



# Aruna Vision

For Universal Robots

## AFFORDABLE VISION FOR COBOTS ▾

Aruna Vision is a URCap that runs directly in the controller of the UR cobot; there's no need for an external computer or controller. It is not for pick and place, but for everything else you can imagine.

Aruna Vision allows a USB camera to give object detection and comparison features to any UR. These two operations constitute the building blocks that can help your cobot to create checkpoints for:



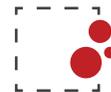
Presence or absence



Shape



Position



Interference



Unidentified elements

With Aruna Vision, your UR is no longer blind; you can create programs that can use a checkpoint to validate if a condition is true or false.

## ON THE ROBOT OR ON THE SIDE ▾

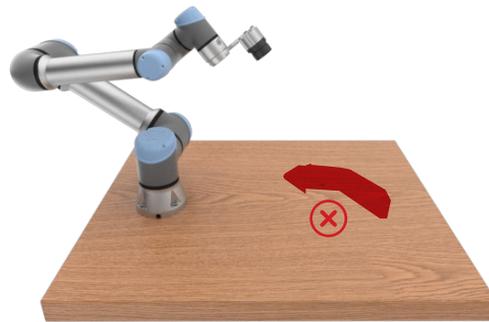
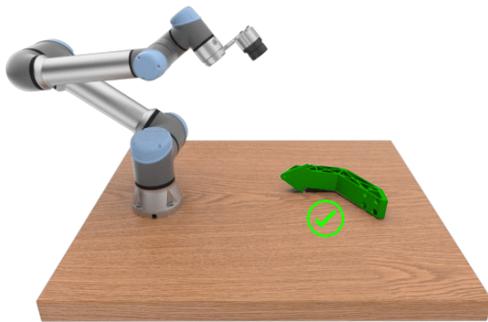
You can place the camera mounted on the robot, or you can install it in a tripod or fixed to a structure. Whatever works for you, you can even place two cameras in different positions.



## TWO MODES IN ONE SOFTWARE ▾

Comes with Object Detection and Image Comparison modes, these work in a similar way identifying a situation and making the robot take a decision from what is it seeing. These two usage modes will get you covered to any situation in your workflow.

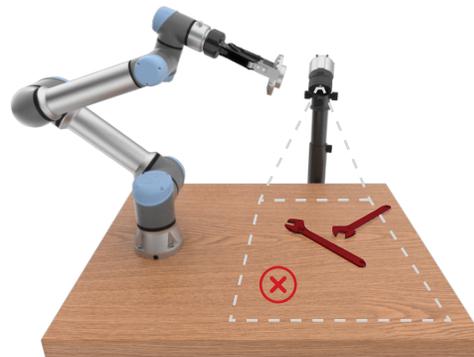
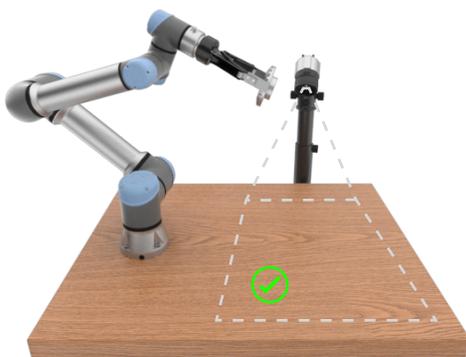
### Object Detection



Aruna Vision allows you to teach the robot by recording the specified object and differentiating it from the background; then you can use this information to validate the following:

