The Evolution of Automatic Pedestrian Detection

(Passive Activation for use with the LightGuard Systems, Inc. "Smart Crosswalk™")

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After LightGuard Systems experienced a high degree of success in having motorists "yield to the presence of a pedestrian" when entering a "Smart Crosswalk" system, one area of interest became more and more apparent to us. The existing system required some form of interaction by the "user" or pedestrian entering the crosswalk. We set out to develop a system that could take this out of the equation, and activate the system automatically or passively without the action or even acknowledgement by the pedestrian that they were entering the crosswalk.

Numerous studies have proven that the statistical "average" number of pedestrians who would make the effort to locate and push the activation feature was around 60%. This is a figure that then through logic, leaves the other 40% at greater risk, in not having the system in operation for their intended crossing. We felt we needed to increase the potential for a higher degree of safety, without the need or interaction of the pedestrian intending to cross.

Our initial concept was pretty good and proved our theory regarding the potential for this type of activation; however it proved to have a number of faults. This first system was conceived as an ultrasonic product, which was placed above the entry zone on each side of the crosswalk. It was designed to have zones that actually "tracked" pedestrians as they moved through the zones. When pedestrians are either entering or departing the crosswalk, the ultrasonic detection system could recognize the direction in which they were going.

However, we knew early on that we did not want the system to be reactivated by the pedestrian exiting the crosswalk; nor did we want the system to stay active once the pedestrian left the crosswalk zone. We believed then, as now, that we did not want the system flashing with no one in the crosswalk, as it could de-sensitize motorists to the lights' significance. The "fault" was that it was sensitive to "motion". If not mounted on a secured and steady point, the wind – either natural, or by busses or heavy trucks - could manage to shake the pole mount, and the system could go off in a false call fashion… Not real bad, but again, not good.

We then tried a microwave technology, which had overall the same problems, and was much harder to "read" the pedestrian's direction. Many false calls, but worse, sometimes "no activation" when the pedestrian entered… Real bad! We quickly dismissed this type of product, and let the manufacturer know that this technology did not meet our needs.

Engineering worked briefly on a "detector pad" using piezo electric technology but quickly abandoned it due to the small area of "activation zone" to work with, knowing that the pedestrians would not always go to the center of the entry zone to use the crosswalk.

Then, alas, the new "video detection" products… We gave them a run also. However, sometimes things work real well in a controlled test environment, and then when you put them to practical use in the field, things "pop out". Well, things popped out! Such as when the sun is on the lens and it "blinds" the camera! Or, it is night, dark, and the pedestrian is wearing "all dark clothing"… the camera doesn't pick them up… Not good. Or, even on a bright sunny day, the pedestrian could be wearing bright yellow and something like a shadow is cast at a certain time, eliminating the ability for the camera to "see" the pedestrian, and activate the system. Again, "Not good"! Yes, we experienced it all.

Then our engineering staff came up with our "entry gate system", using "Bollards". This system simply places two bollards (vertical posts) at either side of the entry to the crosswalk. They detect the motion of the pedestrian entering the crosswalk, and trigger the system into operation for a preset period of time. They recognize the pedestrian exiting the crosswalk and do not re-trigger the system. The system shuts down and waits for the next pedestrian to enter from either side. Should a pedestrian enter shortly after another pedestrian, the system extends the time of operation to allow the last pedestrian time to cross.

Each bollard contains an internal courtesy light making it visible at night. The bollards are designed to "invite" pedestrians to enter a crosswalk at a desired location. We have tried to keep them as a "recognizable standard", so that pedestrians might understand that this was an identifiable and safer place to cross.

When designing crosswalk locations and bollard placement, serious consideration should be given to pedestrian traffic flow into and out of a given site. A key benefit of our bollard system is its reliability and wide coverage area of up to 60 feet apart to "catch" the pedestrian entering. We all know that people will cut the corner to enter the crosswalk, so the wider and farther back we can set them, the better.

We have literally thousands of our bollards in operation, and hundreds of crosswalks throughout the United States. Many have been in service for more than a decade and are still in service. We estimate that the bollard system increases the "activation" to nearly 100% of the time… Far better than the manual "push button" option that on average is near 60%.

In today's fast paced technology environment, many new products are being tried or tested, but until we find one that matches the proven reliability, and aesthetically pleasing solution to "automatic activation" of our Smart Crosswalk™ systems, we will stay with them.