

Pitch Deck

Lvndship

V 01

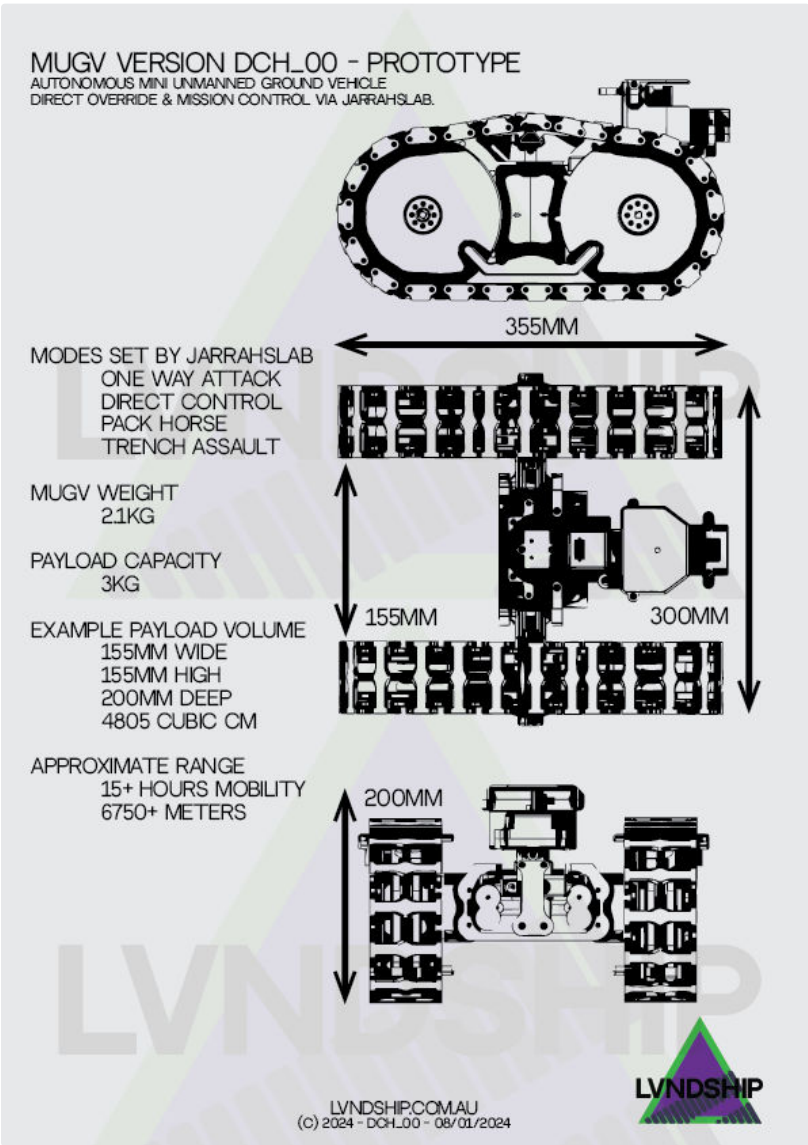
Effective Date: 19/01/2024

Signature: Meg Mathys



1. Introduction to Lvndship

Lvndship is a Western Australian based startup creating autonomous systems and software. The main innovation Lvndship is currently developing is called MUGV, a Mini Unmanned Ground Vehicle. It is a tracked vehicle, capable of navigating difficult terrain at a slow pace, and delivering a small explosive payload to a desired location. MUGV was initially conceived in response to the Russo-Ukrainian War, as a solution to the heavy casualties of trench-warfare.



Early Prototype Dimensions

2. Problem Statement

Eliminating the human element in dangerous situations is crucial, and is being called for in modern applications of Defence technology. The importance of implementing these solutions is outlined in the 2022 Robotic & Autonomous Systems Strategy, which outlines the five key capability offset areas:

- Maximising soldier performance through reducing their physical and cognitive loads
- Improving decision making at all levels
- Generating mass and scalable effects through Human-machine teaming
- Protecting the force
- Efficiency

3. Solution

One of MUGV's greatest strengths is the burden it relieves on troops. MUGV carry their own payload and can be fully autonomous, allowing for whole missions to be carried out without a human operator. Moreover, its manner of trigger detonation eliminates the human error that often causes unnecessary casualties, particularly in the use of grenades.

MUGV can be utilised through Human-machine teaming, working with ground troops to carry out initial assaults, or clearing a path forward. Human-machine teams offer a wider reach over the battlefield and helps to reduce the danger to Army personnel. Additionally, given the inexpensive and quick to produce nature of these machines, they can be used in a swarm fashion to overwhelm the enemy.

