

Accurate unmanned system for inspection

鎮鑫科技 All Aspect System

郭鎮銘 CEO



The team

Founder

- Aerospace MEng. University of Sheffield UK(2005)
- Mech Eng PhD, University of Sheffield UK (2008)
- Research team leader, Fraunhofer IZFP & Saarland University DE– 2008~2015
- Assistance Professor, CYCU TW– 2015~2019
- Original developer for open source UAVs



Co-Founder

- MEng Computer Science =. University of Kent UK (2004)
- Software Engineer. , Fraunhofer IZFP & Saarland– 2010~2015
- All Aspect System - 2019

More than 15 years of experiences on UAS development

Core tech– intelligent vehicle control system

Data encryption

- Anti jamming
- Swarm
- Prevent reverse engineering

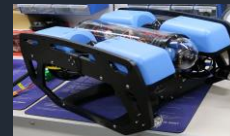
Smart system and software



- In house design software
- MAVLINK compatible

RoVs

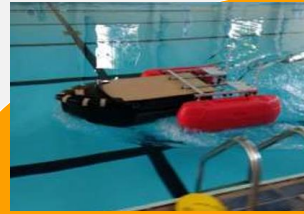
- Underwater inspection
- Bridge pillar inspection



Other vehicles



Unmanned boat



- Water depth & quality inspection
- Bridge inspection

Sensor integration

- Quantification measurement
- Further automation

4/5G & IoT integration

- Highly customization

VTOL

- Large area inspection
- Package delivery
- Signal relay

Current status of Environment and infrastructure

Are we living in a safe environment ?



Bridges are safe ?



Water is clean !?



土砂を貯砂ダムによってダム湖に流れ込む前に貯めた後、取り除きます。

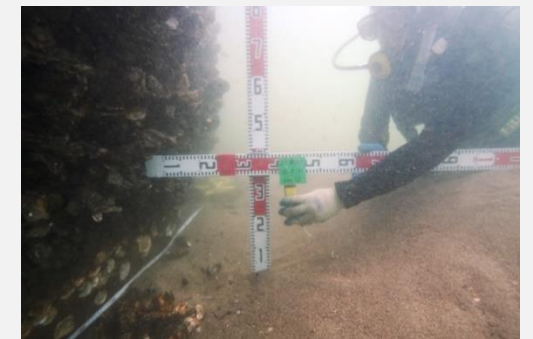
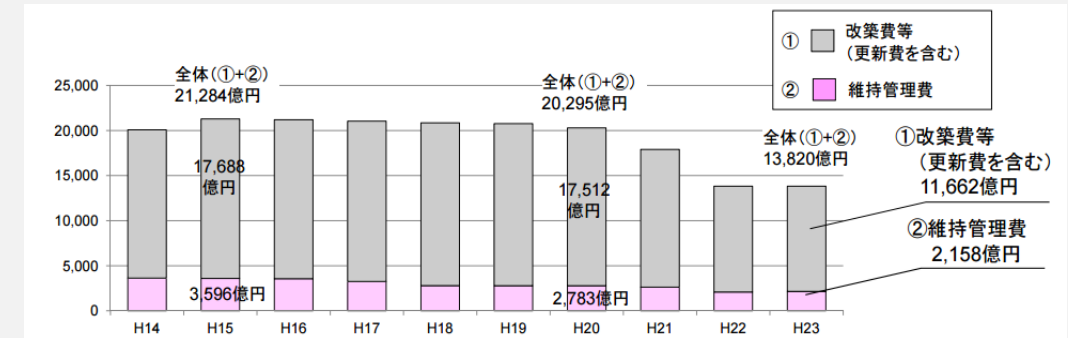
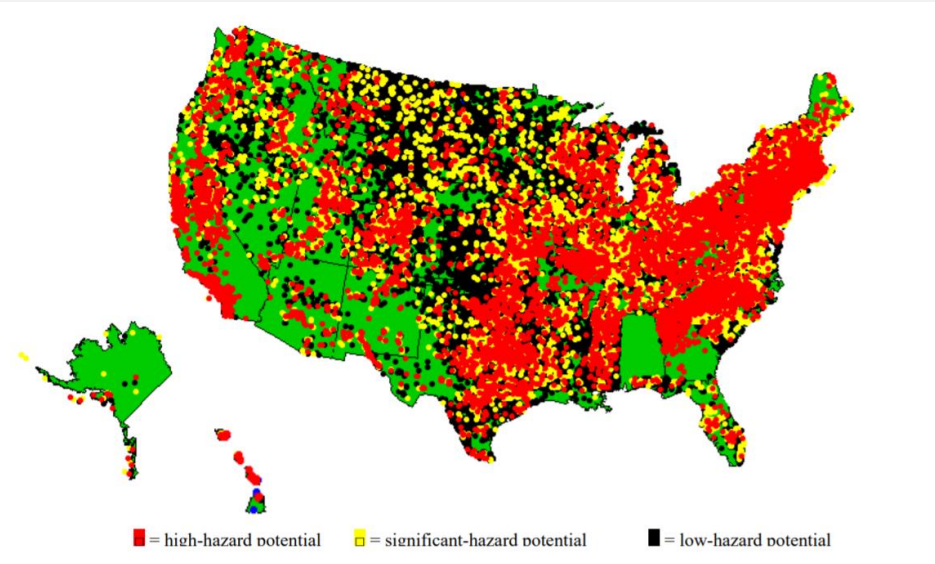


