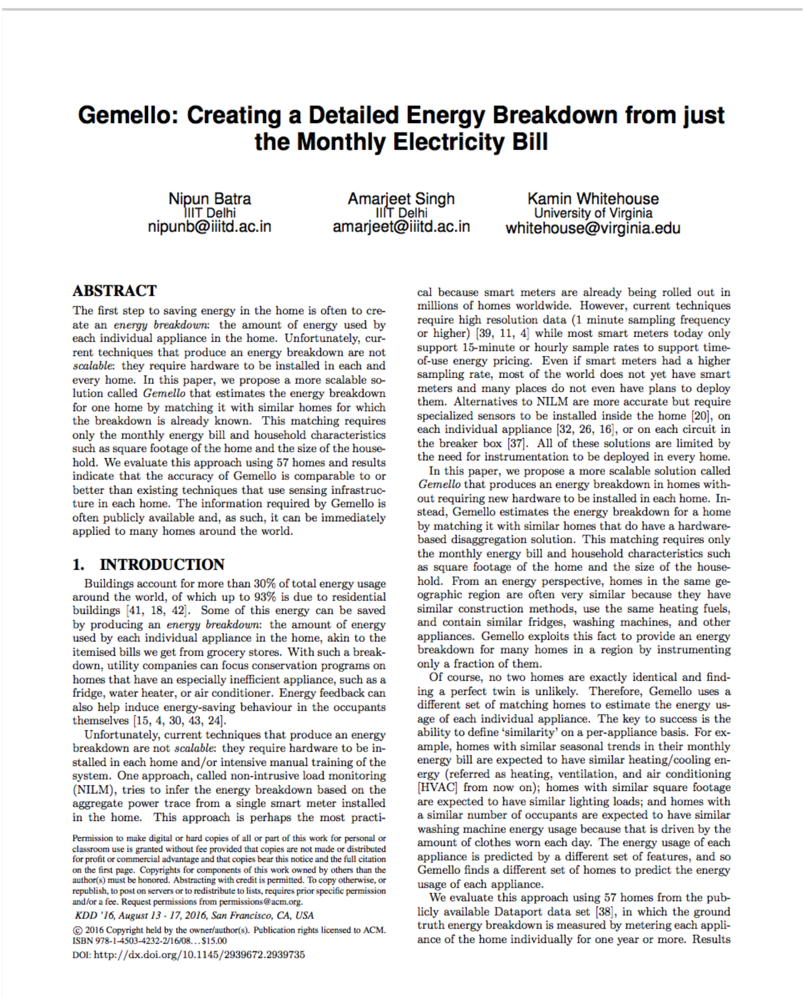
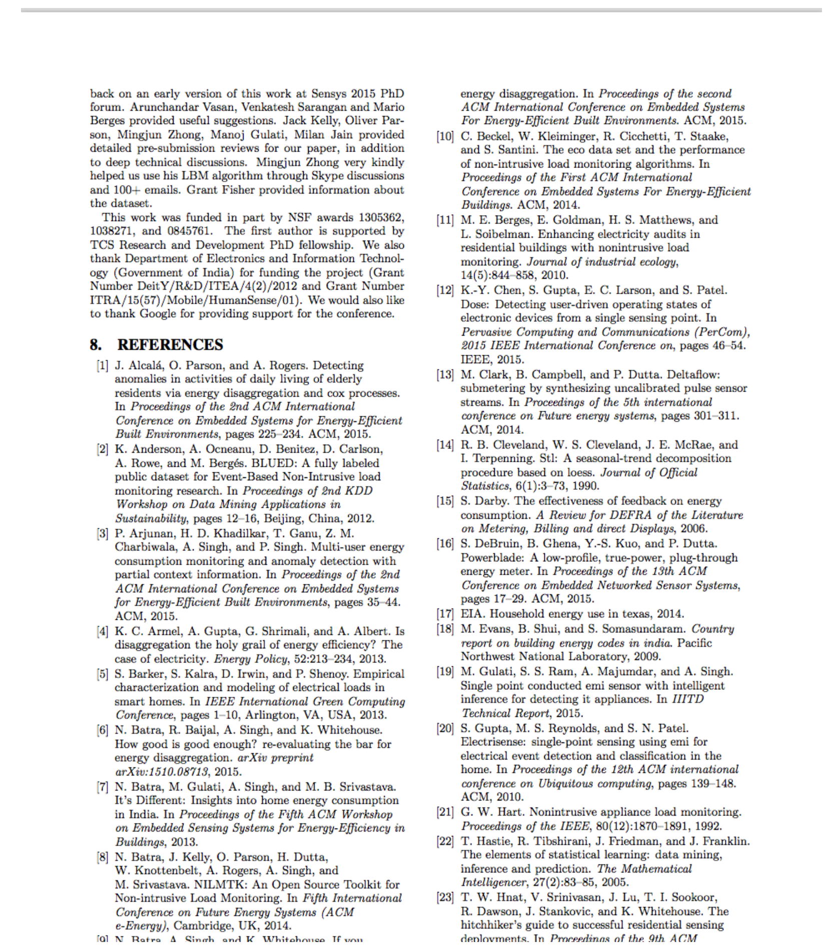
Writing 101: Towards Better Research Abstracts