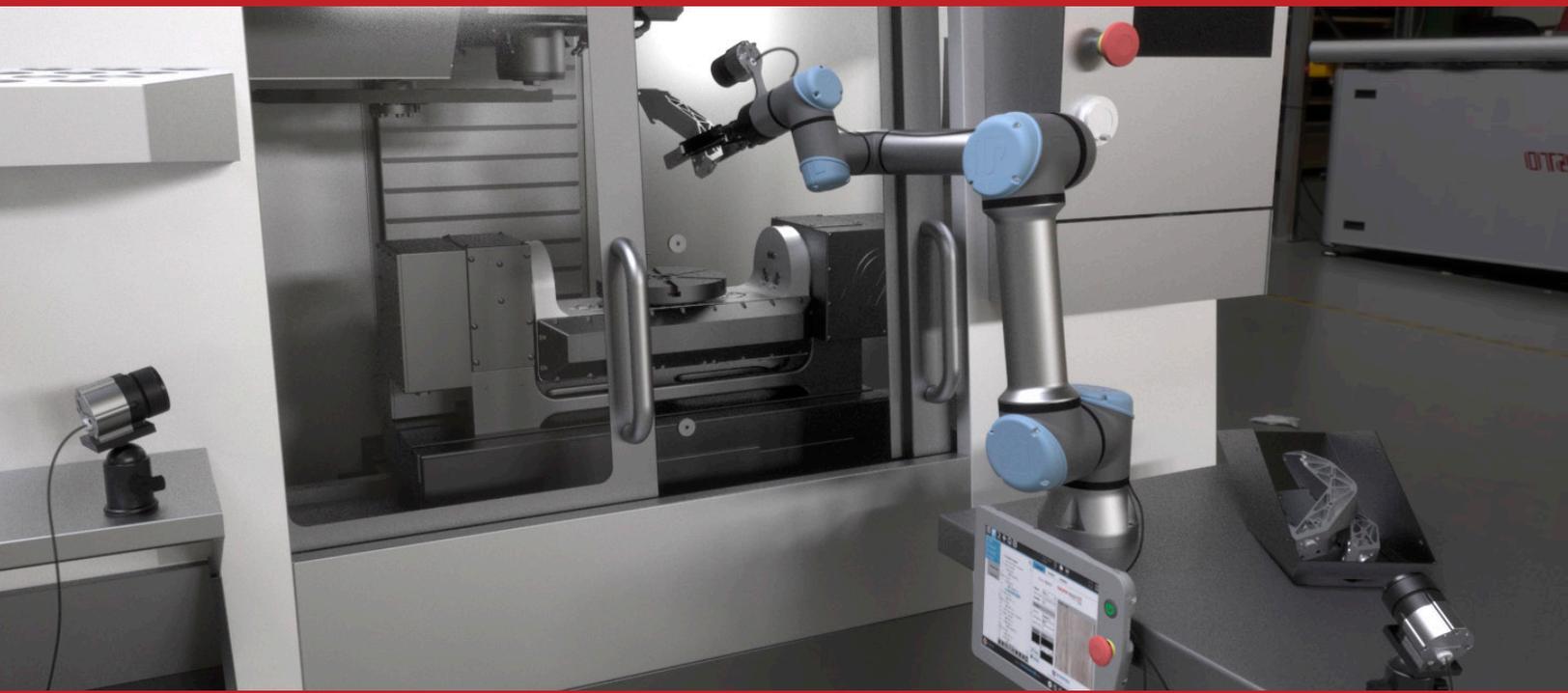
- ▶ Is this the object I am looking for?
- ▶ Does it have the right size and shape?
- ▶ Is it in the right position?
- ▶ Is this located within my region of interest?

### Image Comparison



You can record what is a “good” image on a checkpoint and use that as a reference for the program for comparison. By using If...else statements in the program, you can extend it to multiple images and decisions. Some applications of this are:

- ▶ Check if a surface, table, or tray are clean from other objects before an action.
- ▶ Search for spots or errors in finishing processes.
- ▶ Validate if something is in the way of the robot’s path.



## SIMPLE URCAP

Aruna Vision brings a versatile, light, simple to learn and use machine vision for your Universal Robots' cobot, it's compatible with any model from CB and E series, and runs directly on the controller. These are some benefits of Aruna Vision:



- ▶ Easy to learn and execute with live feedback
- ▶ No calibration required
- ▶ Use off-the-shelf hardware (compatible with more than 200 USB cameras models)
- ▶ Simple logic for the robot: "Is this what I'm supposed to see?"
- ▶ Mount the camera on the robot or on a fixed external mount or tripod.
- ▶ It supports multiple checkpoints with separate cameras.
- ▶ Allows a threshold level of confidence, you can set the minimum percentage for pass or fail.
- ▶ Allows defining a region of interest, to improve performance and narrow results.

