

Fighting Fire

**with S.M.A.T Unmanned Aerial
Vehicle (UAV)**

S.M.A.T group

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Outline of Presentation

- Fire related cases in Myanmar
- What's "S.M.A.T UAV" and its goal
- Design Challenges
- Material selection and Budget
- Firefighting Systems
- Conclusion

Fire-disasters in Myanmar

- Ranked Top 11 Forest Fire in the world
- Highest Forest - fire rank in South East Asia
- Recognized as country's top natural disaster
- Being over 1400 Fire disasters annually (Worse negative impacts comparing developed countries)
- Losses due to fire are increased from 202 million Kyat to 430 million Kyat in Mandalay region during 2017 and 2018

Current difficulties for Fire-Crews

- To enter into the narrow street
- To extinguish the exact point of fire
- To get water in time (lack of hydrants)
- To know the situation of invisible areas
- To spread the fire immediately not to get worse situation
- To solve the problems of traffic Jams



S.M.A.T UAV's Goal

**To help , solve and prevent the difficulties and safety
for Fire- crews before and during the fire-Fighting Process**

What is S.M.A.T Unmanned Aerial Vehicle(S.M.A.T UAV) ?

- Vehicle without a human pilot onboard controlled autonomously by computer
- Monitoring using sensors
- Extinguishing Fire using Fire-Fighting ball
- Use Smothering method (To cut down getting oxidant)

Where can these UAV be used ?

- To get closer to Fire
- To get visible access in invisible areas
- To monitor Fire-Fighters
- To go ahead burning areas and suppress Fire

Upcoming Benefits from our drone's advanced technology

	Conventional Method (with water)	Advanced Technology (with Fire-Fighting Ball)
	<ul style="list-style-type: none">▪ Difficult to get burning area in time▪ Having unnecessary damages▪ Cannot find where the worst fire is .	<ul style="list-style-type: none">▪ Able to go and beat the fire in easy way▪ No damages for Properties▪ Non-toxic to eco system▪ Can detect and point out the commander where it is .
	<ul style="list-style-type: none">▪ Getting worse situation▪ Being unable to beat fire precisely▪ Inaccurate and ineffective system	<ul style="list-style-type: none">▪ Being Suitable▪ Being able to extinguish the exact point of fire▪ Better Performance
	<ul style="list-style-type: none">▪ Extinguishing with water can accidently lead to worse situation as well	<ul style="list-style-type: none">▪ No chemical reaction (Non – toxic inert powder)

Aerial Fire-fighting Procedures



- Step 1 to 4
- Thermal imaging camera to get real time info
- Check and point out the current fire situation
- Release the fire-fighting ball from Safety altitude

Material Selections





S.M.A.T UAV : Design Challenges

- Vertical take-off and landing Octa-copter
- Two payloads system (3kg payload)
 - (1) two fire extinguishing ball
 - (2) thermal imaging sensor
- release the fire ball into the fire through the mechanism exactly
- Low maintenance and Easy to operate



Budget for SMAT UAV system

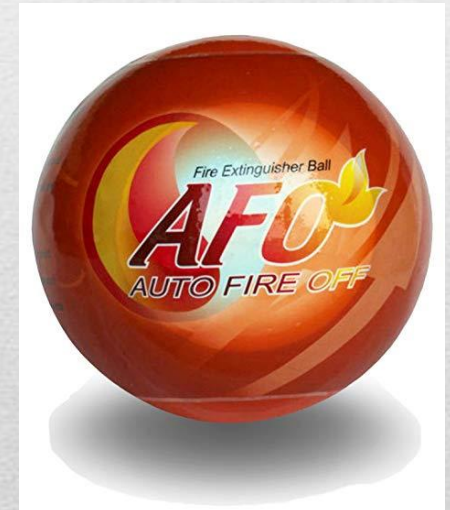
Item Name	Unit	Number	Price	Total
Drone Platform	Unit	1	200\$	200\$
Propulsion System	Unit	1	520\$	520\$
Flight Control System	Unit	1	560\$	560\$
Communication System	Unit	1	280\$	280\$
Payload system	Unit	1	520\$	520\$
Total cost				2080\$

Payload of Fire-fighting system

Weight and size	1.3 kg , (7 x 7 x 7) in ³
Explosion sound level	120 db as Thunderclap
Dry chemical Powder (non-toxic inert chemicals)	Ammonium sulfate & ammonium phosphate



- Self-activate during 3 – 5 seconds and coverage 360 degree around 8-10 m² when its temperature reaches to 70 degree Celsius
- No maintenance is required for five year

