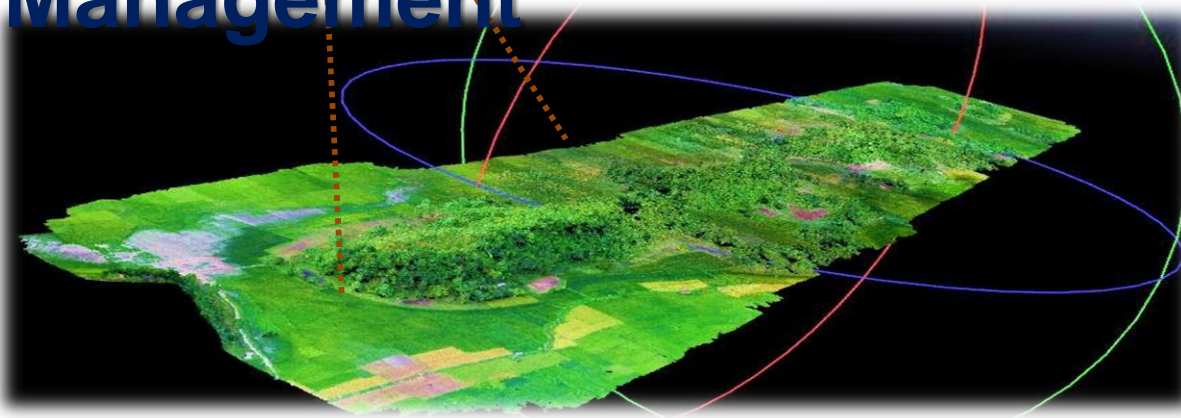**Ministry of Education**
Department of Higher Education
Myanmar Aerospace Engineering University
Department of UAV Research

Research & Application of UAV/Drone Technology for Civilian Applications & Disaster Management

Prof. Dr.Thae Maung Maung
Head of Department
Department of UAV Research

Introduction of MAEU UAV Research Department

Since 2007,Our department at Myanmar Aerospace Engineering University (MAEU) has been researching and developing in the area of UAV designation and autonomous capabilities. Medium Altitude Long Endurance UAVs, Multi-copters, various prototypes ,Autopilot testing and GIS Map production have been successfully operated.

Research Goals

- To develop and Share UAV technologies

 -To apply civilian and military applications.

-To help and support for disaster and environmental management.

-To operate the research-based economic structure.

Specializations

❑ Production (Research Innovation Enterprise)

❑ Aerial Photography ,Topographical Survey ,

❑ Construction of Geographic information database (UAV or Satellite Map)

❑ Utility Mapping Service,3D model ,

❑ GIS/Remote Sensing

❑ Agricultural Section

❑ Defense

❑ Disaster Risk Reduction (Search & Rescue)

❑ Training (Pilot & Mapping)

Our Department helped, supported and cooperated :

Drone applications and Training the following public, government sectors and INGO /NGO, University for benevolent and disaster management.

1. Ministry of Electrical Power and Electricity (MoEE)
2. Department of Disaster Reduction, Ministry of Social Welfare, Relief and Resettlement
3. Department of Agriculture, Ministry of Agriculture, livestock and Irrigation
4. Department of Fish, Ministry of Agriculture, livestock and Irrigation
5. Ministry of Religious affairs and Culture
6. Department of Bridge, Ministry Of Construction
7. Map Production Engineering Unit , Ministry of Defense
8. Department of Meteorology and Hydrology
9. No.(8) Air Defense Command , Ministry of Defense
10. United Nation of Food and Agriculture (UNFAO)
11. Mandalay City Development Committee (MCDC)
12. Meikhtila City Development Committee (MTCDC)
13. Wandwin City Development Committee (WDCDC)
14. Haka City Development Committee (HKCDC)
15. Asia Air Survey Myanmar Co, ltd. (AAS Myamnar)
16. Concordia International Co.,Ltd
17. Universities (YU,YTU,MU,MTU,TUM,Meikhtlar)
18. Right Point Technology Co.,Ltd