Nipun Batra
July 27, 2017

Paper Structure



Gemello: Creating a Detailed Energy Breakdown from just the Monthly Electricity Bill



Paper Structure

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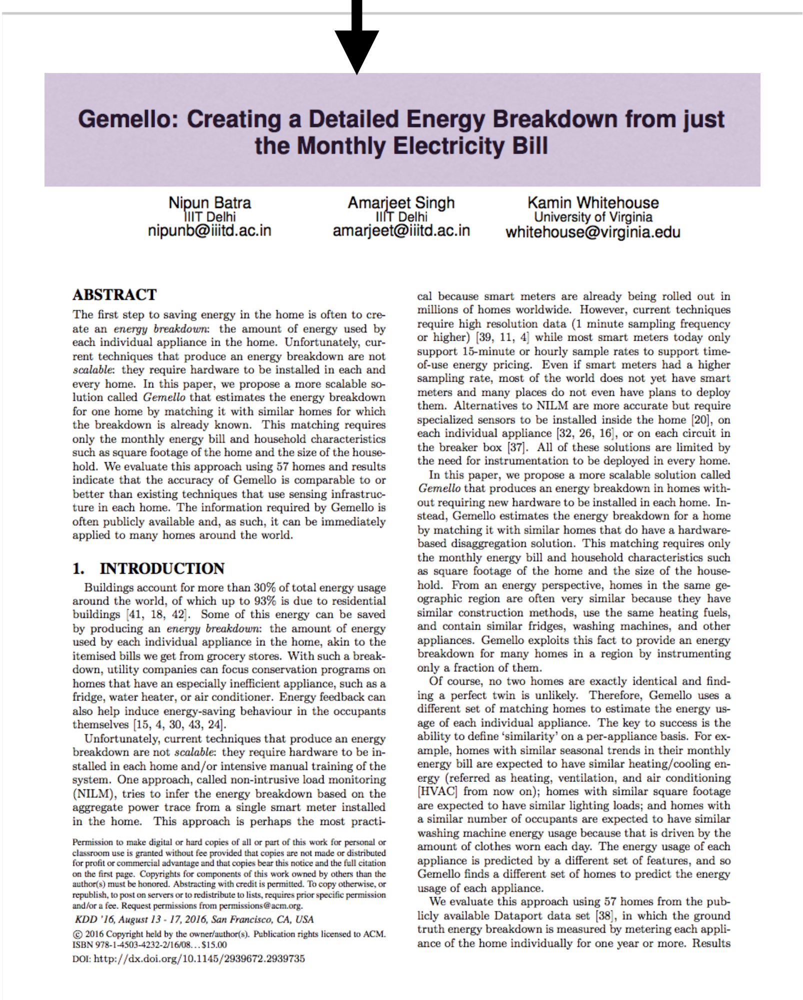