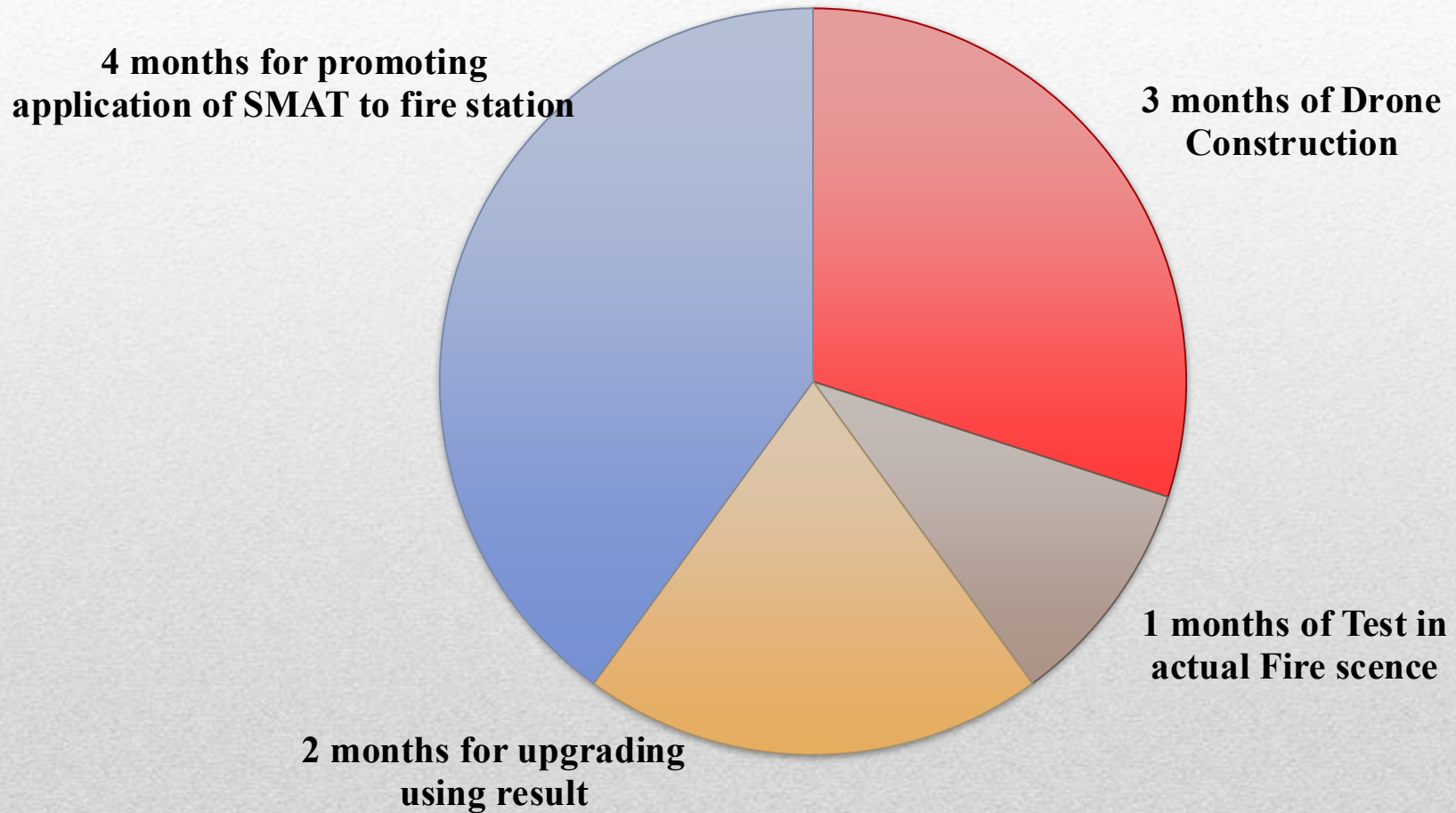


Thermal Imaging Sensor (FLIR ONE PRO)



- To measure Heat by Infrared Radiation
- To point temperature by different color palette
- To watch the situation of invisible areas

Timeline and Planning for S.M.A.T Firefighting platform



Conclusion

- When our drone can be used in the reality, we can solve the following current difficulties
 - Situation in which water is not available immediately
 - Where the traffic jams occur
- Public Safety issues related to fire breakout will be less after fire stations get our SMAT fire fighting platform UAV as their support.



Team Name : Team S.M.A.T
 Project Category : Safety
 Project Title : Fighting Fire With S.M.A.T
 Unmanned Aerial Vehicle (UAV)



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