Proposed Cooperated Organizations
1. Myanma Awba Co, ltd
2. Suntec Technology Co.,Ltd
3.GIZ Co.,Ltd

Research and Development of MAEU- UAV/Drones

Gasoline Engine powered Long Range UAVs (2 hp to 10hp)

MAEU01 UAV

MAEU02 UAV

MAEU03 UAV

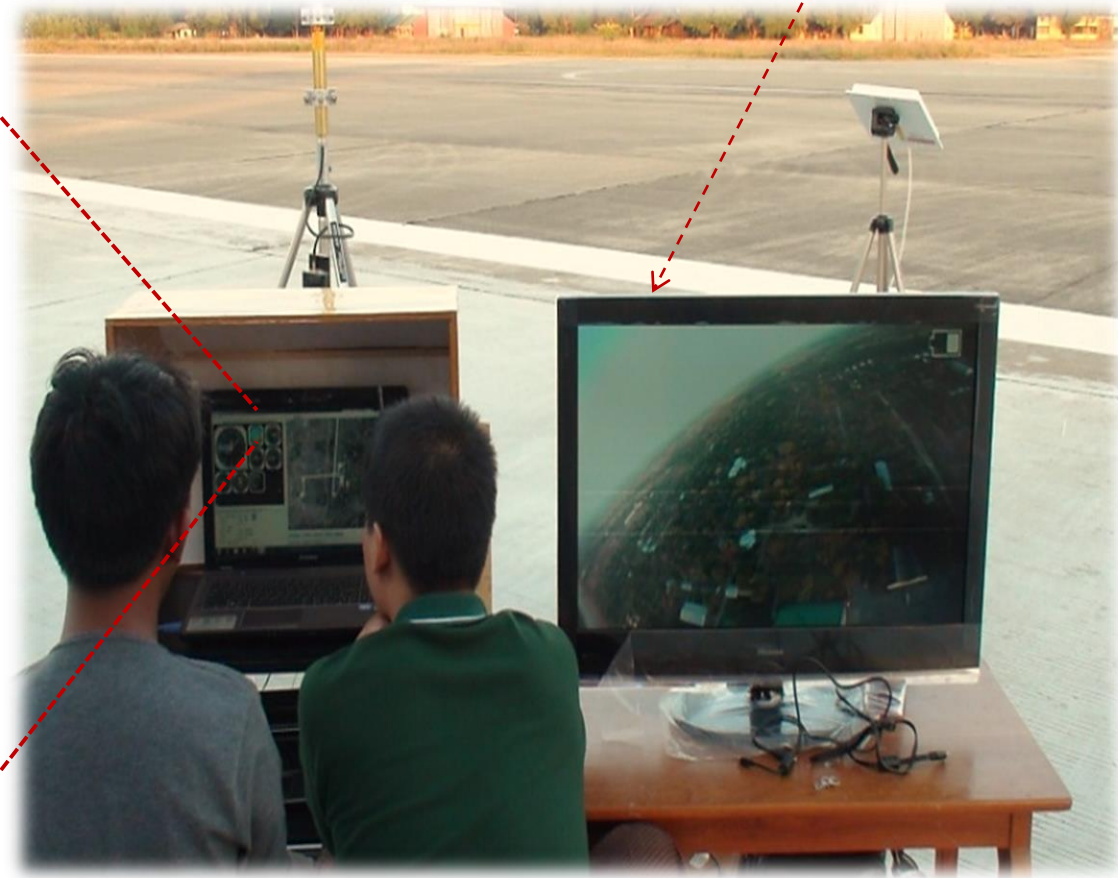MAEU04 UAV
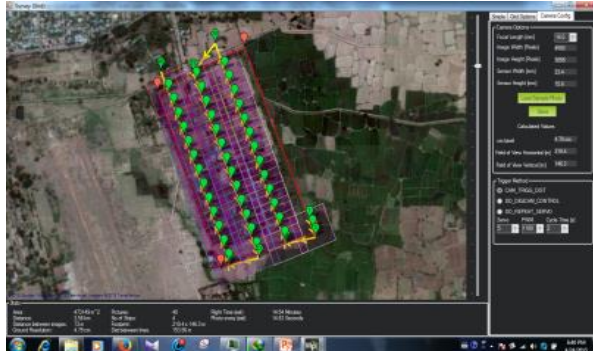

