of robots being able to fully inspect and carry out sand-blasting tasks for the Sydney Harbour Bridge.

3. ProtoSpace or Additive Manufacturing: where 3D Printers capable of using resin, metal, or ceramics can be set to perform a multitude of tasks 24/7. For example, I saw a 21mm Shifter Wrench (albeit plastic) that had been produced within minutes as opposed to within days only a few years ago.

These new UTS facilities are housed in buildings that provide comfortable, innovative and attractive surroundings for students and conference participants.

Finally, as your NSW Delegate, I am looking forward to meeting as many NSW members as I can this year either in networking groups or at the Conference.

John Shervington  
NSW Delegate to Federal Council  
MIIEAust

# UNMANNED AERIAL VEHICLES(Drones) IN AUSTRALIA

BY DAVID KARR(MIIE, FIEE MIEAust CPEng NER)

WHAT IS A UAV (Unmanned Aerial Vehicle)

A UAV can be classified as a drone (or remote) Fixed Wing in some parts of the world, is an aircraft without a human pilot on board.

Flight is controlled either autonomously by computers in the vehicle, or under the remote control of a pilot on the ground or in another vehicle.

## HISTORY

UAV's were first developed during World War I. Some were tethered and others were untethered. The original UAV's were guided by gyroscopes. Only later was radio control introduced.

Remotely controlled UAV's began to be readily used with high bandwidth data links became available during conflicts such as in Afghanistan and later in Iraq.

## CONTROL

UAVs can be controlled by using various communication systems (vhf, wireless, RF, WiFi etc) with various onboard systems such as GPS, cameras, sensors, autopilot etc.

Deployed initially predominantly for military applications

Today used in a growing number of civilian applications, such as photography, survey work, policing, and non military security work, surveillance of powerlines, search & rescue, sports events.

Small UAVs are now even being used to deliver goods

UAVs will also replace piloted aircraft in hazardous situations such as firefighting in the near future

## UAVs IN OUR SOCIETY

UAV's can be used in many aspects of our society other than for military use. This includes:-

- Aerial Surveying/Aerial Photography(various)

- Agricultural(crop spraying, crop survey, mustering, multispectral photogrammetry)
- Fire Surveillance and Management
- Pollution Monitoring/Scientific Research
- Policing/Event Security/Military
- Disaster Search & Rescue(inside/outside)
- Meteorology - Storm Tracking
- Fisheries Management/Shark Patrols
- Pipeline Monitoring/Transmission Line Inspection
- Traffic Monitoring
- Construction Site Management
- Playground Surveillance

## TYPES OF UAVs

There are 4 Types of UAV recognised by CASA(Civil Aviation Safety Authority)

- Fixed Wing
- Multirotor
- Single Rotor

## Examples of UAV's



Fixed Wing



Multirotor



Single Rotor

## BENEFITS OF UAVs

There are many benefits in utilizing UAV's such as:-

- Remotely controlled
- Do not always require a full time operator(not applicable for Level 1)
- Reduction in training requirements
- Vastly cheaper to operate
- Undertake dangerous activities SAFELY
- Reduce risk to operator(pilot)
- Access locations where manned aircraft may not be able to
- Remain airborne for extended periods
- Fly preset course automatically
- Undertake repetitive operations
- Reduce operating costs (pilot, equipment)
- Use various electronic imagery

## OPERATING TIMES

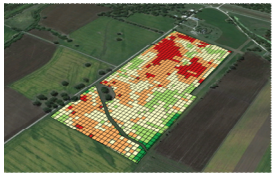
Can range from 15 – 30 minutes(Multicopter) battery operated to 5 hours for Fixed Wing(chemical fuel)

It should be noted that current battery technology(lithium polymer Li-Po) Battery technology will soon be eclipsed by graphene batteries. This will allow a quantum increase in operating times.

