BBM460-Wireless & Mobile Networks

Smart Street Lightning System Using Wireless Sensor Networks Final Report

25/05/2022

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The Problem Statement

In today's world, an ever-growing number of street lights produces problems such as:

- Sometimes street lighting is an expensive process.
- During installation, it can jam traffic.
- Requires a good amount of electricity.

These are the main problems that explain our need for designing a smart street lightning system.

Summary

Wireless sensor networks have been widely used to develop intelligent systems due to its comprehensive and versatile use. We provide a Wireless sensor networks-based street lightning system in this report. Wireless sensors are placed in the street which detects the objects. Since street lighting accounts for nearly 40 percent of many cities' total energy costs, smart street lights can transform the way municipalities manage cities, while delivering enormous savings.

Method

We used 4 sinks and 45 nodes. Each sink has 11 to 12 nodes. We are using 16 nodes for detecting the objects on the street which are moving. These nodes are called ‘detector nodes2. Other sinks are used for routing signals from detector nodes to sink.

How is the street light on?

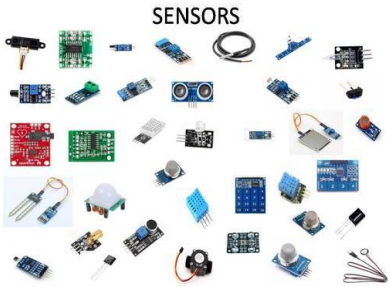
When a moving object enters to the detecting zone of the node, detector node sends signal to the routers and routers transmits the signal to the base station (sink). The color of detector node and sink turns into yellow that means street lamp is on.

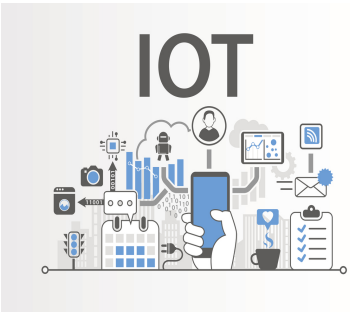
How is the street light off?

When the moving object exits from the detecting zone, The color of detector node and sink turns into grey that means street lamp is off.

When there is no moving object, detector nodes sends no signal to the sink until an object enters into the zone of the detector.