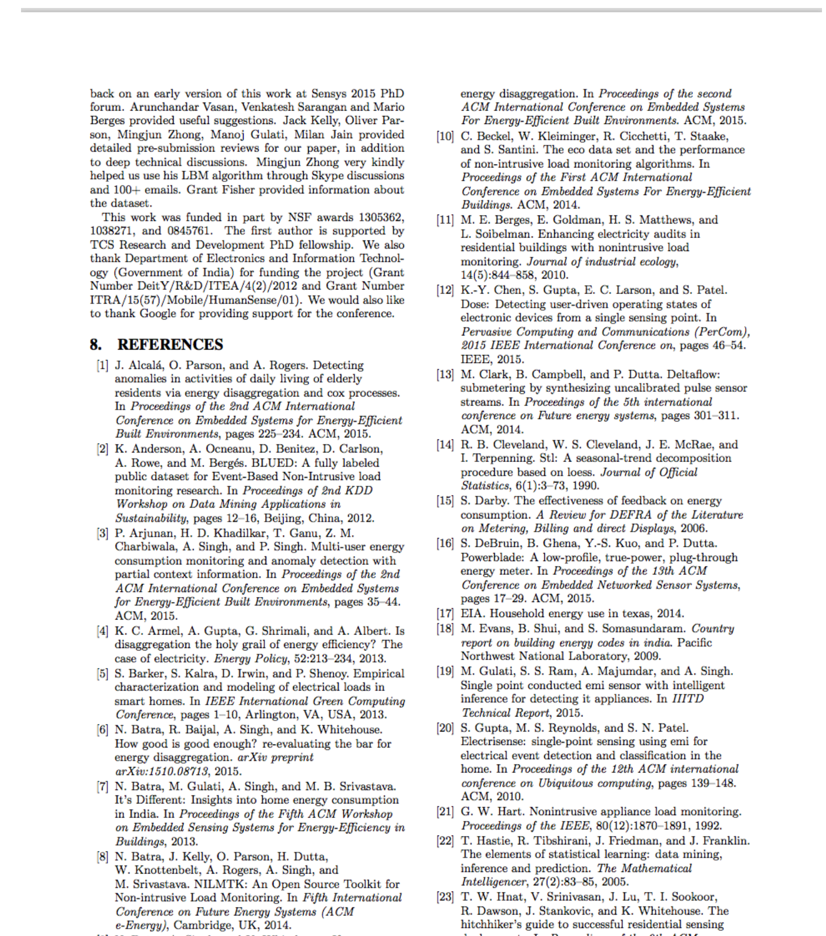

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