

SMART

Revenue Collection Systems



SMART VEHICLE CLASSIFICATION SYSTEM

The SMART Vehicle Classification System (SVCS) is a fully integrated solution that includes highly optimized vehicle tracking and axle sensing devices which work together to form the basis of the most sophisticated and accurate vehicle classification system available today.

At the heart of the classification system is the SMART Lane Interface (SLI), which is the latest in a generation of intelligent classification devices dating back to the 1980's. It is both completely backward compatible with the original Treadle Doctor AVC but also includes a new and enhanced engine that can surpass even the original 99.998% accuracy (1 error in 50,000).

The latest generation of the SLI electronics incorporates several new enhancements, including options for a full 48 Bits of DIO, up to 10 High Speed RS-232/422/485 Serial Ports, and now also supports high speed USB, TCP/IP or UDP communications to the Lane Controller. As a cost savings feature, the SLI can eliminate the need for any additional DIO or serial I/O communications cards.

In its basic single lane configuration, the SVCS can be installed in any existing Automatic or Manual lane and includes several options for overhead lasers, light curtains, and axle detector configurations to meet the cost and performance requirements of any project budget.

To support Multi-Lane, Open Road Tolling configurations, the SVCS utilizes the extensive I/O capabilities of the SLI to integrate multiple Overhead Laser Profilers as well as multiple embedded Axle Detectors which are spread across the various lanes in a zoned array fashion.

The algorithms built into the SVCS intelligently track and queue all vehicles traversing the detection zone, correctly associates the profiling and axle counts to the vehicles, automatically triggers the VES/LPR system, and supports grouping the license plate data with all the other data associated with the vehicle, providing the basis for an ultra unique signature that can be utilized to track and identify vehicles throughout an entire toll road.

Due to the critical nature of the Open Road Tolling operation, nearly every aspect of the SVCS, including the laser profiler array, as well as the embedded axle detector array, has been configured in a fully redundant manner allowing various levels of degraded operation even with the failure of multiple components simultaneously. To provide this high degree of redundancy, the SVCS utilizes highly complex algorithms to both detect failures and to compensate for those failures in real time.

At the highest level of redundancy, the SVCS also incorporates on board electronics to allow two SMART Lane Interfaces to be wired and operate in parallel in a Master/Slave configuration which also allows two independent Lane Controllers to operate in parallel and completely transparently. In this configuration, the two SLI units will arbitrate on power up to determine which device is the Master and which is the Slave and will automatically notify their corresponding Lane Controller of its status. Should either SLI or Lane Controller fail, the other can immediately take over in a hot standby fashion.

SMART

Revenue Collection Systems

SMART LANE INTERFACE (SLI) CONFIGURATIONS AND OPTIONS

SMART Treadle Interface – Designed for single lane configurations including 2 optically isolated inputs for entry and exit presence detectors plus 4 optically isolated inputs for interfacing to any 1-4 strip treadle with optional dual tire detection. Provides axle based vehicle classification

SMART AVC Interface - Includes everything in the SMART Treadle Interface plus an additional serial port to interface to an overhead Ultrasonic, IR or Laser based profiler which then provides complete vehicle classification. I.E. 2 Axle Car, 3 Axle Bus, 6 Axle Truck, Etc.

SMART DIO Interface - Provides up to 48 bits of digital I/O for interfacing with any logic based lane devices such as Traffic Lights, Canopy Lights, Violation Lights, etc. The I/O is not optically isolated on board but is interfaced via dual 50 pin headers that are compatible with industry standard opto interfaces. All I/O Bits are configurable as Inputs or Outputs in banks of 8 bits.

SMART Serial I/O Interface - Provides up to 8 additional ports of serial I/O bringing the total to 10. Each port is jumper selectable for RS-232, RS-422 or RS-485 Multi-drop with onboard termination jumpers. Each port has fully configurable baud rates and can be used to integrate with any Patron Fare Displays, Ticket Transports, Swipe/Prox Readers, AVI devices, etc.

SMART USB Interface - Provides an onboard High Speed USB interface to communicate with the lane controller freeing up the host serial port for any other function.

SMART TCP/IP Interface - Provides an external High Speed TCP/IP [UDP] interface to communicate with the lane controller.

SMART ORT Interface - Special configuration of both hardware and software which provides all the I/O necessary to interface with all the high speed multi-lane free-flow (highway based) lane devices including antenna arrays, overhead lasers, in-ground loops, embedded axle detectors, video enforcement cameras, patron feedback indicators, etc. and includes integrated on board electronics to support dual lane controller, automatic Master/Slave hot standby failover.

SMART VEHICLE CLASSIFICATION SYSTEM

Features

- Dynamically adjusts to any size tire footprint or tire width
- Accurately detects any type of wheel including non-metallic
- Detects rolling on/off treadle without generating axles
- Determines axle direction on completed treadle traversals
- Diagnoses failing treadles long before it can effect performance
- Extends the useful life of treadles by correcting for anomalies
- Reports each individual axle event with detailed diagnostics
- Provides diagnostic reporting of bouncy (failing) strips
- Automatically detects and corrects for shorted or open strips
- Compensates for strips activated/released out of sequence
- Reliably reports axle direction down to only 2 working strips
- Continues to accurately report axles down to only 1 working strip
- Automatically calculates axle based vehicle classification
- Can provide full vehicle classification w/ optional profiler (Car with 2 axles, Bus with 3 axles, Truck with 5 axles, etc)
- ORT configuration accurately classifies vehicles spanning lanes
- Simple configuration and setup is virtually plug and play
- Small form factor allows for easy installation in tight locations
- Can be swapped out in minutes by any maintenance technician

Performance

- Axle detection accuracy: Typically 99.998% (1 error in 50,000)
- Can accurately detect axles at speeds from 0-100+ MPH
- Includes hardware based watchdog to maintain 24/7 reliability

Technical Specifications

- Temperature Range: 0°C to 60°C
- Two optically isolated inputs for entry/exit presence detectors
- Four optically isolated inputs to interface with any 1-4 strip treadle
- On board electronics to support driving treadle voltage
- Can be configured for any external treadle voltage from 12 – 60V
- Can also interface with any fiber optic or piezo controller boards
- Provides real time event data and diagnostics error reporting
- Supports timestamps of individual events at 1ms increments
- Utilizes high speed RS-232/422/485 serial port for host interfacing
- Transmission speeds configurable from 9600bps to 230,400bps
- Most messages transmit in under 1ms at 115,200bps
- Uses ACK/NAK and CRC checksums to ensure message transfer
- Optional USB or TCP/IP based host communications available
- Optional secondary serial port for single lane profiler integration
- Optional 8 auxiliary serial ports for integrating slave devices
- Optional 48 bits of Digital I/O capability via 50 pin headers
- Aluminum enclosure provides excellent heat dissipation
- Enclosure Dimensions: 4 1/4" W x 2 1/4" H x 7" D (1lb or .454kg)
- Circuit Board Dimensions: 3 7/8" W x 7" L (4oz or .113kg)
- Power supply: Input: 120V AC 60Hz 20W 12 VDC
Output: DC 12.0V 1000mA