

# INCREASE THE RELIABILITY OF SURVEILLANCE SYSTEMS

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**To be able to rely on your surveillance system is of great importance. If you invest in a surveillance system to guard your premises, you want to be certain that the system detects all trespassers. However, if there are too many false alarms it might create a "boy who cried wolf" situation and you can become reluctant to react. Could a video surveillance system be more reliable when it's combined with a radar sensor?**

In surveillance systems, the video motion detection software plays a significant role. Modern surveillance cameras with motion detection are widely used for monitoring break-ins and to prevent crime, where the system notifies if any unexpected activity is detected. However, there are times when the surveillance system has difficulties in distinguishing objects i.e. under poor light or weather conditions. There are also problems that the system notifies when there is no human activity, e.g. dynamic backgrounds such as wind beams in trees. If this occurs too often the security of this system is impaired. Why would one think that a radar sensor could improve the reliability of the system?

Recently, there has been major progress towards self-driving cars where the combination of video and radar is widely used since these two types of sensors complement each other well. The automotive industry and surveillance industry are not identical and therefore one can not take for granted that the combination will also work well in surveillance systems.

During this project, a test setup has been used consisting of only one camera sensor and one radar sensor, positioned together. The radar sensor is only able to detect human activity within 50 meters. The main objective was to see if it was possible to reduce the number of false alarms by combining the two sensors after the raw data was processed. This means that there is no need to modify the current video system, we are only adding an extra sensor. Both sensor systems had the objective to only alert when there was human activity in the scene.

When combining the two sensors we had the requirement that the system only alerts if both sensors detected the object. It is clear that when using this method the number of false and true alarms can not increase, meaning that both sensors need to detect a majority of all human activity.

The resulting accuracy of the systems

	Combined System	Video System
True Alarm	92 %	93 %
False Alarm	2 %	21 %

The combined system was compared to an existing well used video surveillance system. The results presented in the table shows that it is clear that when using this method the number of false alarms is reduced while the number of true alarms isn't decreased noteworthy. The scenes that were evaluated has only up to two persons in the frame simultaneously and was recorded outdoors during daytime.

Additionally, in complete darkness, the system can rely solely on the radar sensor. This could be used in different ways, for example when a detection occurs the scene could be illuminated so that a camera could identify the intruder.