

# DARPA's Bay Area SDR Hackfest

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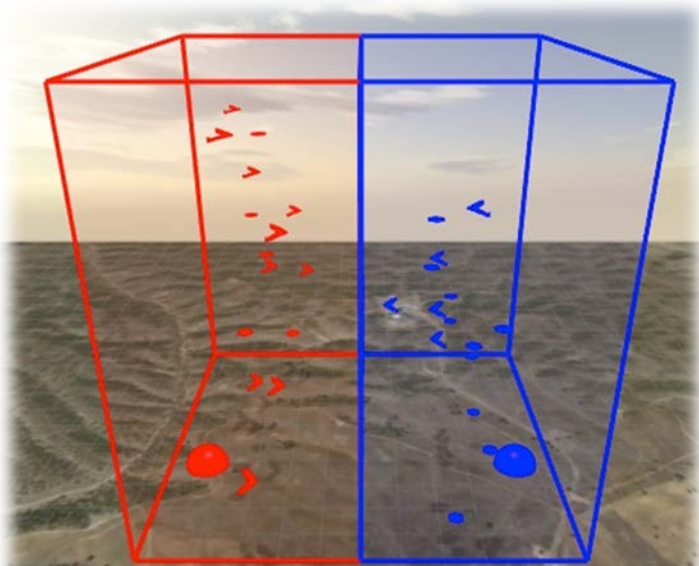
GRCon17

09/13/2017





# Software Defined Radio makes the electromagnetic spectrum programmable



## Service Academy Swarm Challenge (SASC)

U.S. Service Academies compete in up to **25-on-25** aerial swarm battles

Swarms managing behavior in real-time through RF link

Limitations due to spectrum congestion  
Solutions constrained to application layer

Application

Transport

Network

Data Link

Physical



[https://3dr.com/wp-content/uploads/2017/03/Solo\\_r10c-1024x443.jpg](https://3dr.com/wp-content/uploads/2017/03/Solo_r10c-1024x443.jpg)



# Connecting to a UAV through SDR creates a new programmable surface



<http://blog.lumoid.com/this-4th-of-july-you-might-watch-drones-instead-of-fireworks/>

Swarms of over 500 truly autonomous drones are currently impossible

Application

Transport

Network

Data Link

Physical



[https://3dr.com/wp-content/uploads/2017/03/Solo\\_r10c-1024x443.jpg](https://3dr.com/wp-content/uploads/2017/03/Solo_r10c-1024x443.jpg)



<https://www.raspberrypi.org/products/raspberry-pi-3-model-b/>



[https://www.ettus.com/content/images/USRP\\_B200mini\\_Front\\_Diagonal\\_Large.png](https://www.ettus.com/content/images/USRP_B200mini_Front_Diagonal_Large.png)

Programmable over the full stack changes the limits



# DARPA's Hackfest: A three-part event

## Hacker Space

- Open space to develop, learn, and play
- Host experts in SDR
- Some problems will be provided for context/ideas
- Brainstorming session to take place at GRCon17

## Speaker Series

Experts will discuss emerging technologies in larger societal contexts

## Missions

- Team-based
- Teams must apply
  - Expect 8 teams
- Hardware provided
  - UAV + SDR
  - Ground station
- Focus on the problem book