MAEU05 UAV

AeroMas I

MAEU 03 UAV (10 HP gasoline engine)

MAEU UAV - Ground Control Station (100 km Range)

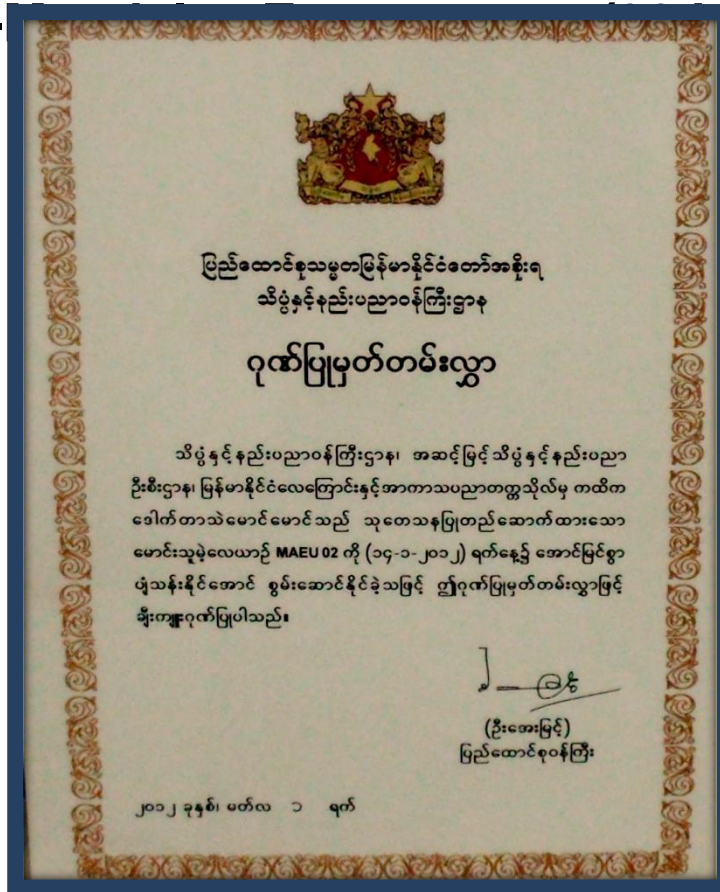Real time Flight data Display

Real time Monitoring Display

Pioneer in Unmanned Aerial Vehicle (UAV) Research :
The first Unmanned Flight test in Myanmar


In January 2012
Applying Autonomous Aerial Photographing and Real time Video Monitoring using MAEU 02 UAV.
-Flight Test Location MAEU02 UAV a long the Yangon- m).

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
သိပ္ပံနှင့်နည်းပညာဝန်ကြီးဌာန

ဂုဏ်ပြုမှတ်တမ်းလွှာ

သိပ္ပံနှင့်နည်းပညာဝန်ကြီးဌာန၊ အဆင့်မြင့်သိပ္ပံနှင့်နည်းပညာ
ဦးစီးဌာန၊ မြန်မာနိုင်ငံလေကြောင်းနှင့်အာကာသပညာတက္ကသိုလ်မှ ကထိက
ဒေါက်တာသဲမောင်မောင်သည် သုတေသနပြုတည်ဆောက်ထားသော
မောင်းသူမဲ့လေယာဉ် MAEU 02 ကို (၁၄-၁-၂၀၁၂) ရက်နေ့၌ အောင်မြင်စွာ
ပျံသန်းနိုင်အောင် စွမ်းဆောင်နိုင်ခဲ့သဖြင့် ဤဂုဏ်ပြုမှတ်တမ်းလွှာဖြင့်
အိုးကျူးဂုဏ်ပြုပါသည်။