# APPLICATIONS ▾

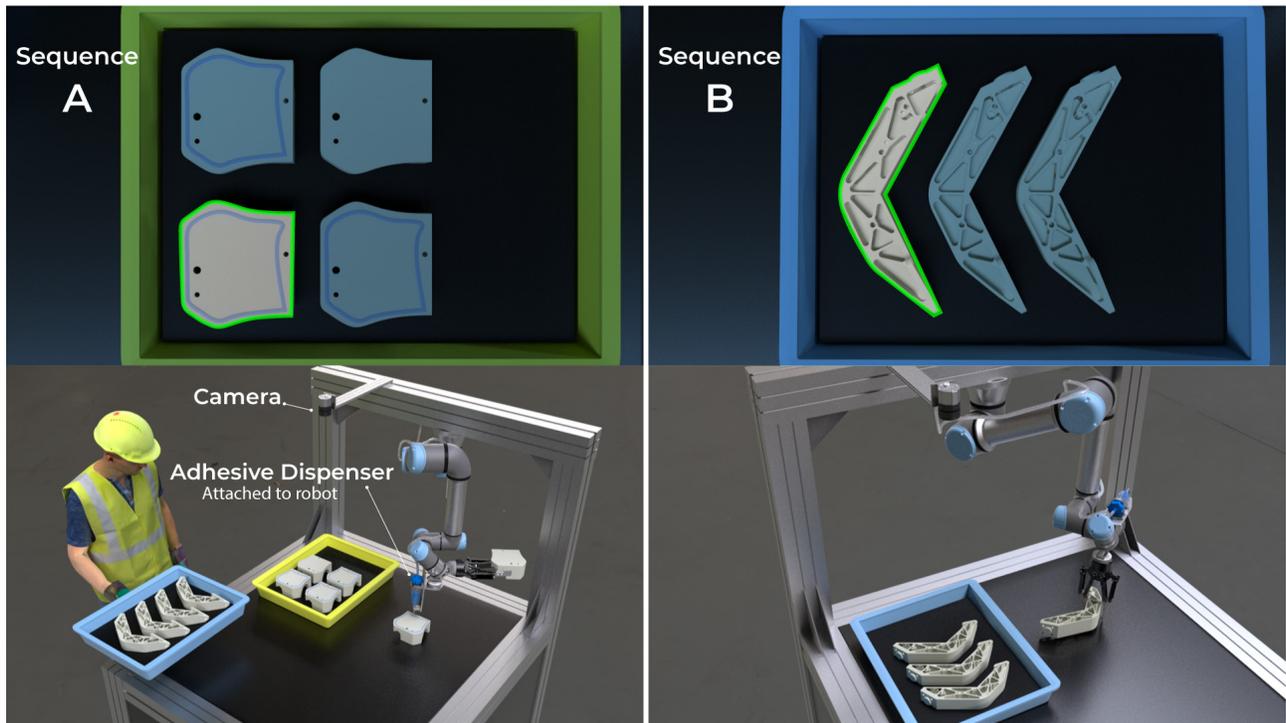
Aruna can be used to improve in any workflow where a collaborative robot is needed. There are some examples below.

- ▶ Error proofing
- ▶ Inspection
- ▶ Decision Making
- ▶ Testing

# DECISION MAKING ▾

When you capture different objects in Aruna Vision, then you can trigger various events based on the “very specific” characteristics of them.

- ▶ Change the motion of the robot based on the type of product
- ▶ Classify products into different bins (Note: not bin picking)
- ▶ Look for cues in other devices to change actions in the robot.



