



Advanced Garage Door System

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Purpose

The purpose of AGDS is to create a garage door system that is safer and more accessible than a conventional garage door. The AGDS can be controlled from any device with an internet connection. The system will notify the user if the garage is open for a prolonged period of time. The user can then access the private AGDS server and close the garage door. The image processing and sonar sensors prevent the door from closing on obstacles that may not be detected by conventional garage door laser detectors.

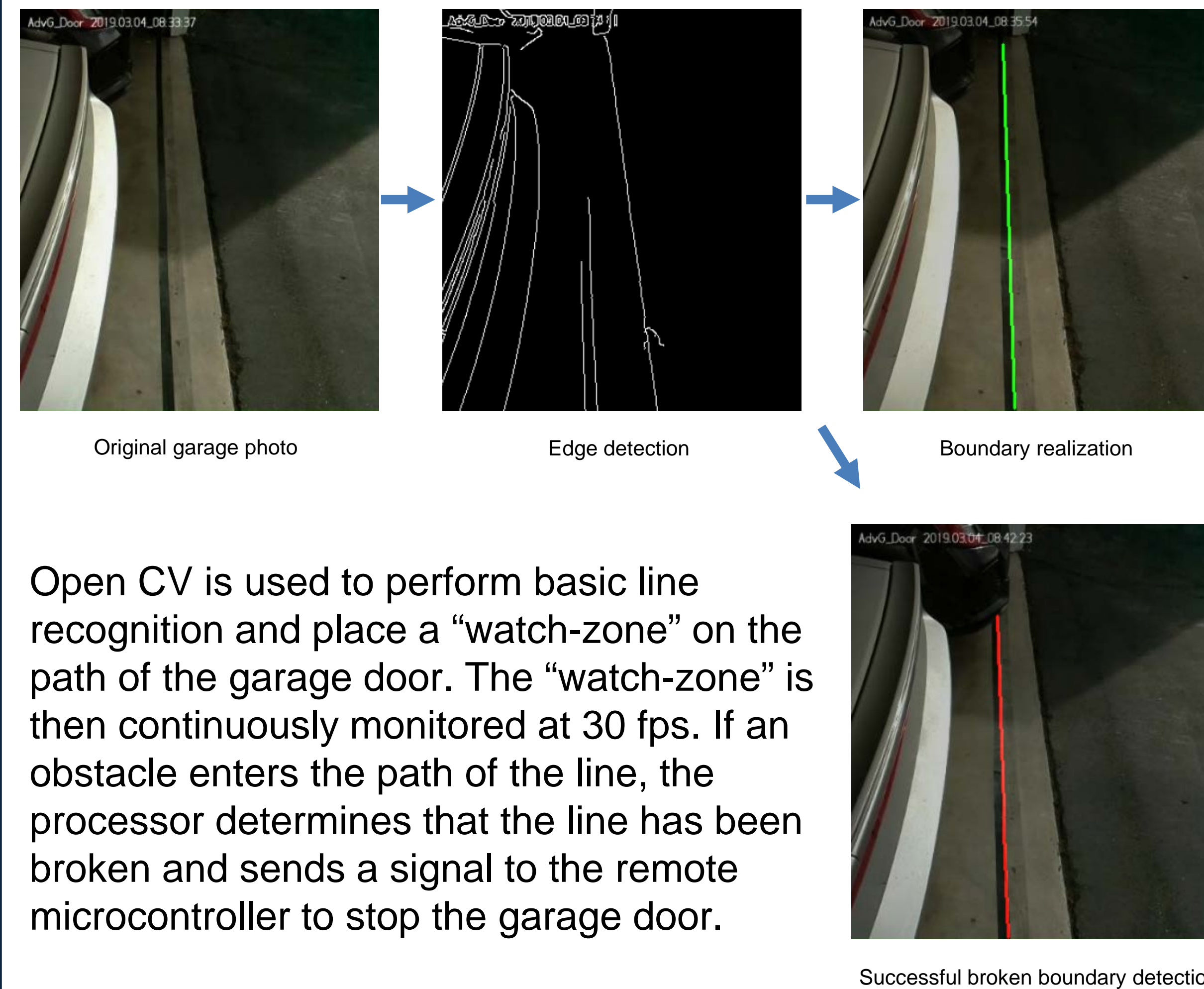
Future Goals

- Increase the accuracy of boundary detection.
- Decrease broken boundary false-positives.
- Create an IOS/Android app for streamlined mobile operation.
- Add a 2nd camera for vehicle license plate recognition and auto-open.
- Increase server security and access control.

References:

1. Mordvintsev, A. (2013). Canny Edge Detection. Retrieved January, 2019, from opencv-python-tutorials.readthedocs.io/en/latest/py_tutorials/py_imgproc/py_canny/py_canny.html
2. Fisher, R. (2003). Hough Transform. Retrieved January, 2019, from <http://homepages.inf.ed.ac.uk/rbf/HIPR2/hough.htm>
3. Gonzalez, R. (2014). Image Thresholding. Retrieved January, 2019, from https://docs.opencv.org/3.0-beta/doc/py_tutorials/py_imgproc/py_thresholding/py_thresholding.html

Boundary Detection



Open CV is used to perform basic line recognition and place a “watch-zone” on the path of the garage door. The “watch-zone” is then continuously monitored at 30 fps. If an obstacle enters the path of the line, the processor determines that the line has been broken and sends a signal to the remote microcontroller to stop the garage door.

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Sonar Sensors

Sonar sensors located on the garage door provide redundant protection from accidental collisions. The sonar sensors communicate with one another and determine if the garage door is approaching an obstacle or the ground. By comparing distance measurements, the system can detect obstacles and stop the garage door if necessary.



Server Interface

Users are able to access the server remotely and monitor the garage door status. Users have the option to view graphical indicators or an actual live video feed of the garage door. The system also provides the capability to open or close the garage door remotely from any device with an internet connection.