(ဦးအေးမြင့်)
ပြည်ထောင်စုဝန်ကြီး

၂၀၁၂ ခုနှစ်၊ မတ်လ ၁ ရက်

⑨

Research & Development of Aerial Survey Mapping UAVs

(MAEU –HL 02 Hand lunched UAVs)
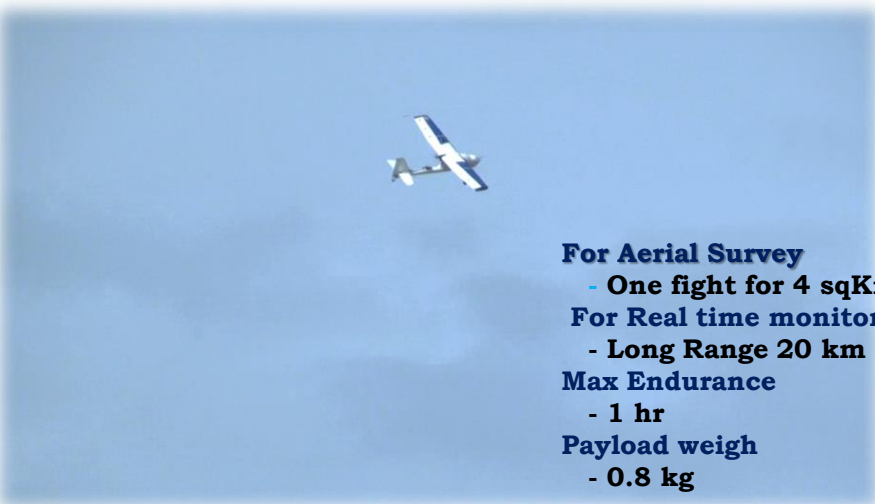
For Aerial Survey
 - **One fight for 4 sqKm**
 For Real time monitoring
 - **Long Range 20 km**
 Max Endurance
 - **1 hr**
 Payload weigh
 - **0.8 kg**

MAEU HL -02 UAV

MAEU HL02 - Ground Control Station

Aerial Survey Mapping UAVs
MAEU FW-01 UAV (Catapult Launch & Parachute Landing)

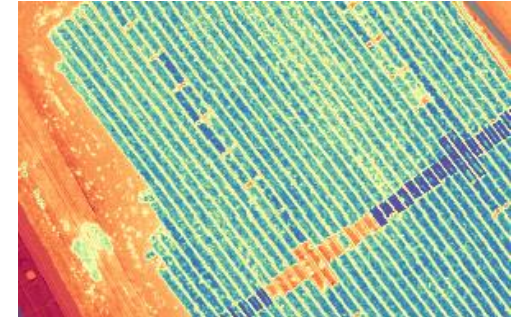|	
Endurance	**- 1.30 hr**
Range	**- 12 mile**
Aerial Survey	**- 15 sqkm/ filght**
Max attitude	**- 900m**
Max payload weight	**-1kg**

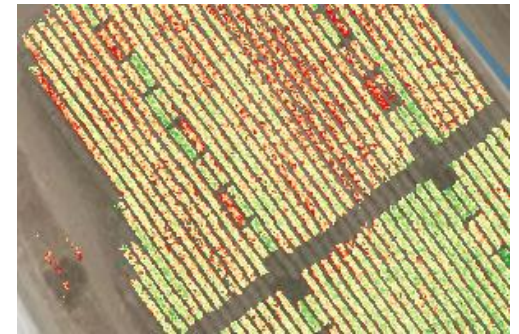# Search and Rescue Mission Drones (MAEU Octo -01)