While there are successful robotic innovations, such as UAVs, currently in use within military applications, they still require an operator. MUGV differs in that they can be programmed with set missions to be carried out, and autonomously navigate to the desired location. This not only removes troops from having to complete the mission themselves, but also relieves them of the burden of controlling the machine and decision making. Furthermore, MUGV has multi-modal capabilities, and can be remote operated or overridden if desired.



Early prototype in outdoor testing

MUGV, both in its use and production, is efficient in nature. MUGV can be produced very quickly, with current printing times running at less than two days for printing, and 4 hours for assembly, per machine. This time will decrease exponentially as the scalability of the manufacturing operation increases. Given the compact and light nature of the machines, they are easier to transport and distribute than other military equipment. MUGV can be transported in a backpack if required, however given their long battery run-time and easily programmable missions, MUGV can also be set off hours in advance.

4. MUGV Use Cases

Current Capabilities:

Trench Assault

MUGV's initial purpose was to remove the human element of storming enemy trenches. The ground between trench systems, as seen currently in the east of Ukraine, is a treacherous area in which many soldiers lose their lives. Instead, MUGV can be deployed from the cover of a friendly trench, autonomously navigate to the enemy trench system, and trigger its payload according to its mission or module. MUGV can carry and trigger 6x F1 (Soviet-type) hand grenades - a module which has been designed for Ukraine's usage.

One Way Attack

The one way attack mode utilises GPS and autonomous navigation to find a target and automatically trigger upon arrival. This mode is particularly helpful for teaming with UAVs, allowing for the more expensive UAVs to be utilised as scouting vehicles rather than one way attack. Inertial navigation is under development for GPS denied locations.

Direct

Direct mode allows for MUGV to be remote controlled out of a position before assuming another autonomous mission. This mode allows for MUGV to be guided out of difficult areas as directly as possible before starting their intended mission.

Pack Horse

MUGV's control system and software includes pack horse mode, where MUGV follows the controller (with a user-set payload) but maintains a specified hang distance. This unburdens infantry and helps improve battlefield supply and logistics.

Future Capabilities:

Ammunition Resupply Vehicle

MUGV has the ability to become an ammunition resupply vehicle by creating a dynamic cycle of constant pick-up and drop-off of ammunition. MUGV can autonomously navigate to weaponry such as self-propelled howitzers. This would eliminate the requirement for crewed ARVs that provide a large target to the enemy.

Medical Resupply Vehicle

MUGV can also resupply crucial medical supplies, and other items such as food and water. MUGV's small stature and confident tracks means difficult terrain can be navigated without attracting unwanted attention. Additionally, MUGV's autonomy can be switched off, and a remote control mode enacted at a press of a button. This allows for supplies to be delivered to specific, if changing, locations.

Surveillance and Threat Detection

MUGV can also be utilised as an autonomous surveillance network. Multiple MUGVs can work together to create a moving border patrol, capable of detecting a threat, reporting it, and standing by for trigger.

5. Market Size & Growth

The global net worth of the Unmanned Ground Vehicle market was USD \$3.07 billion in 2023, and is expected to reach USD \$5.26 billion by 2030. [4]



Early prototype indoor testing with prototype remote control

Australia's manufacturing output has steadily declined since the 1960s; placing last among all 38 countries of the Organisation for Economic Co-operation and Development for self-sufficiency. [1] Our continued reliance on overseas partners for Defence supply chains and manufacturing capabilities means Australia's capability to defend herself is greatly dependent on ally cooperation. The Sovereign Australian Prime Alliance (SAPA) stated in their December 2023 report that "this situation leaves the nation exposed to major disruptions of global governance and supply, such as could be expected in the event of a major war or global catastrophe." [2] Australia needs to look closer to home for our Defence needs as we must reduce our current excessive dependence on international partners, given that nations will naturally prioritise supplies for their own defence stockpiles. Lvndship is one small business that has the capability to dramatically reshape Australia's sovereign manufacturing capabilities. With growth, Lvndship can supply Australian Defence Forces with thousands of machines; designed and manufactured right here in Western Australia, with no reliance on outside countries.

Unfortunately, the 10 year strategic warning time once predicted for wartime preparedness has greatly decreased, with the 2023 Defence Strategic Review indicating the risk of conflict occurring well within 10-years. [3] This does not give Australia the previous assumed lengthy

time to prepare and develop new systems of Defence. Furthermore, the Russo-Ukrainian War has demonstrated the rapid pace in which stockpiles can decline during war times, with stocks reduced across the whole of NATO.

6. Competitive Landscape

Whilst everyone is looking to the skies for drones, Lvndship seeks to optimise the autonomous small-form unmanned terrestrial domain of warfare. Current unmanned ground vehicles remain bulky and expensive with most lacking swarming, lethal or offensive capabilities, nor a realistic wartime manufacturing output. Lvndship is offering machines in a different, smaller and expendable format. Machines within the MUGV Family are compact, lightweight, and inexpensive to manufacture and transport. This makes MUGV one of, if not the first, autonomous land-based one way attack vehicle.