Technologies to Be Used

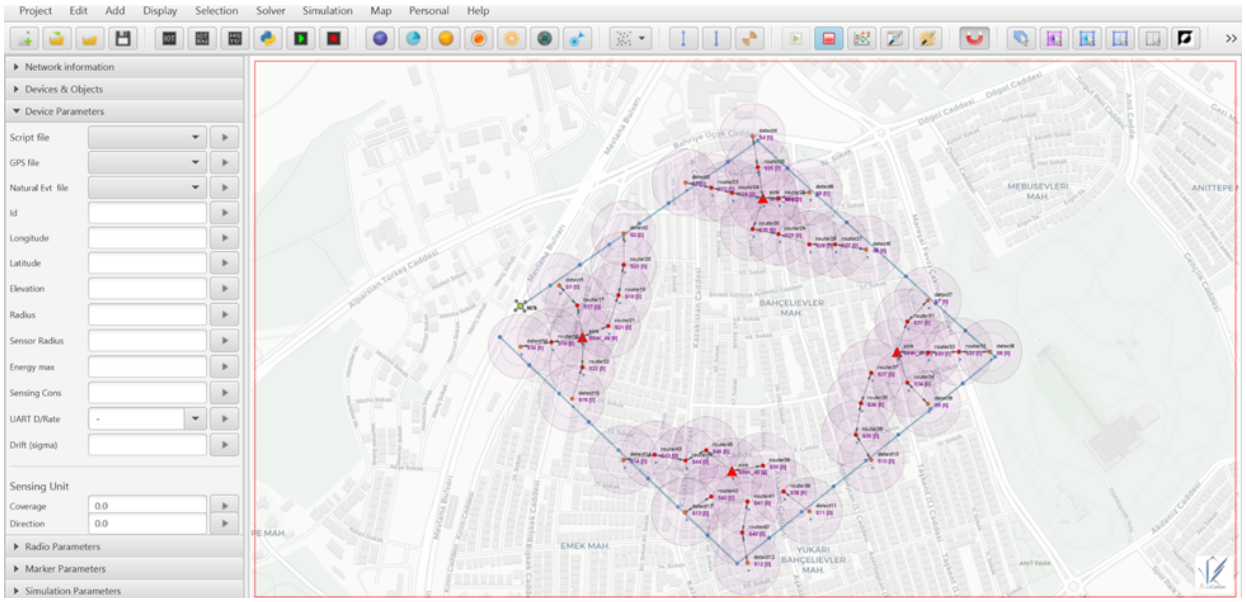




CupCarbon	Sensors	The Internet of Things
CupCarbon is a smart city and IoT wireless sensor network (WSN) simulator.	A sensor is a device that detects the change in the environment and responds to some output on the other system.	The Internet of Things (IoT) describes the network of physical objects that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.

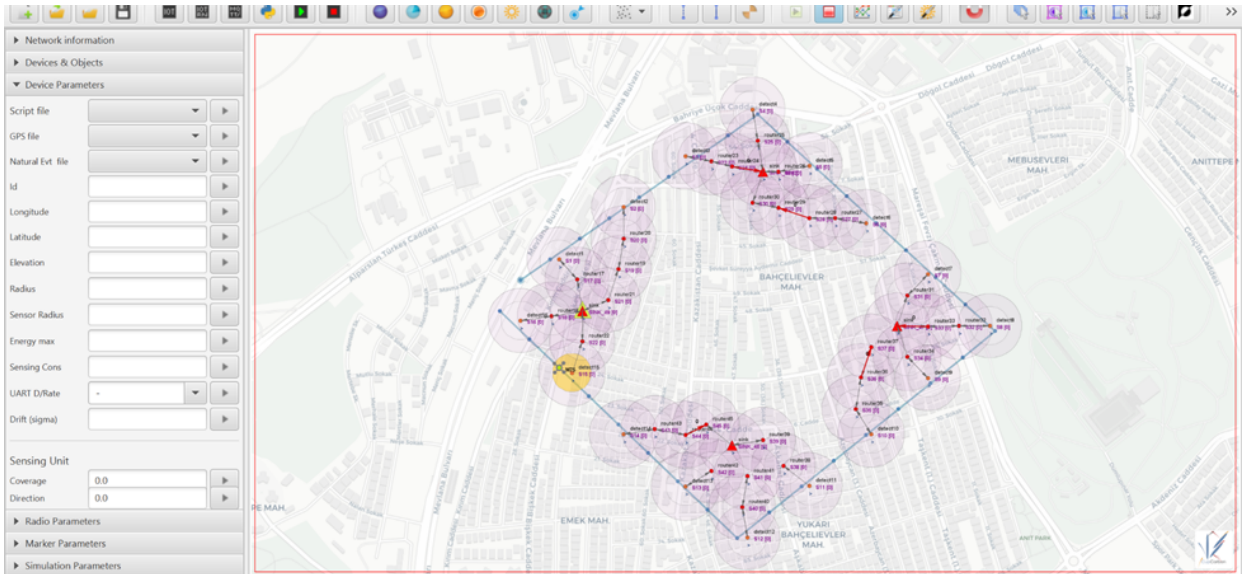
Design Scenarios

When there is no moving object in the detector zone, none of light are on and there is no signal sent to the sink.

