



The Problem

36 states will face serious water shortages in the next five years (EPA, 2008). Simply a 15% reduction in water usage across US households would **save an estimated 2.7 billion gallons/day and more than \$2 billion/year** (American Water Works Association, 2001). In addition, **more than 1 trillion gallons of water leak from US homes each year**, accounting for 10% of the average home's water usage (EPA, 2009). Most **consumers have no mechanism to accurately measure their household water usage** other than total consumption on a monthly (or bi-monthly) water bill.

The Solution

HydroSense is a novel, practical, low-cost, sensing solution for tracking water usage in the home. Unlike traditional home water meters, HydroSense **is not a mechanical device** and therefore **does not require inline pipe installation**. Instead, HydroSense **simply screws onto a single water bib or faucet** and uses the analysis of acoustic, vibration, and pressure differential signatures of water flow to determine usage. **HydroSense offers three unique features** not provided by existing systems, it can:

- (1) calculate real-time water flow and volume;
- (2) infer the specific source of water usage activity (e.g., toilet flush, laundry machine, dishwasher, shower, etc.);
- (3) automatically detect leaks (e.g., toilet, faucet, leaky valves) and pipe ruptures.

HydroSense is low-cost to manufacture: we estimate the initial COGS to be \$35 per unit and a sale price of \$70.

Market Opportunity

- **Municipalities spend over \$1 billion for large capital water infrastructure upgrades** (Mahoney, 2008). By reducing residential water (and effectively sewage usage) by as little as 10%, municipalities will be able to recover their resources and save billions nationwide.
- Outside of the traditional meter, **water usage measurement competition is very limited**.
- The **Obama administration has appropriated billions of dollars** to advance, modernize, and green US infrastructure.
- We predict **10-25% reduction in home water usage** with HydroSense (based on energy reduction studies, e.g., Fischer, 2008), which amounts to household savings of around \$50-120/year.
- Roll-outs of our technology could be easily **piggybacked onto the Advanced Metering Infrastructure movement**, which is also bolstered by the Obama stimulus package. HydroSense allows for low capital roll-outs, so municipalities can start saving *now*.



HydroSense Prototype Sensor

Project Team

We are a diverse group of engineers, graduate students, and faculty advisors with extensive experience in building unobtrusive sensing systems for water, electricity and transportation.

Project Lead	Jon Froehlich	PhD, CSE '10
Engineers	Tim Campbell	UGrad, Meche '12
	Kate Everitt	PhD, CSE '09
	Alex Horton	UGrad, EE '13
	Jianlei Shi	PhD, EE '12
Marketing	Rahber Thariani	PhD, BioE '09
	Conor Haggerty	UGrad, EnvPln '09
Logistics		
Faculty	James Fogarty	Asst. Prof CSE
Advisors:	James Landay	Assoc. Prof CSE
	Shwetak Patel	Asst. Prof CSE/EE

Our Competitive Advantage

	HYDRSENSE	Utility Water Meter*	Ultra-sonic Meter
Fixture-Level Detail	Water Drop		
Real-time leak Detection	Water Drop		Water Drop
Low-cost	Water Drop	Water Drop	
Aggregate Demand Tracking	Water Drop	Water Drop	
Real-time Water Usage	Water Drop		Water Drop
Easy-to-install	Water Drop		

*current industry standard