CORY DOCTOROW



BEN HILBURN



PARIMAL "PK"  
KOPARDEKAR



JOE GRAND



LINDA DOYLE



AMIE STEPANOVICH



HEATHER KIRKSEY



CHRIS ANDERSON



SAMY KAMKAR

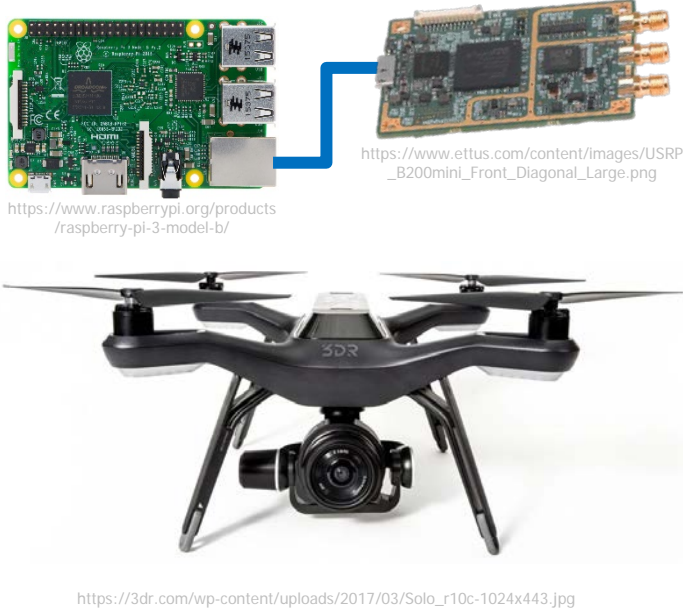


PIERRE DE VRIES



# DARPA-provided hardware will form basis of Hackfest Missions and team activity

## UAV



## Ground Station

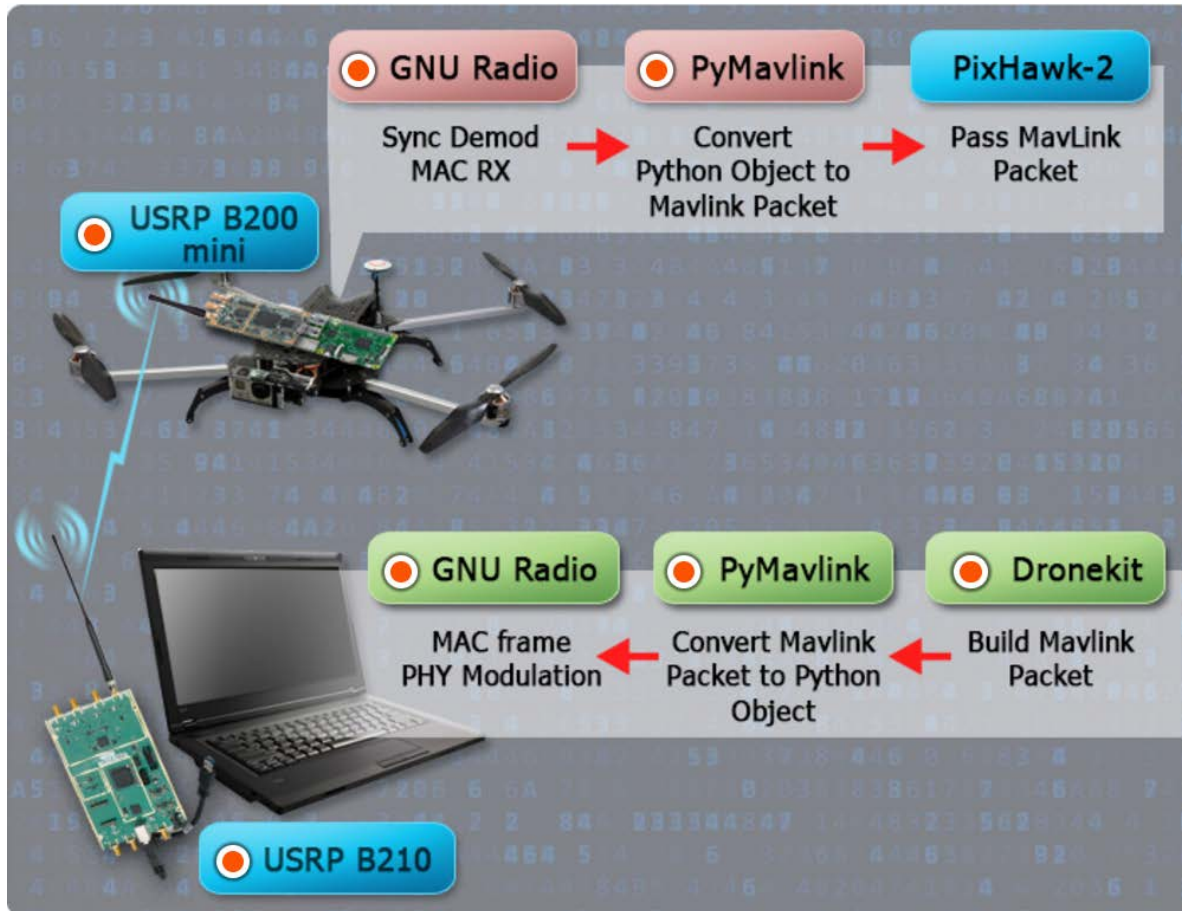


Equipment	Part
UAV SDR	USRP B200mini
UAV Computer	Raspberry Pi 3
UAV	3DR Solo
Antenna	1 Omni
Flight controller	Pixhawk-2
Backup	915 MHz controller

Equipment	Part
GS SDR	USRP B210
GS Computer	<ul style="list-style-type: none"> <li>• Ubuntu based standard laptop</li> <li>• ≥ 256GB SSD hard-drive</li> <li>• ≥ 16GB of RAM</li> <li>• ≥ 4 core i7    Xeon</li> </ul>
Antenna	4-omnis



# DARPA-provided software radio application to control UAV from the ground station



- Simple example implementation
- gr-uaslink
- Basic flowgraph
- User manual
- OpenEmbedded on RPi3
- Root access
- Free and Open Source Software

Code will be available through Git service at [code.mil](http://code.mil)



# Hackfest Schedule

## November 13 – 17, 2017



	Monday 13-Nov	Tuesday 14-Nov	Wednesday 15-Nov	Thursday 16-Nov	Friday 17-Nov
8:00	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
9:00	Kickoff: Rondeau	Team Work /Hacker Space	Team Work /Hacker Space	Team Work /Hacker Space	Team Work /Hacker Space
10:00	Team Orientation				
11:00					Final Flight Tests
					Hacker Space wrap-up
12:00	Lunch	Lunch	Lunch	Lunch	Lunch
	Keynote <i>Doctorow</i> <i>Stepanovich</i>	BS Session	BS Session	BS Session	Keynote <i>Doyle</i> <i>de Vries</i>
13:00	Team Work /Hacker Space	Team Work /Hacker Space	Team Work /Hacker Space	Team Work /Hacker Space	
14:00					Mission Judging
15:00					
16:00					
17:00	Lightning Talks	Lightning Talks	Lightning Talks	Lightning Talks	
	Dinner	Dinner	Dinner	Dinner	Dinner
18:00		Keynote <i>Hilburn</i> <i>Kirksey</i>	Keynote <i>PK</i> <i>Anderson</i>	Keynote <i>Grand</i> <i>Kamkar</i>	Closing: Rondeau
19:00					



Registration open now!

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[darpahackfest.com](http://darpahackfest.com)





[www.darpa.mil](http://www.darpa.mil)