

# Coordinating Robots for Environmental Sensing and Fun



Thomas Bewley

## CURRENT RESEARCH

Democratizing modern robotics for the enjoyment and betterment of mankind

Imagine a swarm of hundreds of small smart sensor balloons, robustly built leveraging inexpensive cellphone technology, that can (a) be released into a hurricane as it begins to form, (b) self-distribute over the hurricane in an energetically-efficient manner, (c) report measurements back to hurricane forecasting centers as the hurricane develops, and (d) move with the hurricane as it evolves over several days, all the way until landfall. The energetically-efficient balloons steer using buoyancy control only, just like hot air balloons, leveraging the strong vertical stratification of the winds. The continuous monitoring of the storm by such balloons can radically improve the accuracy with which meteorologists can predict the evolving storm track and intensity, thus providing a crucial extra couple of days to move people out of harm's way when the next Katrina or Sandy threatens. Similarly, imagine a squad of small sensor-laden unmanned aerial vehicles (UAVs) deployed into a dangerous plume of ash from a volcano, or into a radioactive cloud from a nuclear incident, and commanded to fly optimally within and around the plume to minimize the uncertainty of the plume's current location as well as its future evolution - again, to keep people out of harm's way. Sound like science fiction? Researchers in Prof. Bewley's Flow Control & Coordinated Robotics Labs at UCSD are hard at work making such novel applications of robotics a reality, realizing the promise of today's remarkable cellphone technology, high-performance "cloud computing" capabilities, and global communication infrastructure.

Integrated with Prof. Bewley's research is his passion for inspiring young minds to pursue careers in science and...

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## AFFILIATION

 University of California, San Diego

## EDUCATION

- Ph.D. in Mechanical Engineering 1998, Stanford University
- Diploma in Aeronautics/Aerospace 1990, von Karman Institute for Fluid Dynamics
- B.S./M.S. in Mechanical Engineering 1989, California Institute of Technology

## AWARDS

- Innovative Toy of The Year, 2015
- MAE Best Teacher Award, 2013
- ONR Young Investigator Award, 2003

## RESEARCH AREAS

Technology, Computational Sciences / Mathematics, Electronics / Sensors, Robotics

## FUNDING REQUEST

Contributions will support the research of Prof. Bewley's team at UCSD, as they merge fluid dynamics, high-performance computing, control theory, and robotics. Get involved today! Donations of any size are welcomed. Donations of \$100K per year for multiple years will establish anonymous or named fellowships administered by Prof. Bewley (e.g., the John & Jane Doe Graduate Fellowship in Coordinated Robotics), and will make a substantial impact on the scientific and educational projects of the lab.