Cities should be built to reflect the needs and lifestyles of the people who inhabit them. Infusing the surface of the city with information, energy, and light, will enable the city to adapt to the changes of urban life in real-time. The cities of today do not reflect the needs of the people as they use too much energy, and have less than optimal safety, on roads.

**Energy is inefficiently used in today’s society.**

**One of the main sources of energy waste is transportation.** According to Figure [1], road transportation is the main contributor to energy waste with 93.4% of all transportation energy waste.

**Road systems require advancements in order to enhance road safety.**

The safety of humans on roads is at risk as traffic congestion increases; this is due to various causes as shown in Figure [2] with accidents being the second highest cause.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Solutions</th>
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| Cities should be built to reflect the needs and lifestyles of the people who inhabit them. Infusing the surface of the city with information, energy, and light, will enable the city to adapt to the changes of urban life in real-time. The cities of today do not reflect the needs of the people as they use too much energy, and have less than optimal safety, on roads. | **Vehicle ad-hoc Network (VANET)**
- Real-time communication system.
- Provides a platform for communication between vehicles and the infrastructure [3].
- Redirects traffic flow and enhances road safety.
- Weather and emergency conditions can be transmitted to other vehicles in the network. **Sensors merged with positional LED lighting**
VANET is incorporated into these sensors to enable its functionality.
- Thin layers or reprogrammable sensors embedded between layers of asphalt as shown in Figure [3].
- This “Smart Tile” surface is the next upgrade of infrastructure required to coordinate the flow of cars, bicycles, and pedestrians in a completely fluid and adaptable way [4].
- Geographical Information System (GIS) used to identify the components of a transportation network.
- Harvest energy from the sun as well as piezoelectric power of human movement transferred by electromagnetic induction.**LED Dynamic Dimming Control**
- To ensure safety light bulbs should be illuminated continuously.
- Sensors to detect existence of vehicles or humans to activate the lights.
- Decrease power consumption by approximately 10-30% [5].
- In comparison to sodium lights, LED decrease energy waste by 70% [5].

<table>
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<th>Evaluation</th>
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<tbody>
<tr>
<td><strong>Criteria</strong></td>
<td><strong>Vehicle Ad-hoc Network (VANET)</strong></td>
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<tr>
<td>Energy saving</td>
<td></td>
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<tr>
<td>Safety</td>
<td>✓</td>
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<tr>
<td>Feasibility</td>
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<tr>
<td>Accessibility of Materials</td>
<td>✓</td>
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<td>Durability</td>
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</table>

**Conclusion**

The use of all the proposed solutions in unison would decrease the amount of energy wasted while increasing safety on the roads.

**References:**


![Figure 1: Energy Consumption in Transportation Networks](http://www.archdaily.com/77103/big-competition-winning-urban-future urbain-futur/audi-urban-future/)

![Figure 2: Causes of Traffic Congestion](http://www.ctps.org/drupal/data/html/programs/cmp/Report/CMP_Report_Introduction.html)

![Figure 3: The “Smart Tile” System](http://www.ieee.org/xplore/)