

StopLift provides video analytics and computer vision for **Point of Sale (POS) revenue assurance**. The company's loss detection services significantly reduce inventory shrinkage, **deter future theft**, and boost profitability to ensure that retailers get paid for every sale at the front-end of the store.

Malay Kundu, StopLift's CEO and founder, studied at **MIT** and continued his background in computer vision while working in the development of **real time facial recognition systems**. His idea for StopLift first grew out of that work. Malay later went on to attend **Harvard Business School** where he first came across the problem of inventory shrinkage in retail. In fact, he led a field study called **Project StopLift**, which involved research of inventory shrinkage and which kinds of things could be done to address it.

While developing the solution, he encountered challenges with the real world application of the problem. As one of the oldest types of businesses in the world, retail has developed evolutionary processes over time. This means that in developing its technology, StopLift didn't have some of the controls preferred in computer vision such as starting out with a blank slate, having the exact camera angles, and so forth.

“Many different things will go across the scanner completely unrelated to any transaction”

In addition, since most retailers already have their own cameras in stores, Kundu didn't want to ask them to change their existing systems. Instead, he wanted to figure out how to fit his technology with retailers' pre-existing standard operating processes. This also posed a challenge because of the

variations of systems used by retailers. StopLift's developers first tried the simplest idea, and the one that everyone assumes that they use, which is to identify scan avoidance at the checkout by detecting motions across the scanner with no transaction logged for that item. For example, when an employee trying to steal a product pretends to move the item across the price scanner, without actually scanning its barcode. In this way, the system would indicate suspicious activity with the corresponding **POS record**.



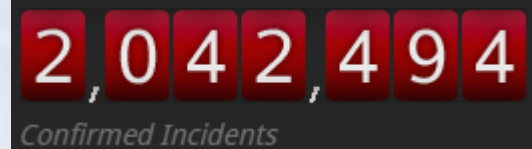
Many different types of loss at the register (click here if can't launch video)

They quickly understood that outside of the lab, this process wouldn't work. In a real world situation, like in an actual store, **many different things will go across the scanner completely unrelated to any transaction**. For example, as the cashier handles things, their hands or head could **occlude those regions** which we think might be the region of interest. In addition, there is the real case of the cashier who tries to scan an item, and often times it doesn't scan the first time. The cashier may then need to scan a bottle of water a few more times before it works. We would detect **several motions for only one scan** and would assume scan avoidance for the first few motions, while in fact the customer purchased only one bottle of water for three swipes.

In the end, the **detecting motions across the scanner failed colossally** in a messy real-world scenario, even though it was the simplest approach to think of.

Live counter just crossed the 2 million mark!

Kundu shared with us some of the technology behind StopLift. Their toolbox includes standard tools like **frame differencing, background modeling, blob tracking** etc., as well as different learning techniques. But when retailers would ask Kundu about the analytics used in StopLift's technology, they would often show him some sort of printout from the Internet or Wikipedia that recommended tripwires and motions. *"We sort of use all of those, and none of those"*, Kundu explains. He found that the more generally applicable something is, such as tripwires and motion regions, the less specifically effective it is. For that reason, he considers this common question from retailers as interesting, but not the right question to ask: research done at StopLift has enabled the company to develop things that really hone in on solving **specific problems in loss detection**.



Meanwhile, the StopLift website keeps a **live count of incidents** - which just crossed the **2 million mark** - that have been detected and confirmed. Kundu shares a story that involved an independent retailer who privately owned 20-30 grocery stores. The retailer called StopLift concerning an incident detected by his system in which a cashier had not scanned 47 pieces of expensive meats like steak. Although the cashier did scan some other items, she failed to scan those 47 pieces, apparently on purpose. The retailer panicked because this cashier not only worked at his store, but happened to be a tenant in one of his properties and, most alarmingly, also worked as his housekeeper. It was very fortunate that StopLift managed to detect the incident...



StopLift found self-checkout theft up to 5 times higher than manned checkout theft. Kundu might well be the only person in the world with the documentation to prove it.

When asked about the next step for StopLift, Malay joked: *"If we could magically make one step forward, it would be that all point-of-sales use standardized interfaces."* But, of course, that does not happen in the real world.