コンクリート用の砂利や盛土材として有効利用しています。



Dam condition !?

Number of water reservoir Taiwan, Japan and US as example



- There are **50 major reservoirs** in Taiwan, **709 reservoirs** in Japan, and a total of **84,000 reservoirs** in the United States. Therefore:
 - Estimation: the domestic market is about **230 million TWD per year**, and the foreign market is about **19.8 billion TWD per year**.
- There are approximately **50 underwater bridge piers** in Taiwan, **5,164** in Japan, and **4,386** in the United States. Therefore:
 - Estimation: the domestic market is about **10 million TWD per year**, and the foreign market is over **2 billion TWD per year**.

資料來源：国土交通省 <https://www.mlit.go.jp/>
資料來源：經濟部水利署 <https://fhy.wra.gov.tw/fhy/>
資料來源：国土交通省 <https://www.mlit.go.jp/>

Market analysis – TW JP EU & US

unit : USD million

Countries	No. dam	note
Jap	709	
EU	1172	Major dam
US	84000	
India	3200	
IDN	19	Major dam
TW	50	

Countries	No bridges
TW	20000
US	600000
Japan	700000

Area	TW	EU	JP	US
Service	Total market	Total market	Total market	Total market
Coastline water depth	22.1	need to work with local partner	need to work with local partner	need to work with local partner
Port water depth	0.2			
Dam water depth	0.7	14871.77	708	6300
Dam water quality	0.53			
Under water structure (dam)	6.63			
Bridge (under water)	0.33	not yet	not yet	starting
Total	30.5	14894	730	6300
			Total market	21955

- Market in TW is estimated to be **900 million NTD** (30 million USD) and **world market to be 21 Billion USD.**

AAS USV-integration with Sonar (single/multibeam)



SGS Taiwan in use



Number of motor	2
Size	140~150cm * 200cm
Weight	Empty weight Around 25kg
Thrust	34 lb *2 (can be upgraded)
Payload	More than 30kg (max 200kg)
Night operation	Yes
Endurance	5hr or more (depends on number of batteries)
Range	15km
Speed	Max = 4 knot regular = 2 knot
Extra function	- Dynamic position (DP) - Object avoidance - Under water sonar



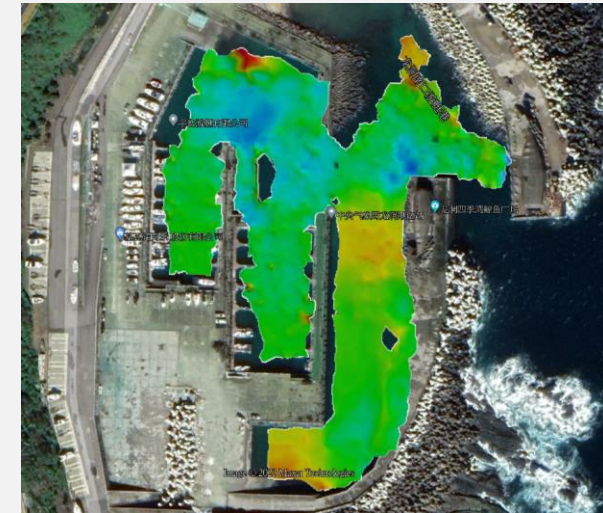
Specification	
Number of motor	2
Size	160cm * 130 cm
Weight	80Kg+
Waterproof	Yes
Mission payload	30 +kg
Night operation	可
Endurance	5 小時以上
Range	15 公里
On board sensor	Sonar(single/multibeam), oil sensor, HD camera
speed	1 knot (eco cruise, 10hr) 3 knot max (in real environment)
Extra function	- Dynamic Positioning 4/5G UTM
Others	- Already in operation in sea ports & river - Fully modular design