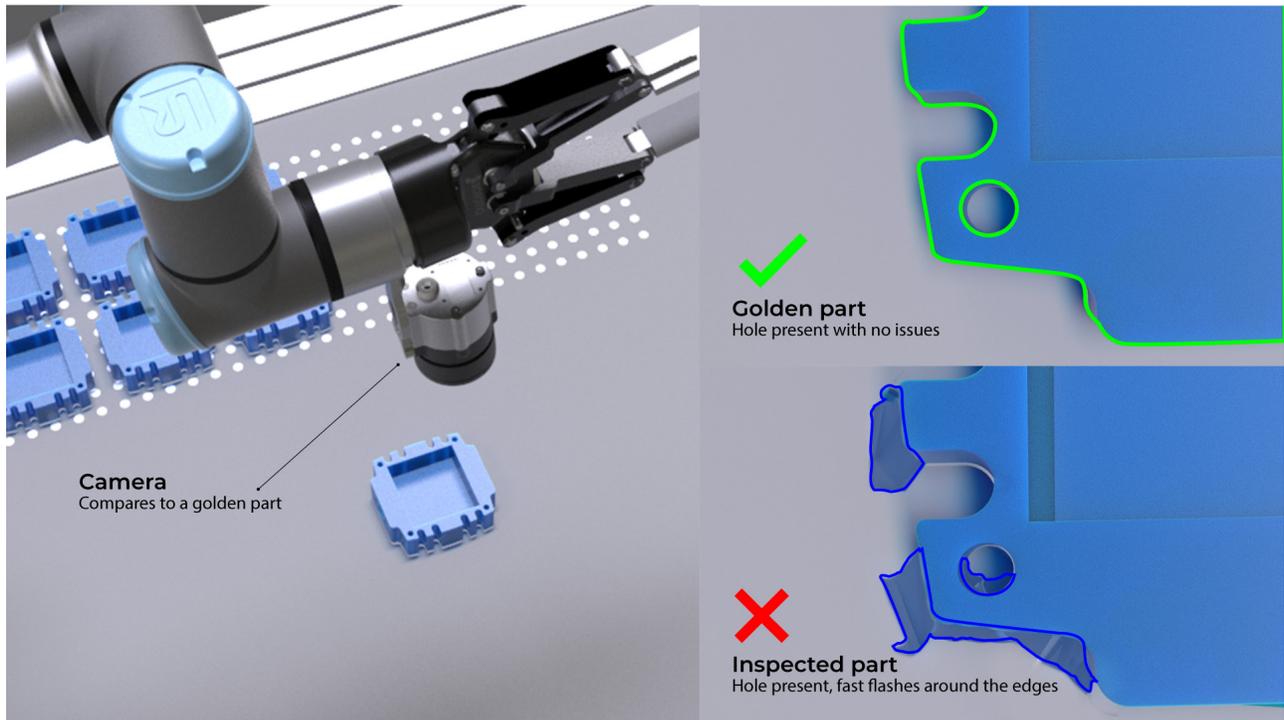
## Example use: Automatic sequence selection - Single camera setup

Detects the shape to run a specific program sequence that pick and place the part correctly to dispense adhesive along the shape of an object, then validates the correct application to return the object in it's respective tray position.

Aruna is able to detect a missing tray or an object who doesn't fits in the program.

## INSPECTION ▾

Once you can see the difference and know what's the right thing, you can use Aruna Vision to execute simple automated inspections looking for missing elements or surface defects.



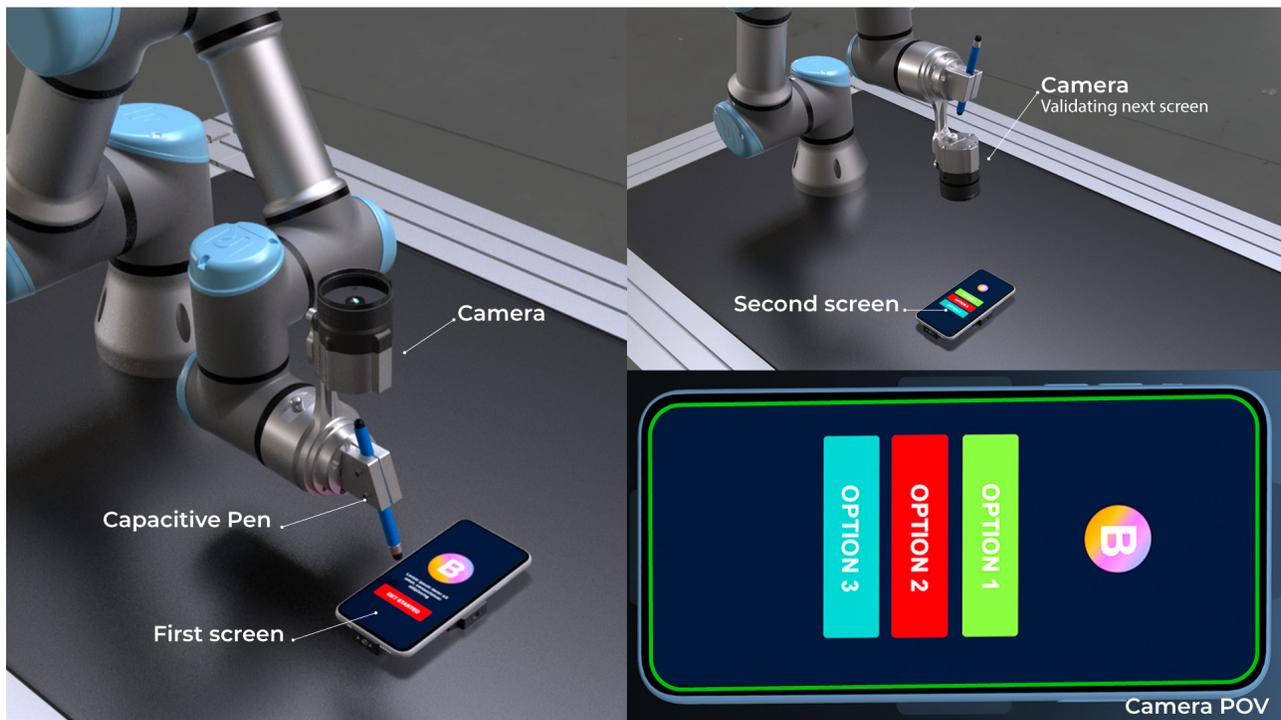
### Example use: Plastics Inspection - Single camera setup

