

The logo for GadgEon, with 'Gadg' in blue and 'Eon' in orange.

Engineering Smartness

CV GUIDED ROBOTIC ARM TO CALIBRATE LASER POINTERS IN A LIDAR SYSTEM

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CV Guided Robotic Arm Calibration of LASER Pointers



A leading LiDAR technology company that is into the manufacturing of LiDARs had a challenge in automating the calibration of LASER pointers. The calibration is done by picking highly compact PCB from an array of PCBs with sub-millimeter dimensions and calibrate its position.

Solution Description

- Gadgeon automated the calibration process using multiple camera & borescope-based CV solution. The CV solution automatically guided a robotic arm to grab highly compact PCB with sub millimeter dimensions from an array of PCB stack and calibrate its position.
- The Robotic arm could identify and grab the PCB safely without damaging the components with micrometer accuracy
- This highly complex task was accomplished by the system with all the space constraints in the final enclosure

Outcome and Benefits Delivered

- LASER pointers are the heart of a LiDAR system. Hence the calibration of the LASER pointers are very much essential for achieving accuracy.
- Manual Calibration of the LASER Pointers in a LiDAR system took a whole day to complete. After automating the task, it took only a few hours to complete the task.
- This directly contributed in the agile manufacturing of LiDARs



The Business Context and Challenges of the Customer

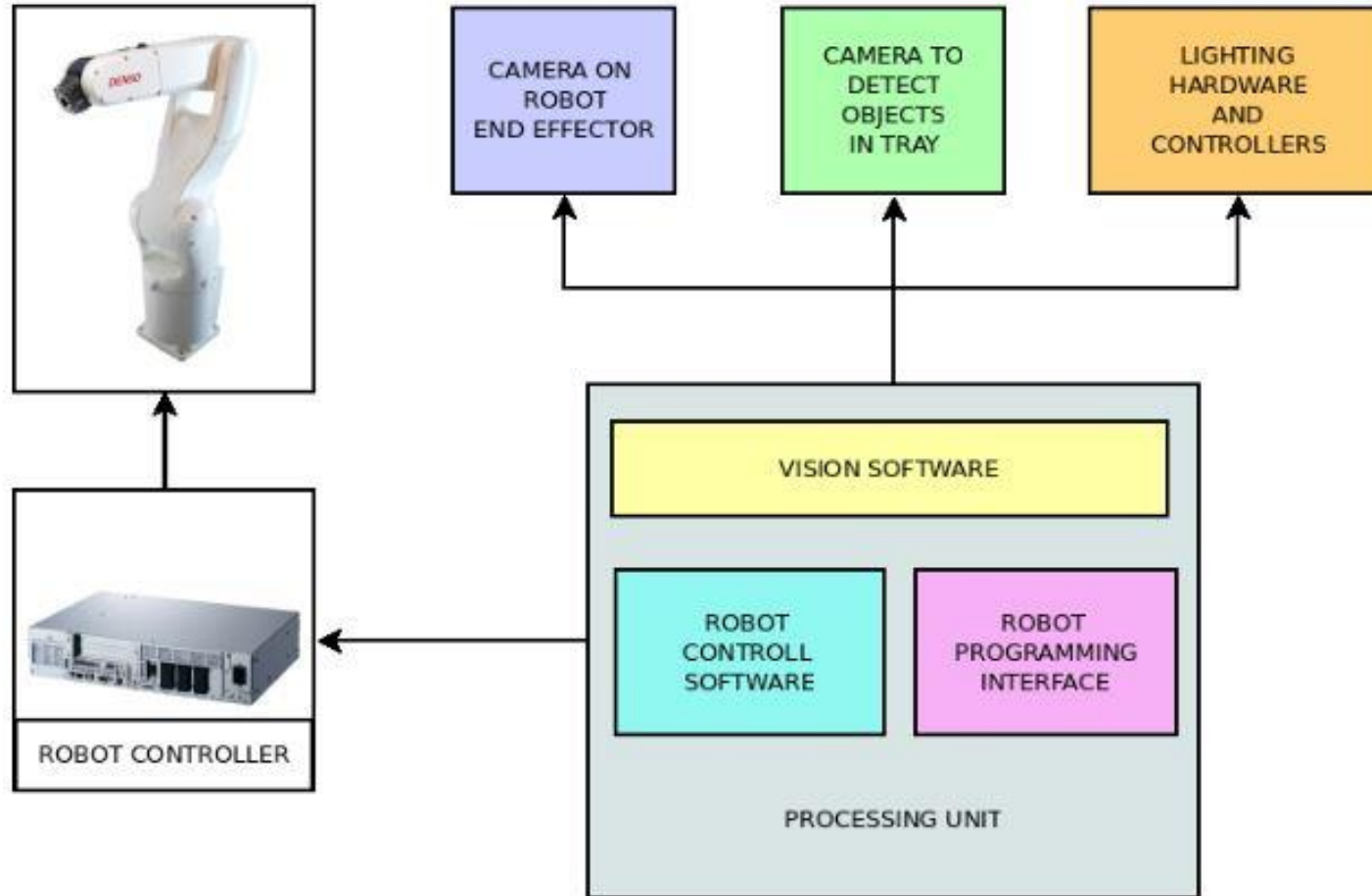
- The customer was a leading LiDAR manufacturing company based out of the USA. They provide LiDAR solutions for autonomy and driver assistance. The LiDAR instrument fires rapid pulses of laser light from the LASER pointers. One of the major challenges was the calibration of LASER pointers inside the instrument. To achieve maximum efficiency the LASER pointers need to be calibrated. The calibration is a cumbersome task if done manually which will take a day considering the space constraints and accuracy needed for the task. The calibration involves picking a highly compact PCB with sub-millimeter dimensions from an array of PCB stack and place it at the desired position and calibrate its position.
- The available space where the Robotic Arm operates inside the LIDAR is highly constrained and only a small camera can access that space. Identification of a camera that can operate here and get required image resolutions is a key challenge.
- The PCB to be picked/placed using Robotic Arm are very small and micrometer level accurate coordinates need to be arrived using image processing.
- They were looking to automate this specific task of calibrating the LASER pointers. This should be performed carefully handling the PCBs without damaging the components with micrometer accuracy.