Port depth/oil measurement –USV with 5G system



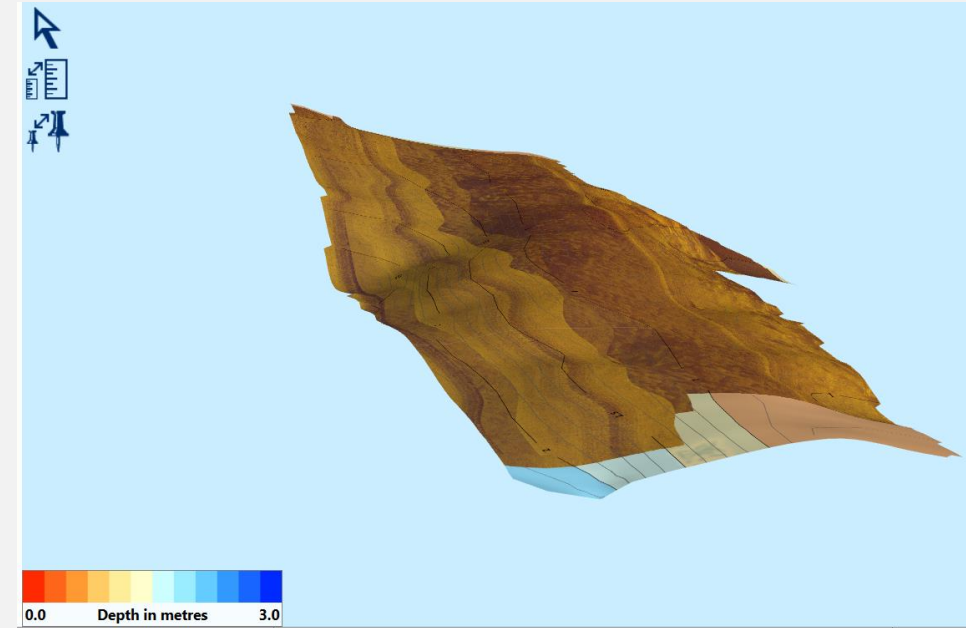
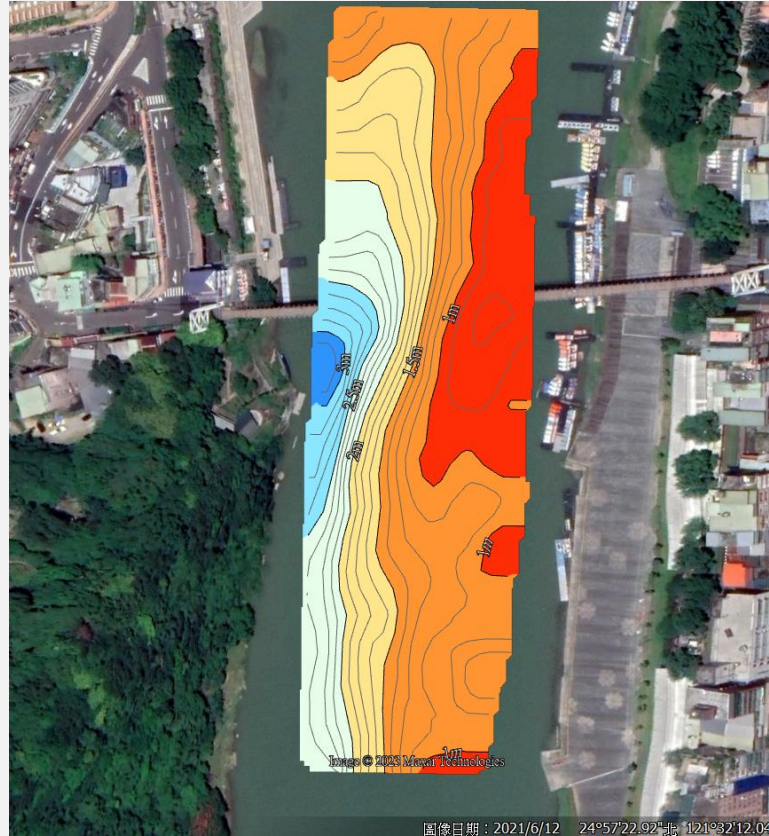
Real time oil data