In the plastic injection industry, the quality control can be automated by programming a sequence that picks and place the recently manufactured parts to compare them with a golden part; to search for fast flashes, full plastic injection, the use of the correct mold, and percentage of quality of each part.

## TESTING ▾

Electronics' hardware testing requires thousands of cycles to repeat over and over; cobots are ideal for this. By adding Aruna Vision to a testing process, you can make the robot react to LEDs on or off, messages in LCD displays, or even full touchscreen displays.

Aruna Vision can record a screen message or window and react accordingly; it doesn't need to know how to read the content of the message, it knows how it looks and remembers; you assign a variable for when the camera captures that message and use an if..else statement to trigger different motions in your UR program.



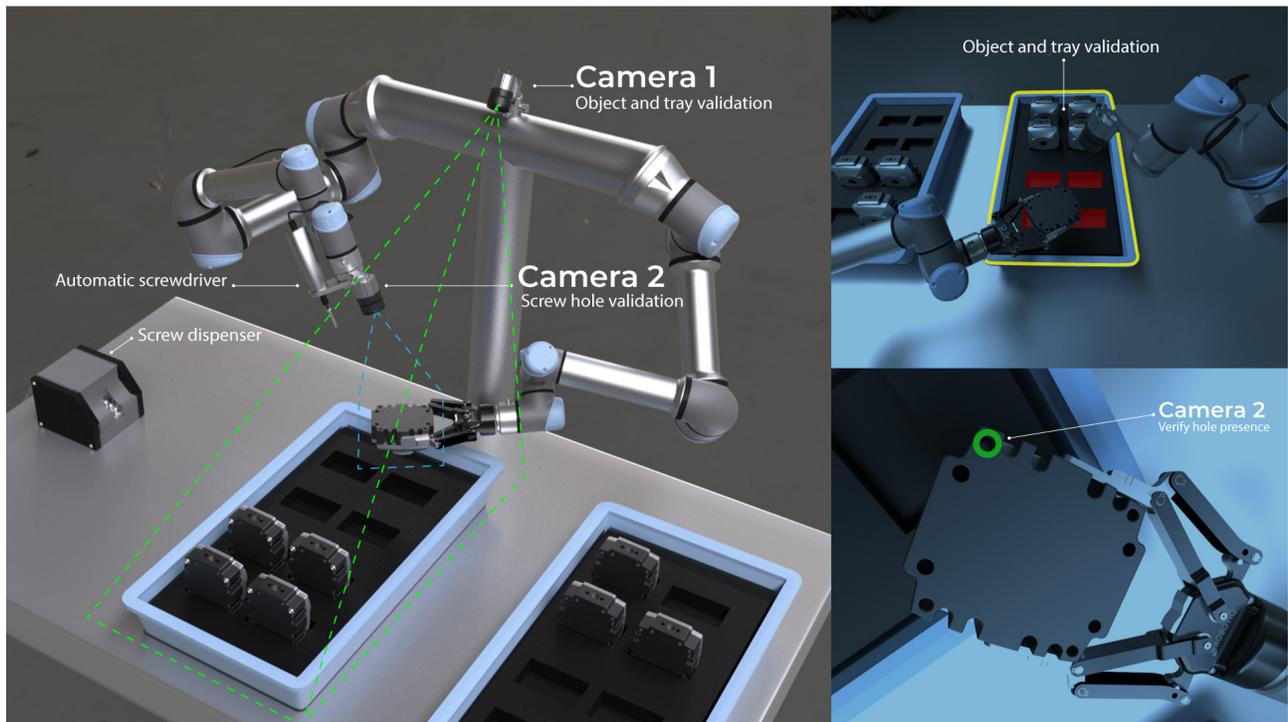
### Example use: Smart hardware testing - Single camera setup

