***The executive summary is professional and creates curiosity in the reader to go further in the report. It has to have info such as (e.g., motivation, problem statement, solution procedure, deliverables).***

This report provides the problem statement and solution procedures, together with management and engineering plans, of the very first project of X-Cali.

X-Cali is a company that was created by five undergraduate students. In our company, it is aimed to produce robots with high-quality and that include latest technology items.

In the transportation sector, import and export goods have a large percentage. Nevertheless, it is not possible to carry all goods in a similar way due to their shape and other features. For instance, to carry a long object, a forklift may not be a good resolution. We focused to carry a long object in a maze (an example to a difficult environment to carry a goods) that the object, normally, is not suitable to turn the corners.

The main issue that needs to be dealt with in this project is monitoring and determining the other robot’s next possible movement, since direct communication is off-limits and due to the constraints, the robots cannot make U-Turn at once.

To solve this trouble, as first solution, “Image Processing for Collaboration” is preferred. With image processing, the angle between plank and robot’s direction vector will be measured by making use of the color differences. And with the help of the angle, other robot’s position will be determined by mathematical and algebraic calculations.

“Hall Effect Encoder and 3-axis Gyroscope” is chosen to be the second solution to our main problem. A Hall Effect Encoder can find the rotation angle of plank that is mounted on the robot. Nevertheless, detecting the position of angle (whether it is in positive or negative direction) is not among the functions of the sensor. Therefore, 3-Axis Gyroscope is, also, utilized in our method to compensate for the lack of the Hall Effect Encoder.

The product package includes the robot itself (size is determined by customer), a plank, 2 spare tires, a back-up battery, a remote-controller, a user manual and 2-year warranty (extendible). Complete package (optional) also includes another robot and a maze. For further information and contact, please visit our website “<http://www.xcali.ml/>”.