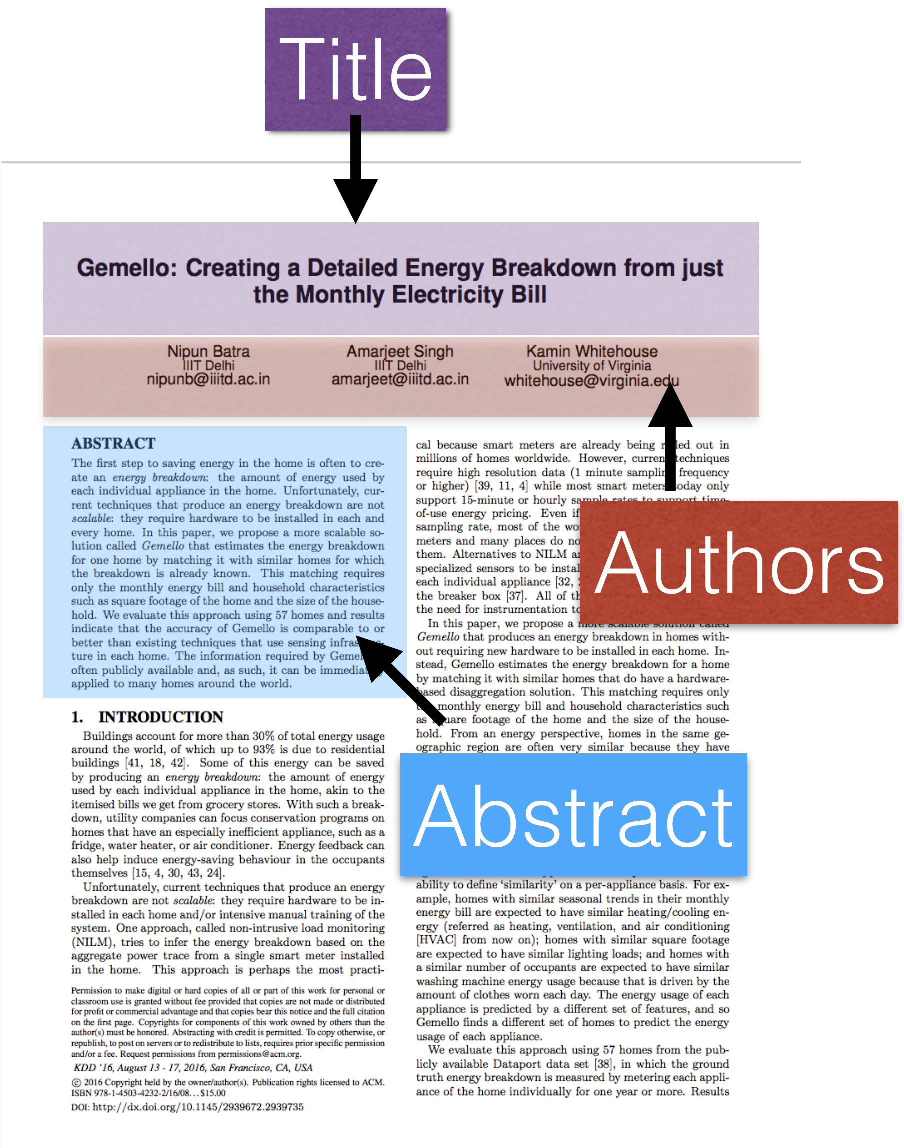