The robot can see and wait for a screen to show up and act depending on the results. During the testing, constant decisions are taken to adapt to the speed of the software and performance of the hardware.

## ERROR PROOFING ▾

You can error-proof your process for unknowns, especially when your cobot is interacting or working around people. You can give an extra level of awareness that requires no e-stop triggering, for example:

- ▶ Validate if the robot received the right tray
- ▶ Check if a surface is clean and ready to work
- ▶ Verify if a something or someone is in the way
- ▶ Wait until a human puts the desired object in the right place
- ▶ Check if the tray has object A or object B, and choose which part of the program to run automatically.
- ▶ Trigger a signal to the user when a tray, container, or table is empty and needs refilling.
- ▶ Notify if the wrong product is present.



### Example use: Autonomous dual arm screwdriver - Dual camera setup

Aruna validates the shape of the tray to pickup the object and verify hole presence so the automatic screwdriver can do it's job without issues like a missing tray, incorrect pickup or try to insert the screw in a missing hole.

## ARUNA VISION CAMERA ▾

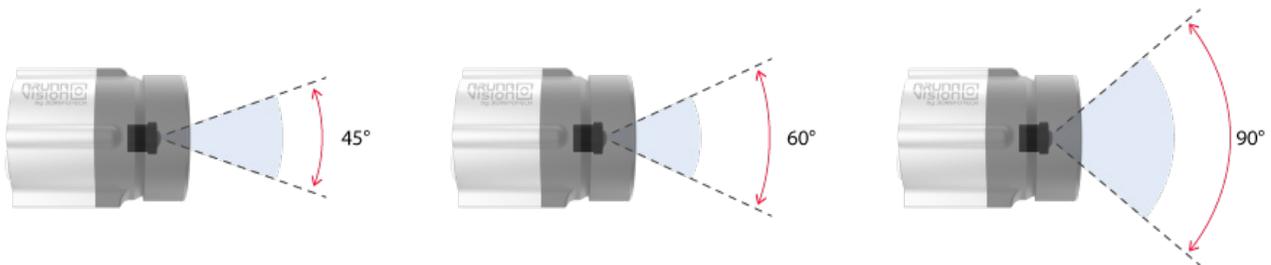
If you need a tested professional USB camera with interchangeable lenses, rugged design, and dedicated mounting adapter for Universal Robots and camera tripods, choose Aruna Vision Camera:



- ▶ Full HD 1920x1080 resolution
- ▶ 1/3" CMOS Color sensor
- ▶ 1/4-20 Tripod mount point
- ▶ Multiple mounting points for the UR mounting adapter with M4 screws in different areas

### Interchangeable lenses

The official Aruna Cámera includes a lens kit for different fields of view (FOV) that can be used for long or close range. The range of the interchangeable lenses provide the user with a wider choice of image-recognition capabilities.



45° Lens FOV

60° Lens FOV

90° Lens FOV

Aruna Vision can be used with almost any USB camera or webcam, for a list of compatible cameras visit:  
<https://www.ideasonboard.org/uvv/>



## COMPATIBILITY ▾

- ▶ USB camera compatible with UAB Video Class for Linux (UVC drivers)
- ▶ Color or grayscale camera
- ▶ PolyScope 3.7 or greater
- ▶ UniversalRobots' CB series and E Series

### ***About Aruna Robotics, by 3D Infotech, Inc.***

Aruna Robotics it's a division of 3D Infotech, Inc., an award winning company founded in 2005 that develops hardware and software tools to accelerate and simplify the quality assurance process for manufacturers in the aerospace, automotive, and consumer product industries.



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