Early prototype in outdoor testing

The physical parts that make up Lvndship's machines are all printed on Fused Deposition Modeling (FDM) 3D printers. This in-house manufacturing allows complete control and sovereignty over the entire production of innovations. 3D printing has several advantages over traditional methods of manufacture such as CNC machining, casting, or injection molding, predominantly in that the output of parts can be changed immediately, without time and financial consequences to the production line. A significant advantage of 3D printing is its ability to facilitate rapid prototyping. Design iterations are quickly and easily implemented, allowing for faster product development. This agility reduces the time from concept to physical prototype, and greatly reduces the time and cost of making small, simple changes compared to traditional production methods.

Lvndship has the capability to expand into a forefront for Australian engineered and manufactured Defence solutions. The sovereignty Lvndship holds over the design, development and manufacturing processes ensures that Australia benefits from the rewards of creating a new manufacturing industry. We additionally provide Australia with a realistic and scalable method of producing warfighting and supporting machines in times of conflict.

7. Team

Lvndship is 100 percent West Australian owned and operated, with the founders being born and raised in rural WA. The business currently operates out of a residential household in Baldivis WA, comprising of a husband and wife team.

Although Lvndship comprises of just a husband and wife team, our past accomplishments demonstrate our commitment to Lvndship and achieving our goals. Tyler is a dedicated engineer who developed this innovation completely from the ground up. Whilst maintaining a high-pressure, full time job, he designed, manufactured, assembled, and tested over twenty different variations of MUGV over the course of 13 months. Lvndship intends to employ more resources, both in the engineering and printing spaces, when capital increases.

8. Milestones

Proof of concept for this idea was established in October 2022 through the use of fused deposition modelling (FDM) printing and rapid prototyping. By December 2022, four internal mechanical versions of the machine had been developed, each iterating on the last. The machine and the software surrounding it continued to change with continual testing, until it began to take shape as a Mini Unmanned Ground Vehicle (MUGV). More than 10 MUGV machines had been manufactured to completion by mid April according to the maturity of the design at the time, throughout the development cycle. Each of which serving as an excellent opportunity for refinement and improvement of elements of the machine. On 22 May 2023, Lvndship received an invitation to display MUGV at the Army Robotics Exposition 2023 (ARX23), taking place during the Chief of Army Symposium. Development of MUGV continued until ARX23 on 29 and 30 August 2023, where we presented our innovation to industry and Defence. The teachings we received from this event directed future development of MUGV, changing the machine's profile and drivetrain.



Early MUGV prototype at the Army Robotics Expo 2023

Initial printing of MUGV parts began on a single machine in October 2022, now a year later, printing occurs over four FDM machines with optimised printing procedures. Lvndship's quality management system began to mature in September

2023, with preparations currently underway for ISO 9001 compliance auditing. Lvndship is also actively working with the Office for Defence Industry Support (ODIS) to become 'defence ready.'

In just one year of development, completely out of conventional working hours, Lvndship has developed the world's first unmanned, autonomous, one way attack, ground vehicle. No other vehicle on the market is as inexpensive or expendable, and no other machine can be made as quickly on scale, without a substantial financial investment.

9. Financial Projections

First-pass Financial Modeling:



10. Investment Seeking

Investment	Brief Detail	Output
\$500 000	<ul style="list-style-type: none">• 2x full time employees<ul style="list-style-type: none">◦ \$339 000• 60x printers<ul style="list-style-type: none">◦ \$25 400• Recycling system<ul style="list-style-type: none">◦ \$5000• Standard compliance<ul style="list-style-type: none">◦ \$29 000• Commercial space<ul style="list-style-type: none">◦ \$30 000• 100x MUGV materials<ul style="list-style-type: none">◦ \$24 000	<ul style="list-style-type: none">• Upscaled manufacturing capacity• 100 MUGVs produced initially• Equips us to produce >1500 MUGVs per year for Defence and Ukraine

11. References

- [1] [Australia ranks last on OECD manufacturing self-sufficiency measure](#)
- [2] <https://www.austal.com/sites/default/files/00-images-philippines/Developing Australias defence industrial base -- December 2023.pdf>
- [3] [National Defence: Defence Strategic Review 2023](#)
- [4] [Unmanned Ground Vehicles Market Size & Share Report, 2032](#)

W: [Home | LVNDSHIP](#) E: hello@lvndship.com.au

Tyler Ross-Clarke | Founder | CEO | Principal Engineer | 0410 814 713

Meg Mathys | Co-Founder | COO | Head of Business | 0433 772 080