Smart Sea Level Sensors in Chatham County

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Overview

A high-density deployment of smart sea level sensors to provide hyper-local, real-time water level data across the community.

Goals:
- emergency planning & response
  real-time data portal & toolkits
- short- and long-term risk assessment
  and resilience planning
- develop & test educational resources
  middle & high school curricula
- communication and awareness
  public events, installations, website

See more details at http://sealevelsensors.org
Busy Week
A Week of Uncertainty
The project team

**Nick Deffley**
Office of Sustainability
Tom McDonald
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*GT-Savannah
Sea level rise on the Georgia coast

60% of "Major" flood events have occurred since 2015

Source: NWS Charleston
Ultrasonic Range Sensors

Deployed on bridges and docks across the county

Low installation and maintenance costs
37 sensors
14 gateways

**goal:** 50 sensors this year
37 sensors  
14 gateways  

group: 50 sensors this year  

currently:  
sea level, air temperature  

planned:  
seawater properties  
air quality  
inland flooding  

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- Savannah Hilton Head International Airport
- Port Wentworth
- Savannah National Wildlife Refuge
- Garden City
- Savannah
- Fort McAllister State Park
- Daufuskie Island
- Georgia Ports Authority
- Pooler
- Sun Zone Amusement & Sports Park

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- 37 sensors
- 14 gateways
- 50 sensors this year
- Sea level
- Air temperature
- Seawater properties
- Air quality
- Inland flooding
gateway device:
- 1 to 4 mile range
- can serve hundreds of sensors
- needs internet, power

goal:
provide backbone for diverse ‘internet of things’ applications
benefits of GT-designed sensor:
high precision (1mm)
long battery life (3-5yrs)
low cost (<$300 components)
FROM THE OPEN OCEAN TO THE URBAN SCALE:
A MODELING SYSTEM FOR SAVANNAH CITY AND THE GEORGIA
Ocean Model Grid

simulate tides, hurricanes, extreme weather

Goal: 3 day forecasts

in process
+ hydrology
+ land model
+ infrastructure [with David Frost & Iris Tien (CEE)]
Model Visualizations  http://savannah.cmcc-opa.edu
Sensor data vs. ocean model output

- quantify accuracy of model simulations of past and future flood events, inform uncertainties
Civic Data Science Team

Focused on identification and tracking of anomalies in the sensor data
Chatham Emergency Management Agency (CEMA) Portal Team

Developing tools for emergency management users

Inundation Methodology

Data
- 1 ft (m) lidar-derived DEM (SAGIS)
- possibly DSM to do bridge inundation?
- Hydrologic features (SAGIS)
- Sensor readings (API)
- HUC 12 boundaries? (USGS)

Methods
- Modified bathtub model vs. interpolation
CEMA Portal Team

Worked with end-users to identify workflow and design appropriate tools

**Before sensor data**
1. Receive an alert of a flooding event
2. Visit Fort Pulaski tide gauge chart
3. Check if water level has exceeded a threshold
4. If yes, dispatch 1-2 people to drive to known low lying areas
5. After the event, review which areas were affected and differences from the previous flooding event

**With sensor data**
1. Receive an alert of a flooding event
2. Open one tab with Fort Pulaski tide gauge chart
3. Open another tab with Sea Level Sensors dashboard
4. Compare differences between Fort Pulaski measurements and sensor measurements
5. Dispatch people to areas around specific sensors to see what’s going on
Community engagement

TOP STORY
Ga. Governor Brian Kemp issues mandatory evacuation for multiple coastal counties

Evacuation Pace Slow Despite Mandatory Order
By GRANT BLANKENSHP • 9 HOURS AGO

By Tuesday, there wasn’t enough traffic to push westbound cars into eastbound lanes on I-16 near Dublin.
GRANT BLANKENSHP / GPB NEWS

Getting the message out can be difficult
Community Engagement Team

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Tim Cone
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Alisha Saxena

David Donnelly
City of Savannah, Director of Emergency Management

Dr. Allen Hyde
Georgia Tech, Assistant Professor of History and Sociology
Educational Partnerships

Current

• Jenkins High School, School of Engineering
• Oglethorpe Charter Middle School

Planned

• Otis J. Brock Middle School
  • Curriculum
  • Sound, air quality sensors
• Woodville-Tompkins High School
  • Air quality sensors
  • Intersection sensors
  • Data analysis
Future Funding

Multiple proposals and funding opportunities pursued

- Georgia DNR Coastal Incentive Grant – awarded $80K
- NSF Award – Network Infrastructure Resilience – awarded $200K

NSF S&CC Proposal to be submitted this week
Lessons Learned

• Technical challenges, limitations, improvements

• Major effort coordinating deployment on diverse infrastructure with many stakeholders

• Sensors are just the beginning, the data is not enough

• Community engagement takes time and local partnerships – one neighborhood at a time

• An enthusiastic community response is inspiring!