The Solution / System Description

- A High precision Image Vision system to assist Pick and place Robotic Arm. The automation was realized using computer vision and a robotic arm. Multiple cameras and a Borescope vision system was used to access areas inaccessible to regular machine vision cameras. The computer vision guided the robotic arm to pick and place the PCB in the desired tray. The tray dimension was 10 X 10 CM and the PCB dimension was 2 X 4 mm. The robotic arm performed this task with high accuracy without damaging other PCBs of micrometer dimensions.
- A Denso VP series robotic arm was employed for performing the task
- Developed an image processing algorithm to predict the location of the PCBs with needed precision for the Robot to accurately grab

System / Architecture Description



THANK YOU



For More Details, Let's Connect



Gadgeon Systems Inc.

881 Yosemite Way, Milpitas, CA 95035, USA

CONTACT - USA

Mani Ram - Vice President - Solutions and Technology

 +1-678-900-0874 |  mani.ram@gadgeon.com

Gadgeon Smart Systems Pvt Ltd.

VI 405/E1, Fathima Tower, Maleppally Road, Thrikkakara PO,
Kochi, Kerala, PIN: 682021, India

CONTACT - INDIA

Hari Nair - CEO & Co-Founder

 +91 989-501-5880 |  hari.nair@gadgeon.com

Gadgeon Europe

Antwerpsesteenweg 124/54, 2630

Aartselaar, Belgium

 +32 475 23 39 46 |  europe@gadgeon.com

 sales@gadgeon.com