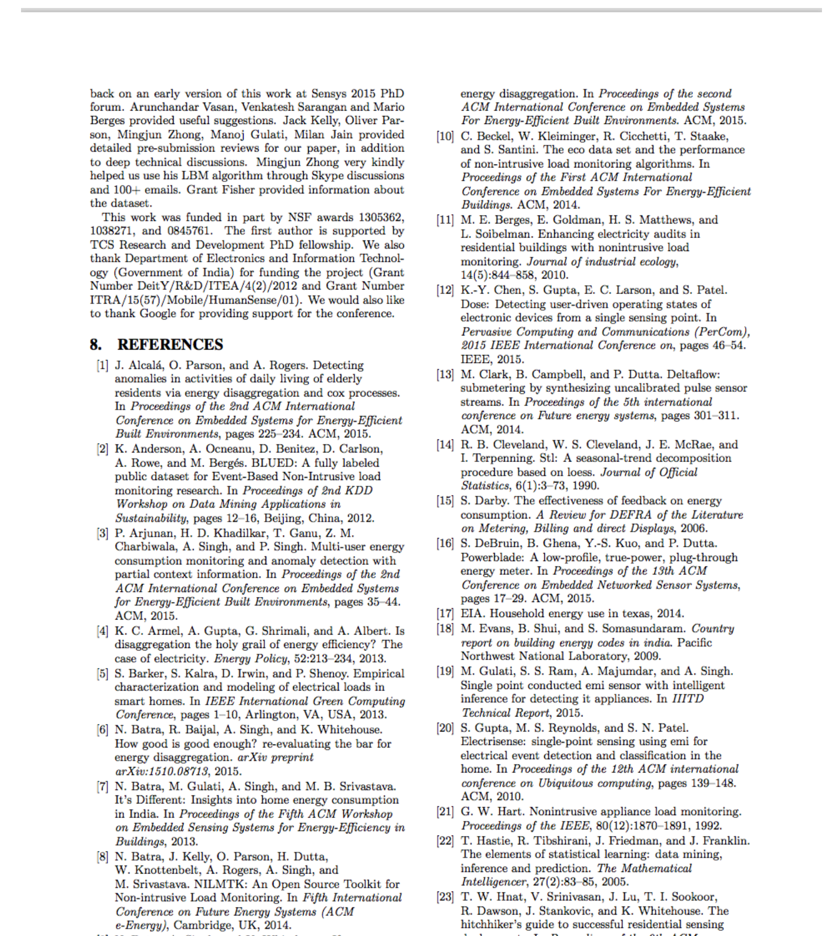
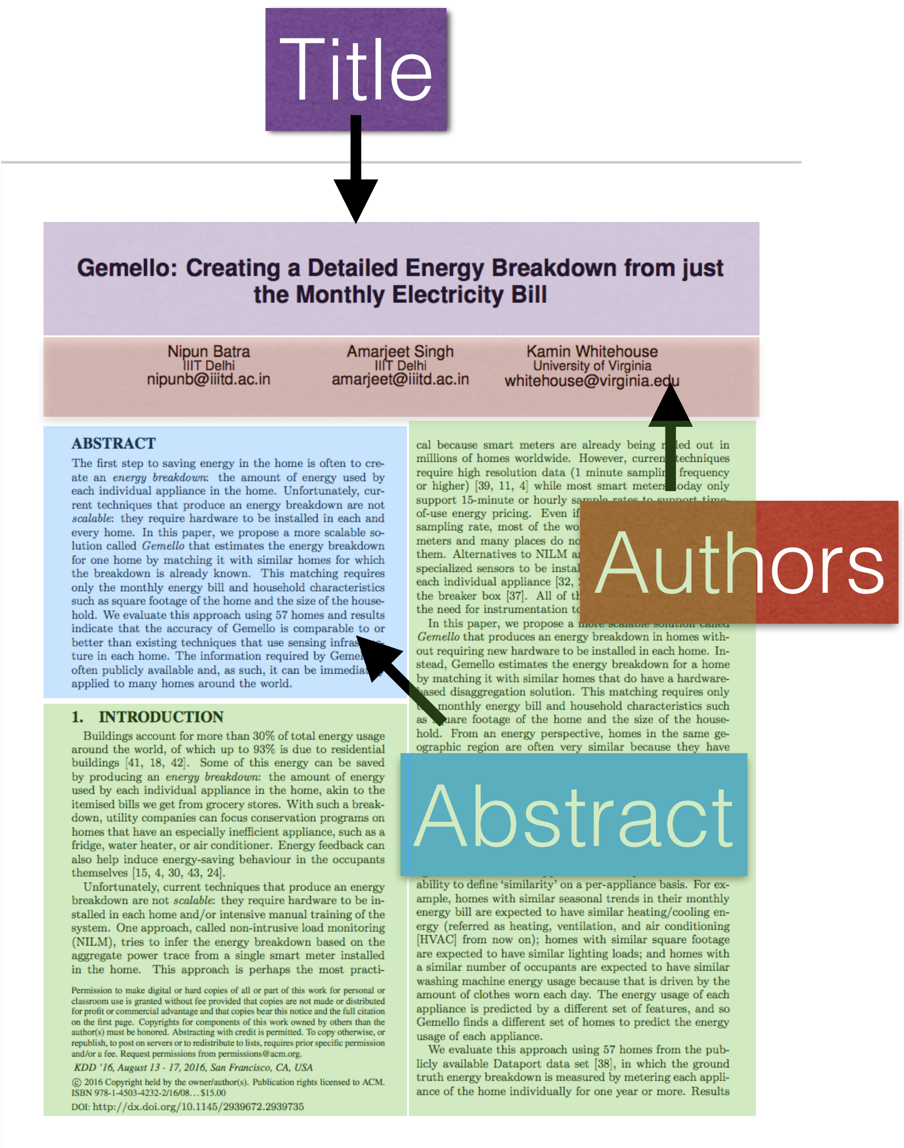