Real time single beam sonar data



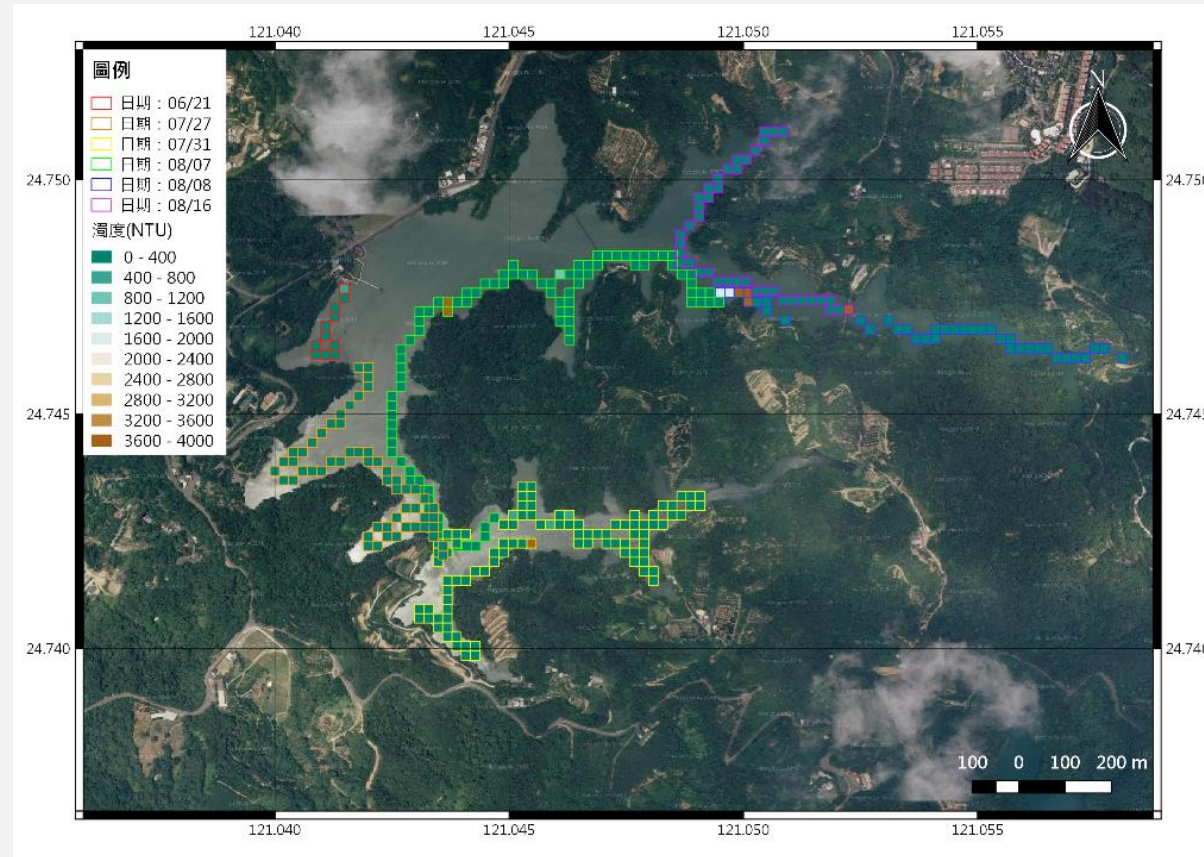
- From July to September 2022, **automated measurement of water depth and oil pollution** were taken place **Keelung Port** twice a week at least.
- This project has won **the Smart Places Project of the Year** award at the **2022 Asia Communication Awards**, represented by Chunghwa Telecom.

River depth measurement- USV with 5G system



- In 2023, AAS is collaborating with **academic institutions** and the **Ministry of Transportation** to conduct underwater inspections of river depth and bridge structures.
- Currently (as of March 2023), testing is being carried out at Bitan in New Taipei city.

Water quality inspection in water dam



High resolution map



3D Map demo

- The **first practical unmanned boat in Taiwan** was used for **water quality inspections** at **Baoshan Reservoir** in Hsinchu starting in **2017**.
- This system is **highly automated and precise**, providing **600 to 6,000 times the accuracy** of **traditional inspection methods** while **only requiring one-third of the cost**.

