

机场助航单灯监控无线传感器网络低能耗路由研究

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摘要:

为合理利用节点有限的资源, 完成高效的数据采集任务, 延长无线传感器网络使用寿命, 本文以机场进近区助航灯的无线传感器网络监测为研究对象, 提出了针对机场助航灯监测的基于分区的WSN(Wireless Sensor Network)路由协议AL-CADE (Airfield Lighting—Clustering Algorithm based on Distance and Energy)。该协议将监控区域按助航灯分布的地理位置分成几个区域, 在各分区中设置了高级节点作为中继节点。对椭圆分区内节点进行了簇头数优化, 提出了基于能量和距离分布的簇头选举算法。仿真结果表明: 该协议可有效降低节点能耗, 延长网络寿命。助航灯监控系统的使用对保障飞机的起飞和着陆安全, 提高机场维修工作效率和维修保障能力十分重要。

关键词: 无线传感器网络; 路由协议; AL-CADE; 网络寿命; 进近区; 助航灯光

Research of Low-Energy Routing on Single-Lamp Monitoring of Airfield Lighting

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Abstract:

To accomplish data collection by utilizing the limited resource in WSNs (Wireless Sensor Networks), and prolong the lifetime of the networks, a WSN routing protocol AL-CADE (Airfield Lighting—Clustering Algorithm based on Distance and Energy) based on logic zones was developed to monitor the airfield lighting in approach zone. In the protocol, the monitoring area was set several small logic zones according to geography locations of the nodes, and there were some advanced nodes placed in the logic zones as relay nodes. The cluster-head number of the nodes was optimized in the elliptical area, and the cluster-head election algorithm based on energy and distribution of nodes was put forward. The simulation results show that the protocol is effective in reducing node energy consumption and prolonging the network lifetime. The monitoring system of airfield lighting is essential for ensuring airplane safety during taking off and landing, and improving the work efficiency as well as guaranteeing ability of maintenance.

Keywords: wireless sensor network; routing protocol; AL-CADE; network lifetime; approach zone; airfield lighting

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