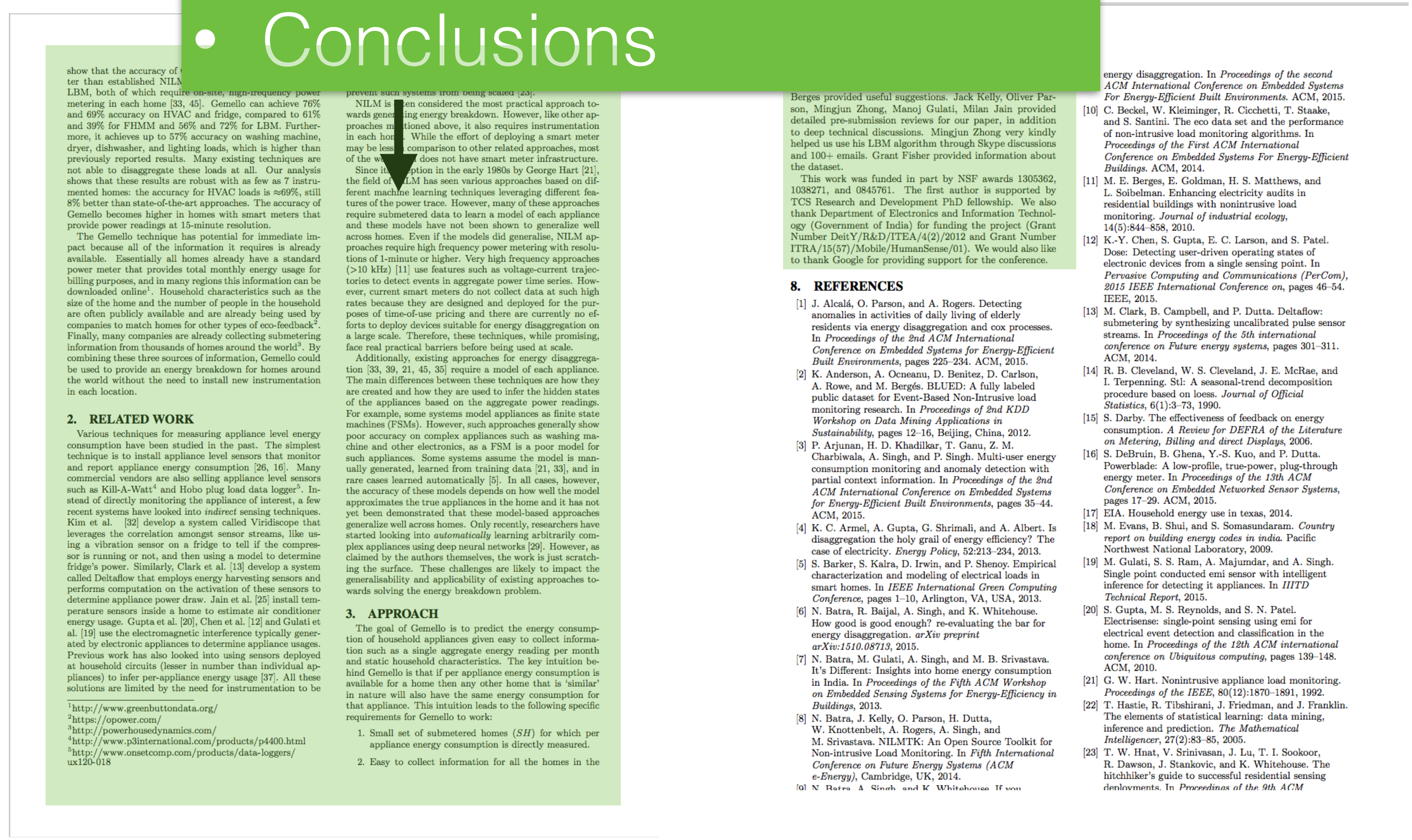


Paper Structure

Sections

- Introduction
- Related Work
- Approach
- Evaluation
- Limitations & Future work
- Conclusions





