

Executive Summary

Modifying the view of a security camera to ensure that no public property nor the private property of others is in range of view is legally required in the European Union (EU). Security cameras with view cropping capabilities exist, but these cameras generally result in the range of view not encompassing the entirety of their property due to the property line issue being addressed by a zoom in feature. The Surveillance Camera Tracking of Driveway team will provide a solution to this issue by producing a security camera system which allows the user to predefine their property lines and then blacks out the area outside of one's property. This will allow for the entirety of one's property in view of the security camera to be monitored, while excluding the other private and public areas surrounding the users property - providing a legal option for users to monitor their property with a security camera.

2. Introduction

This document is an introduction to the Surveillance Camera Tracking of Driveway team's Property Line Sensitive Surveillance (PLSS) system. The objective of this project is to develop a surveillance system that enables homeowners to actively monitor their property while allowing them to define specific areas that should be blocked from the camera's field of view. The PLSS system will provide a legal option to monitor all of a user's property in range of view of the camera, while blacking out the other private and public properties/areas.

2.1 Background

According to the General Data Protection Regulation (GDPR) - Article 6, a security camera may be used on one's property but the privacy rights of others must be considered. In addition, according to Strafgesetzbuch 201a it is a violation of a person's privacy rights to photograph them without their consent in Germany.

Multiple solutions already exist; however, most do not cover the specific need of the EU. Many solutions either mean have a highly limited view, or are only able to black out simple areas. These solutions (such as Ring and Blink camera systems) do not provide a good range of view of one's own property, while allowing other areas to be removed from camera view. The PLSS system would be a replacement for current solutions, fulfilling and exceeding the current capabilities.

The PLSS system provides property owners in Germany with a surveillance system that abides by EU and German data and privacy laws. The PLSS system uses sensors to identify motion to trigger the camera to record. The PLSS system contains a PC application that allows the user to define their property lines, and uses that information to black out the area outside their property bounds in the security camera video. The camera will be on a motorized gimbal which allows pan motion. An accelerometer on the system detects if the camera has been moved after setting up property lines. A deep learning model will identify recorded individuals and identify them as known or unknown. This system will provide property owners in Germany with the necessary tools to maximize the monitored area of their property.

2.2 Overview

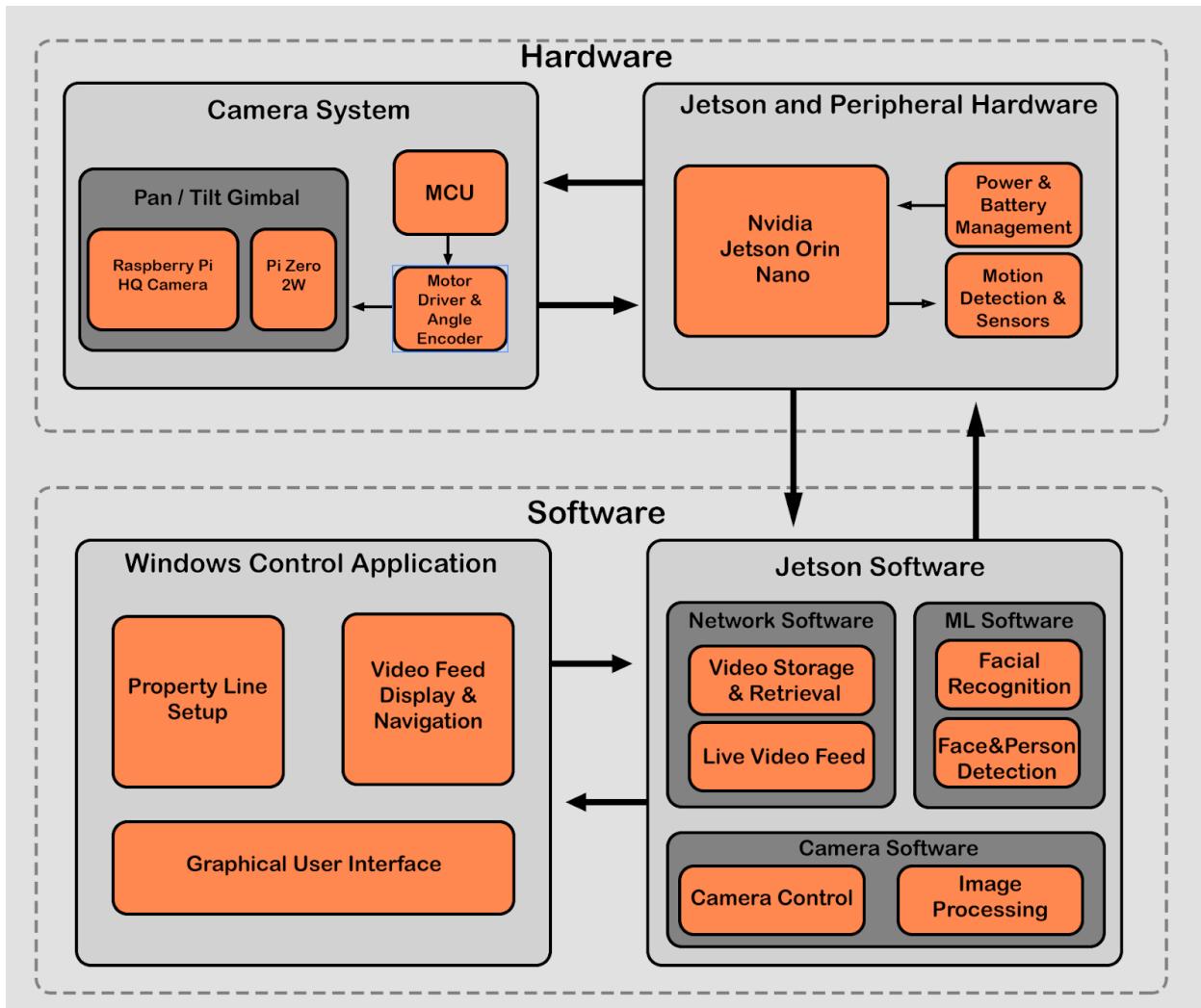


Figure 1: System Block Diagram

Operating Concept

3.1 Scope

The Property Line Sensitive Surveillance (PLSS) system will allow property owners in Germany to legally monitor their private property by blacking out the surrounding private and public property. This system will allow users to monitor all of their property in range of the camera without having to crop or zoom in on their property to exclude surrounding properties.

The PLSS system consists of a camera, NVIDIA Jetson Orin Nano, PC application, motion sensors, batteries and power circuitry, and an enclosure. The PC application allows the user

to turn the camera on/off, control the camera rotation, view recorded videos of motion, and set up/reset the property lines.

The setup process is activated by a setup button on the PC application. This button triggers the NVIDIA Jetson to create a panorama showing the entire field of view of the camera. This panorama then populates into the application and the user is asked to draw their property lines as a polygon on the image of the camera view. Once the user has successfully drawn their property line as a polygon, they must click the “Done” button and the area outside of the polygon is blacked out. The details of the user mask are then sent back to the NVIDIA Jetson to be processed and applied to the live camera view/video.

Motion sensors are used to activate the camera and a recording begins when any motion is detected. A web server exists to store the recordings so they can be accessed at any time. This web server can be accessed from within the PC application. The PLSS also has a rotating and stationary mode. When the rotating mode is activated the camera will move towards the area of surveillance where motion was detected.

Upon activation by motion detection or user input, the camera system employs a deep learning model to identify visitors on the property as recognized or unrecognized. Users can upload images of known visitors to the web server, enabling the model to be trained to identify these individuals accurately.