Spraying Drone for Agriculture Applications (MAEU SP-01)

Crop Monitoring Drone using Rededge Multispectral Camera
(MAEU-Agri 02)

Optimized Soil-Adjusted Vegetation Index

Chlorophyll Map

Target Drone Research
Supporting to No (8) Air Defence Command & No (2032) Air Defence

a. To use as Target drone for the training of the air defense System
b. To apply in Bomb damage assessment
c. Real monitoring   for Surveillance Mission

 UAV Pilot & Ground Control System were trained to Air defence officers.

Solar Powered UAV system

Aircraft weight	6.7 kg
Wing span	10.5 ft
Chord	1 ft
Wing area	9.7 ft^2
Power loading	12 lb/ hp
Cruise velocity	15 m/s
Fuselage length	6 ft
Horizontal tail span	2.5 ft
Horizontal tail chord	7.5 in
Vertical tail span	0.93 ft
Vertical tail chord	7.5 in
Solar panel area	7.3 ft^2
Total number of solar	44 cells

Fire Monitoring Drone
Supporting Drone Application and Training Meikhtila Fire Brigade

Research & Development of Take-off & Landing (VTOL) UAV

- # **For Special Mission**
- Lower cost possible

- Vertical take-off and landing capability

- Hovering capability

- Low noise electrical power system

- Ability to work with different payloads of surveying cameras and sensors

Drone Pilot Training instructed by French Drone Trainer

Drone pilot Training by instructor form French for international Standard .

Remote Sensing Methods and Tools For Resource Assessments
with GIS /Drone *Training*
Trainer - American GIS /Drone Trainer

Development of Aerial Survey & Mapping Process

Output applied Map &3D Model

Flight Plan

Ortho mosaic
3D point clouds
Digital surface model (DSM)
Digital terrain model (DTM)
Contours
Google KML tiles

3D Modeling
GSD = 4 ~ 6 cm/pixel
Geo-location accuracy
X-y =15cm ,z =25cm

Sensor selection

Data collection &Data Processing Team

Ground control station

RTK GPS /Level Team

Flight Team

Applications of MAEU- UAV/Drones
&
Supporting Drone Pilot and GIS Mapping Training
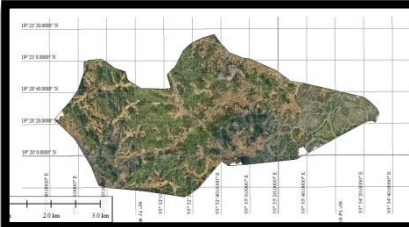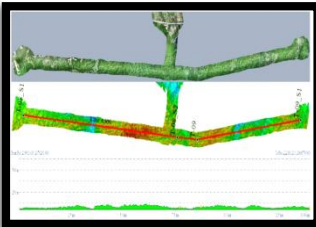
The First Appling MAEU- UAV in Myanmar: for Ministry of Electrical power and Energy
## MAEU-05 UAV System for Topographic Survey of Transmission Line

In November 2014 ,
- MAEU 05 UAV was successful of surveying for route of 500 KV transmission line which is 192 km (Taungoo to PayaGyi).
- This 500 KV transmission line for Ministry of Electrical Power and Electricity (MEPE) is the biggest power line ever built in Myanmar. MAEU -05 UAV for surveying transmission line is also the very first time and the newest technology .
- This survey project is a collaboration of Department of MAEU UAV Research, Asia Square Power Co., Ltd and Korea KYUNGIL Co., Ltd.
- Our department was responsible to take the aerial photographing and to operate the camera control system. KYUNGIL Co., Ltd from Korea supported an aerial photo for 3D survey mapping. We got the recommendation Letters for performance MAEU -05 form Korea KYUNGIL Co.,Ltd.
- Our Dept can Support the funding (10,000,000 kyats) for Government.