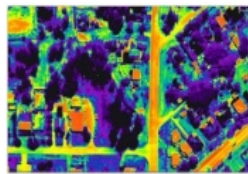
## PHOTO IMAGES

UAV's can be utilised for various photographic imaging such as:-

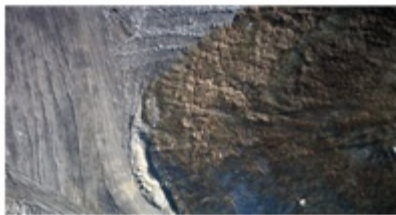
- Multispectral Photography
- Thermal Imaging
- 3D Imaging



Multispectral



Thermal



3D

## REGULATORY BODIES governing the use of UAV's for Commercial Purposes

There are various Regulatory Bodies that impact of the commercial use training of UAV's in Australia including:-

- CASA-Civil Aviation Safety Authority(rules)
- AirServices Australia(documents/airports)
- ATSB-Australian Transport Safety Bureau (investigation)

## UAV FLYING RULES in Australia

The rules for flying UAV's commercially(as well as for recreational purposes)

- At less than 400 feet AGL(~120m)
- In visual line of sight
- In day visual meteorological condition (VMC)(outside)
- In Controlled Airspace, below 400ft AGL- only with conditions
- No closer than 3 nautical miles from a Controlled Aerodrome
- No closer than 3 nautical miles from an aerodrome or aircraft landing area
- marked on the aeronautical Charts- Closer than 3nm is available with conditions
- Not over a populous area
- Not within 30 metres of a person, other than the operator's personnel
- Weight Restrictions apply – The first CASA approval will normally be up to 7kg)

It should be noted that the rules for flying UAV's in Australia are under review at present.

## TRAINING(Commercial Operations)

In order to operate a UAV commercially, the operator requires a Remote Pilot License(RePL) similar to a Private Pilots License(PPL).

As with any aviation organisation an Remote Operators Certificate(ReOC) is also required- similar to an Aviation Operators Certificate(AOC). Only the Chief Pilot of the Organisation needs to hold the ReOC. There are various CASA registered UAV training organisations that provide the required training.

It should be noted that the use of UAVs can just be considered as a more efficient method, in the Industrial Engineering context of undertaking various activities.

David Karr(MIIE, FIIE, MIEAust CPEng NER)

Principal/CEO  
Interspatial Systems

## Fellowship Awarded

Federal President, Sam Ghaith was recently elected as a Fellow Member of the Institute of Industrial Engineers.

This is in recognition of the diligent effort on

behalf of the IIE.

The nomination was put forward Bob Watson and universally acclaimed by the Federal Council.

Congratulations Sam.

## Chris Heyde Excellence in Industrial Engineering Award Presentation(abridged)

John Shervington, a long time member of the IIE presented the Chris Heyde Excellence in Industrial Engineering Award in November 2016.

John presented his work experience from his time as a Perth Hospital's School of Occupational Therapy in 1967 specialising in the return of injured workers to their pre-injury job.

Chris Heyde's MODular Arrangement of Predetermined Time Standards (MODAPTS) was adopted early in his career. John subsequently used it as a frame of reference when formulating a Return to Work Plan.

John consequently, I knew and worked with Chris for some twenty years.

John went onto analysing with MODAPTS of telephone dismantling of obsolete telephones from the Postmaster General Department and of producing incendiary capsules for the Forestry Department resulted in the creation of 18 different jobs within Processwork at Rehabilitation Centre.

In 1977 John accepted the position of Lecturer in OT at the Western Australian Institute of Technology (WAIT)(now Curtin University), responsible for teaching Work Study to second year OT students and Occupational Health to third year OT students.

In addition these students were trained in an introduction to Methods Study and the use of MODAPTS as work measurement.

For the International Year of the Disabled Person (1981) John was involved in establishing a joint contribution by the Institute of Industrial Engineers (notably with its members Bob Watson and Ray Baker) and the School of Health Sciences at WAIT.

In 1989 John relocated to Sydney working full-time at the Royal Rehabilitation Sydney Centre as a Senior OT in their Occupational Rehabilitation Unit. On Saturdays John again worked with Chris Heyde. Together they started making further modifications to WORKABILITY Mk II.

To further the acceptance of WORKABILITY Mk III in his OT profession, John commenced in 1992 a Masters in Applied Science (OT) by research at the University of Sydney.

In 1998 John completed his thesis at the University of Sydney in Reliability and validity of Workability III. These last years consolidated his ongoing career in occupational therapy but the personality of Chris Heyde with the experience of using his MODAPTS and WORKABILITY were the catalysts.