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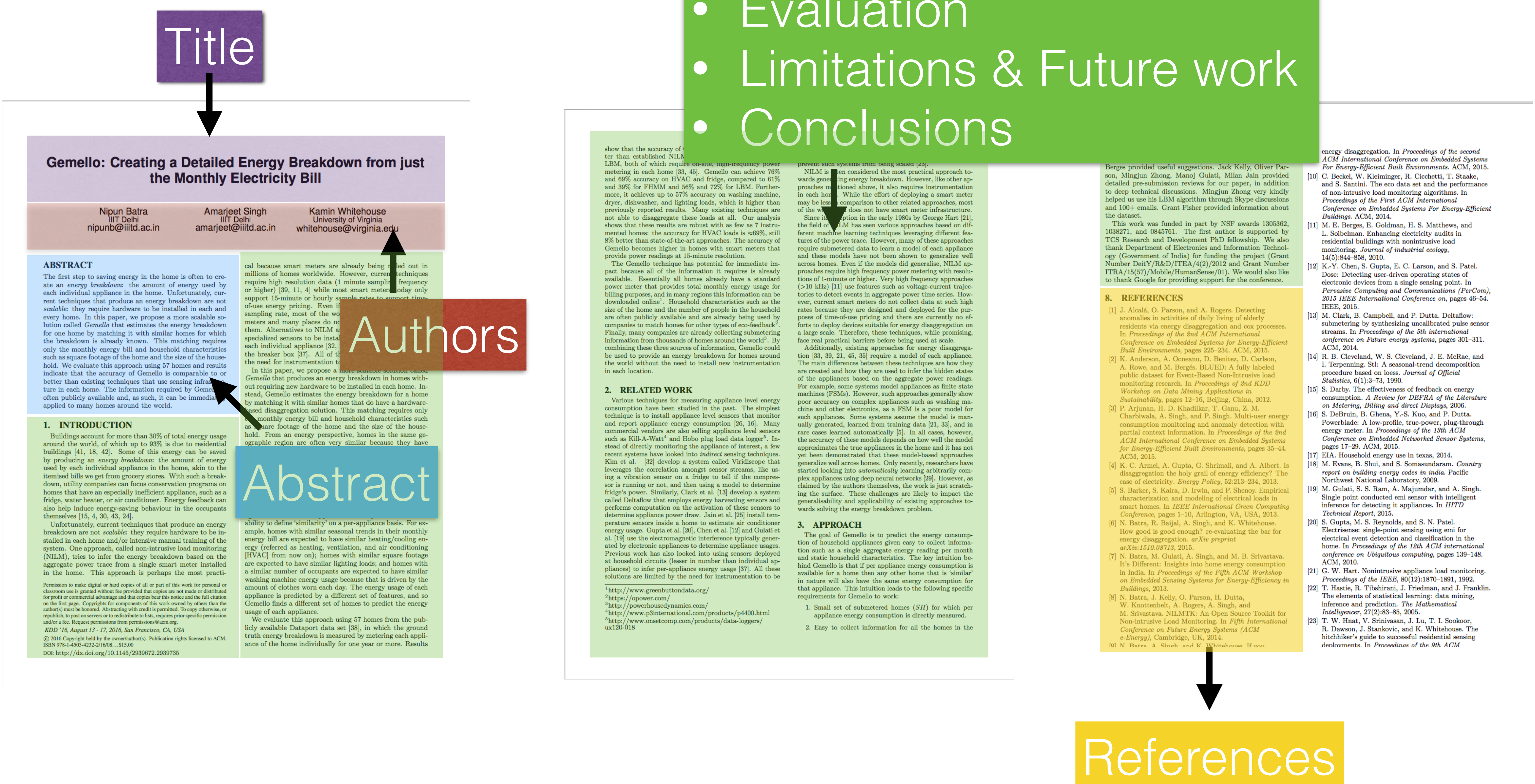

Abstract

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Abstract

Context All US homes have water heaters.