3D Model, Plan & Longitudinal Section
for 500 KVA Transmission line
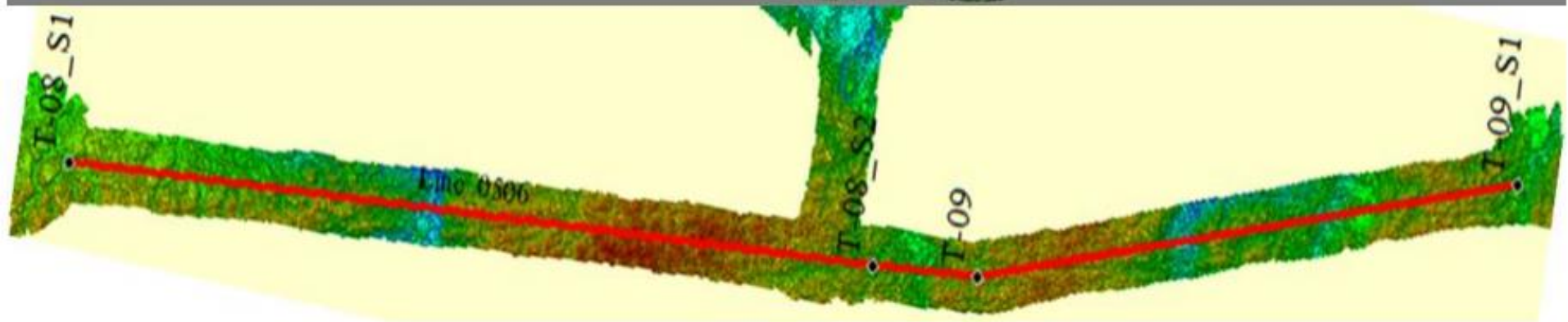
From Pos: 219913.430, 2078291.000

To Pos: 222161.210, 2064579.000

500 m

250 m

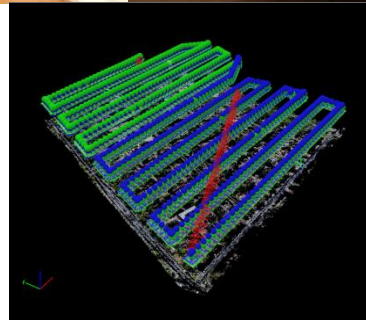2.5 km   5.0 km   24 4   10.0 km   12.5 km   13.98 km

Handover Successfully Yangon University Drone Mapping Project to Minister of Education

Aerial Survey project for Yangon University & Department of Higher Education

ပညာရေးဝန်ကြီးဌာန ပြည်ထောင်စုဝန်ကြီးထံသို့ ရန်ကုန်တက္ကသိုလ် အတွက် အသုံးချမြေပုံများပေးအပ်

Support to Ministry of Construction (MOC)
for New Bridge Route line Aerial Survey Project

Supporting the Department of Bridge , Ministry of Construction for Aerial Survey Mapping (3D,Contour ,Ortho photo ,DEM) .The project is for new Bridges (Part Quaky and Ra Maung) through Yangon –Minbuu- Ann High way road at Rakhaing State.

Supporting Ministry of Religious affairs and Culture

2016 Bagan Earthquake, MAEU UAVs/Drones supported 3D model production (42 monuments) and Map of Bagan Region (42 sqKm) for Department of Archaeology , Ministry of Religious affairs and Culture. Our products are used for damage assessment and using World Heritage notation submitted process.

Project 1. **3D Modeling for 40 Bagan Monuments and Temples using MAEU Multicopters**
Project 2. **Aerial Survey Mapping for Bagan Region Using MAEU -UAVs**

**Cooperated with Department of Archaeology, UNSECO, Myanmar Engineering Society ,
Myanmar Earthquake Organization, Myanmar Archaeology organization, University of Computer Science Yangon.**

Project Period – 3 months @ Bagan