RoV –Integration of scanning sonar and Video



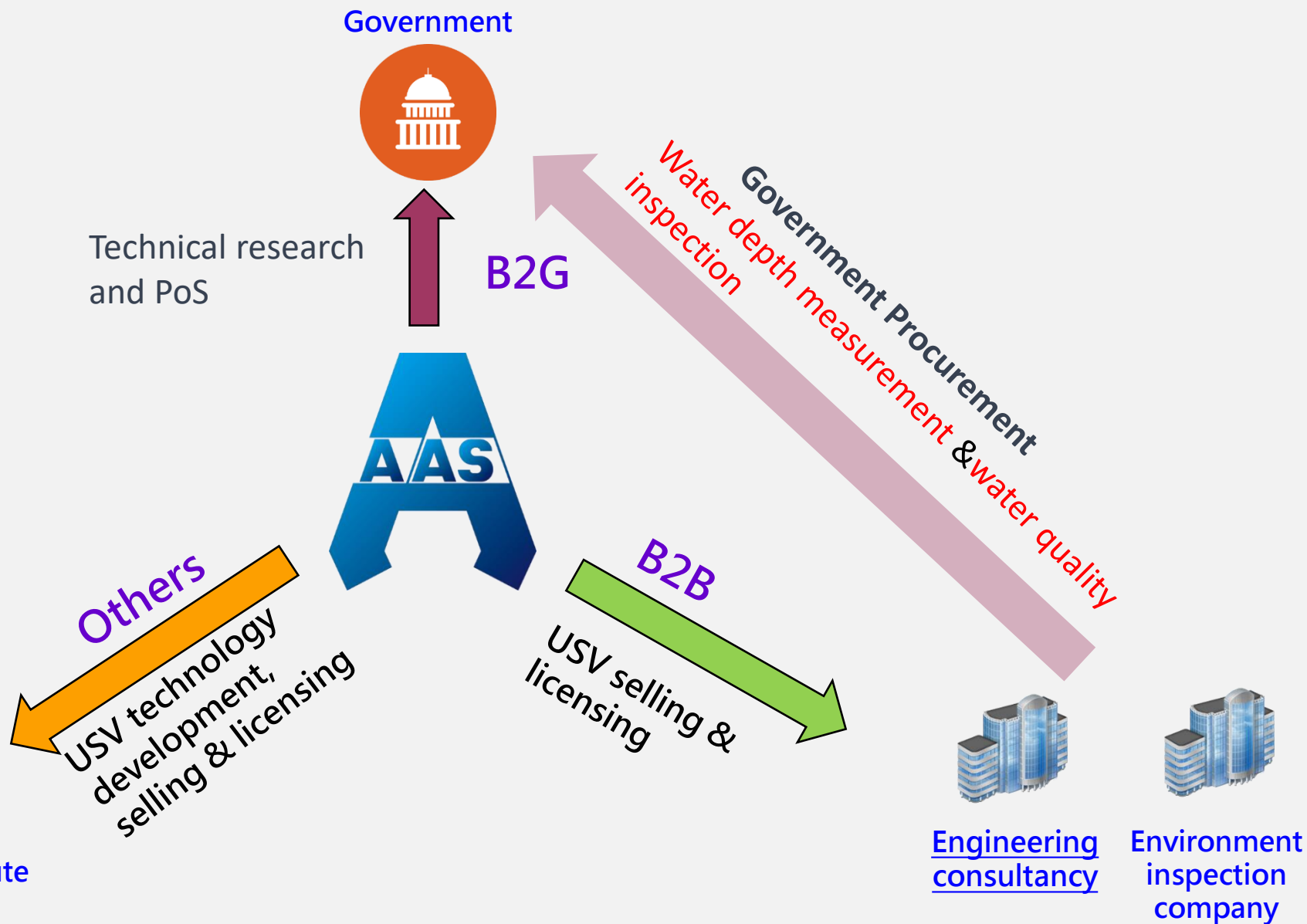
Sonar display window

Real time HD video display

- GUI- HD video integration with scanning sonar data
 - **Fulfill class 2 level of underwater inspection by Federal Highway Administration (FHWA US)**
- From July to September 2022, underwater inspection mission in **Keelung Port Taiwan**

Business model

	國內	國外
協力完了	SGS、中科、聯華集團、颱風洪水中心、達雲科技、工業技術研究院、雷虎科技	英國Salford大學、英國Sheffield大學、新加坡南洋理工大學、泰國農業大學
将来のパートナー	中油、中華電信、其他建設公司、檢測維護類工程顧問公司、工程或環境檢監測承攬公司	



Looking for partnership



- Expand international business – especially Japan and Asia region
- Further development for offshore wind industry underwater inspection (4m size USV and 8Kw RoVs)

Thank you for listening

cymeuas@gmail.com



All Aspect System
providing a safer environment