

1

LUFTA

Introduction

Introduction

In the year 2000, the popularity of Unmanned Aerial Vehicles (UAV) around the world peaked. It was due to their successful deployment during the wars in the Middle East. The trend resulted in the Malaysian Government creating many research programs in the country and UPM won numerous research grants to study these unique vehicles. To test these UAV prototypes, a suitable dedicated area was developed within UPM.

Ladang Puchong was chosen as the site to build a 150m long runway for these prototypes to takeoff and land. 20 years later, Ladang Puchong and the runway still stand strong and has served students, staff and industry players successfully.

This book contains some success stories how students, staff and industry players used UPM's Ladang Puchong UAV Flight Testing Area (**LUFTA**) to conduct flight testing safely and successfully over the years.



2

LUFTA

History of LUFTA

The Farm

15km away from UPM Serdang Campus, a farm sits peacefully today in the middle of bustling Puchong. *Ladang Puchong* (Puchong Farm) was once an active plantation with crops and cattle roam freely. Rumor has it that once upon a time, the farm was home to every single species of durian in the world. Going back even further before the area was cleared, the farm was a thick rainforest where families of tigers and panthers used to roam. In the early 2000, cobras and pythons could still be found lurking in the bushes. Wild boar footprints could be seen on soft ground and monitor lizards were often mistaken as crocodiles due to their sizes. 20 years later, they are still roaming around the farm, although, not as frequently as before.

Ladang Puchong is approximately 440 acres of pristine land surrounded by urbanization that slowly squeezing in. One could not help but to wonder how long can the farm last before it gets engulfed by modernization. In the early 2000, hardly anyone knew this area let alone been there. Therefore, for that reason, it was probably the best place at the time to build an airstrip for Unmanned Aerial Vehicles (UAV) projects. For flight testing purposes, the farm was an ideal location not so far away from the university but far enough from populated area.



3

LUFTA

Teaching in LUFTA



Flight Dynamics and Control

For Aerospace Engineering students, any class involving flight is a reason to be excited about. UPM is the very few public universities in Malaysia that offer this course to anyone who wants to learn more about it. For academic staff, having a dedicated flying field empowers them to conduct many flying related activities involving remote control (RC) aircraft, unmanned aerial vehicles (UAVs) and drones. Although theoretical work is good as classroom activity, flying in the real world is almost certainly different from the theory. For these students, it was their first experience ever flying these vehicles. For the first time they get the valuable experience what the real problems of flying are.



4

LUFTA

Research in LUFTA



UAV Programmes

'Learning' in LUFTA is not only for students but for professionals too. Most of the time, the flying site is used to perform experimental research on UAVs. Since the early 2000, various platforms have flown (and crashed) on LUFTA airspace. For researchers, LUFTA is their site to learn about the flight dynamics and mechanics of their flying machines. Using sophisticated (and often, very expensive) equipment, every intricate movement of their unmanned vehicle is analyzed.

One of the most challenging phases of designing a new UAV is to tune the autopilot system to enable the aircraft to fly completely autonomous. If tuned properly, the human pilot who controls the aircraft remotely can handover the flying of the aircraft to the onboard

autopilot system and the computer will fly the aircraft well. If the autopilot is tuned wrongly, the aircraft can lose control and crash.

For these kind of high-risk research, LUFTA has been the ideal place to study new technology and ideas to increase the boundaries of flight for UAVs. At the test site, scientists have test flown long endurance UAVs, high speed UAVs and other UAVs in between. Plenty of prototypes have crashed within site but as scientist, this was part of the lessons we needed to learn. The most important lesson for us is to know why the UAV crashed. In the end, some of these UAVs have flown beyond expectations and some have been commercialized overseas. All these from the thirst to learn more and improve.

5

LUFTA

Serving the Industry

Universiti Sains Malaysia (USM)

Apart from UPM staff and students, LUFTA also welcomes other universities to use its facilities to conduct flight testing. We provide support in technical matters if necessary. For members of USM testing team, their mission was clear, and the work completed successfully under a typical blistering sun in LUFTA.



An aerial photograph of a farm or agricultural facility. The top half of the image shows a dense forest. Below the forest, there are several large, light-colored buildings with curved roofs, possibly greenhouses or covered walkways. In the center, there are several rectangular ponds or tanks. The bottom half of the image shows a grassy field with a small white structure, a larger pond, and several rectangular tanks. A semi-transparent white rectangular overlay is positioned in the center of the image, containing the number '6' in a circle, the word 'LUFTA', and the word 'Guests' in a large blue font.

6

LUFTA

Guests

Civil Aviation Authority Malaysia

Over the years, we have had the privilege of welcoming important guests to LUFTA. The VIPs come from companies and various government agencies. One such important visit was from the Civil Aviation Authority Malaysia (CAAM). The UAV Team invited the team from CAAM to witness a flight demonstration in LUFTA. The objective was to seek special permission to conduct flight testing at suitable times without compromising

airspace safety. Because our UAVs fly in the same airspace as other manned aircraft, they could meet in the air and crash. By declaring our intention to fly with CAAM, such incident could be avoided by allowing only one aircraft to fly at that time. As a result of the visit, UPM obtained a special permission to fly in LUFTA subjected to filing NOTAM with the Air Traffic Control Center in Subang. For us in LUFTA, this was a groundbreaking good news.