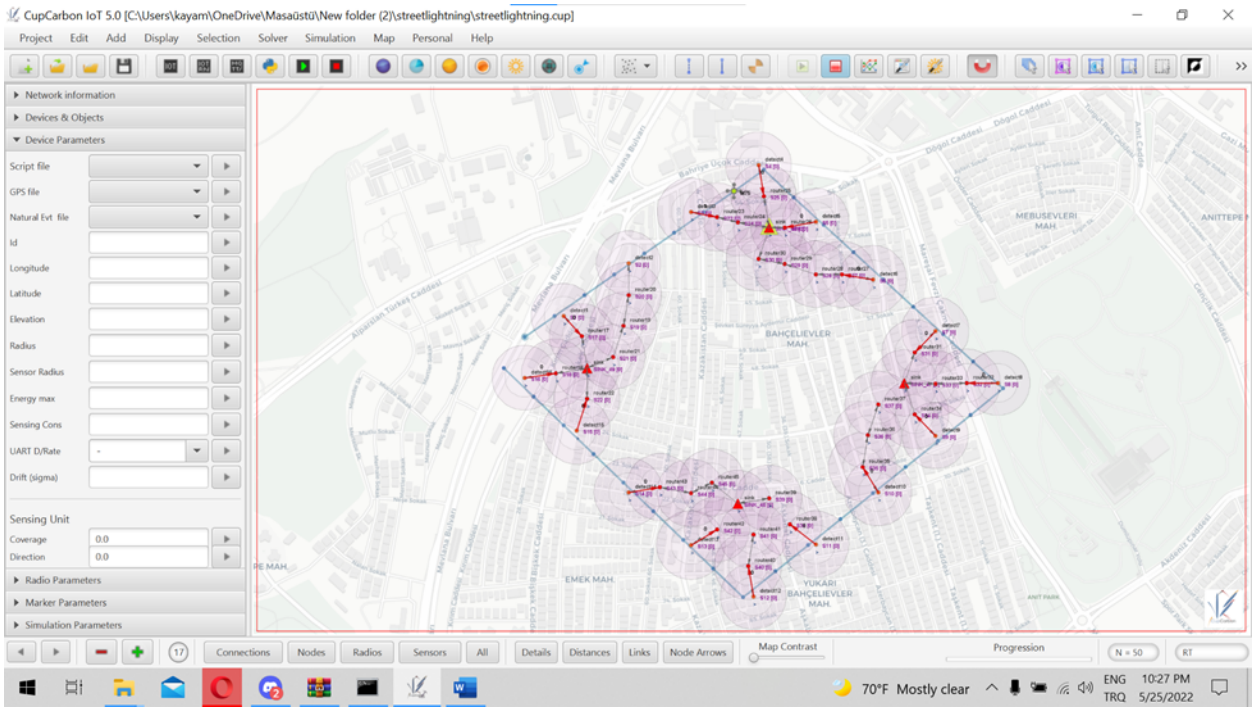


When there is a moving object in the detector zone, light are on and signal sent to the sink.

ScreenShot-1:



ScreenShot-2



Data Generation

We generate data using detector nodes and transmit to the sinks via router nodes. When detector nodes perceives a moving object it sends signal 1 to the sinks via routers.

Advantages of Smart Street Lightning System

Smart lights will help cities reduce electricity costs, lower CO2 emissions, and improve maintenance. With auto-dimming, scheduling, and a host of other capabilities, cities could see a 50-75% reduction in energy costs via smart street lighting. But energy efficiency is just the beginning. Air quality monitoring, traffic control, accessible public wi-fi, security cameras, gunshot detection devices, and digital signage/advertising all represent viable candidates for implementation into urban street light infrastructure.

Conclusion and Results

In this paper, we mentioned how the increasing number of street lights leads to budget and energy problems in today's world. We proposed a street lightning system to reduce these problems in an intelligent way using wireless sensor networks and explained our project plan without going into details. Smart street lightning system reduces the cost of lightning streets very much in comparison to the traditional lightning system.

Future Use

Companies in the technology and city planners will continue to collaborate to deliver much-needed smart street lightning solutions that save drivers time and money. Malls, store owners, and municipal governments may benefit from the collaborative efforts by receiving vital analytics data that will help them develop better cities and businesses.

Smart street lightning is one modest step towards the future of smart city planning, however it may be a few years away.