Continuous surveillance of points by rotating floodlights

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Let $P$ and $F$ be sets of $n \geq 2$ and $m \geq 2$ points in a plane, respectively. We study the problem of finding the minimum angle $\alpha \in [\frac{2\pi}{m}, 2\pi]$ such that one can install at each point of $F$ a stationary rotating floodlight with illumination angle $\alpha$, initially oriented in a suitable direction, in such a way that, at all times, every target point of $P$ is illuminated by at least one floodlight. All floodlights rotate clockwise at unit speed. We provide bounds for the case in which the elements of $P \cup F$ are on a given line, and present exact results for the case in the plane in which we have two floodlights and many target points. We further consider the non-rotating version of the problem and look for the minimum angle $\beta$ such that one can install a non-rotating floodlight with illumination angle $\beta$ at each point of $F$, in such a way that every target point of $P$ is illuminated by at least one floodlight. We show that this problem is NP-hard and hard to approximate.