Defense Announcement

Automating a Seismic Survey using Heterogeneous Sensor Teams and UAVs

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Degree: MS, Electrical Engineering

Date: 11/16/2016   **Time:** 10:00 A.M. to 11:30 A.M.

Location: W342

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Seismic imaging is the primary technique for subsurface exploration. Seismic surveying requires placing a large number of sensors (geophones) in a grid pattern, triggering a seismic event and recording vibration readings at each sensor. The goal of the surveying is to often locate subsurface resources. Traditional seismic surveying employs human laborers for sensor placement, lay miles of cabling and then recover the sensors. Often sites of resource or rescue interest may be difficult or hazardous to access. The major drawbacks of surveying with human deployment are the high costs and time,and risks to humans due to explosives and harsh climatic conditions. Thus, there is a substantial need to automate the process of seismic sensor placement and retrieval using robots.

We propose an autonomous heterogeneous sensor deployment system using UAVs to plant immobile sensors and deploy mobile sensors. Detailed analysis and comparision with traditional surveying were conducted. Hardware experiments and simulations prove the effectiveness of automation in terms of cost and time.The proposed system overcomes the drawbacks and displayed higher efficiency.