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

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Motivation

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Abstract

Related Work

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, **but** these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Abstract

Approach

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Abstract

Evaluation

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Abstract

Results

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Abstract

Conclusions

Circulo can be a scalable cost-effective solution.

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Structure of a Good Abstract

1. Context
2. Motivation
3. Prior art
4. Approach
5. Evaluation
6. Results
7. Conclusions

Abstract Tells a Lot Paper Quality!

(or, avoiding common pitfalls!)

Context All US homes have water heaters.

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Abstract Tells a Lot Paper Quality!

Color coding for next few slides

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Good

Bad

Piece of the pie!

Context

All US homes have water heaters.

2% US homes have water heaters.

The average [partly covered by the red box above] drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Piece of the pie!

Motivation

The average home in the US flushes **1000's** of gallons of water down the drain each year while standing at the fixture and waiting for hot water.

The average home in the US flushes **10's** of gallons of water down the drain each year while standing at the fixture and waiting for hot water.

increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Is Prior Art Already Good Enough?

Prior art

Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs.

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Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur $5 per year in energy costs.

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Using a Weak Baseline/Bad Prior Art

Prior art

Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs.

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Some households use a 1940s technology and waste $1000 USD.

learn patterns of hot water usage in the home and to circulate hot water only when future hot water usage is highly likely. We call this approach Circulo. We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each. Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

Weak evaluation

Evaluation

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to learn patterns of hot water usage in the home and to circulate hot water

We evaluate Circulo by analyzing hot water usage patterns from 5 different homes over a period of 7--10 days each.

different homes over a period of 7--10 days each. Our results indicate that

We evaluate Circulo by analyzing hot water usage patterns from 2 different homes over a period of 2 days each.

Metrics not Tying to Motivation

Results

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to

Our results indicate that Circulo can reduce the energy needed for HWR by 30% while still providing households with hot water over 90% of the time.

different homes over a period of 7--10 days each. Our results indicate that

Our results indicate that Circulo can predict water need with 95% RMSE while still providing households with hot water over 90% of the time.

Incomplete Metrics

Results

The average home in the US flushes 1000's of gallons of water down the drain each year while standing at the fixture and waiting for hot water. Some households use a pump for hot water recirculation (HWR) to ensure that hot water is always immediately available, but these systems can incur more than $1000 per year in energy costs. In this paper, we explore the hypothesis that "just-in-time" HWR can reduce the energy footprint of HWR systems, without increasing hardware or installation costs and without increasing water waste or human annoyance. Our basic approach is to

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Abstract

Motivation

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Exercise #1 (3 mins)

Write an abstract for a smart coffee machine

1. Context
2. Motivation
3. Prior art
4. Approach
5. Evaluation
6. Results
7. Conclusions

Exercise #1 (3 mins)

Write an abstract for a smart coffee machine

1. Context: XX% of homes in the US have coffee makers
2. Motivation: YY work hours are lost annually due to late coffee
3. Prior art: Current coffee makers have timers, but…
4. Approach: 1) sensors 2) learning 3) optimization
5. Evaluation: 100 houses with both types; measured productivity at work
6. Results: Homes with smart coffee maker have ZZ% higher productivity
7. Conclusions: Companies should subsidize smart coffee maker purchases

Exercise #2 (5 mins)

Write an abstract for any research you want to do

1. Context
2. Motivation
3. Prior art
4. Approach
5. Evaluation
6. Results
7. Conclusions