

## HOW TO RUN AN INTERNAL NI AUTONOMOUS ROBOTICS COMPETITION

### OVERVIEW

The NI Autonomous Robotics Competition (NI ARC) is designed to encourage learning, development and innovation among students in the field of robotics.

NI ARC features student teams from the top universities in Australia, New Zealand and Singapore. Each team develops an autonomous robot to ultimately compete in a live competition with the objective of autonomously completing a set of predefined tasks in the shortest amount of time while earning the most points. The robotics application focus areas are navigation, obstacle avoidance, object handling and spatial awareness.

Learn more about the competition on the NI ARC website at [australia.ni.com/ni-arc](http://australia.ni.com/ni-arc)



### LEARNING OUTCOMES FOR PARTICIPANTS

- Apply kinematic models to design and control a mechanical wheeled robot
- Apply control system theory to design and implement a control system
- Select and integrate sensors and actuators into a mechatronic system
- Implement intelligent robotics algorithms, including image processing and motion
- Manage a project to deliver a working solution based on the requirements
- Demonstrate effectively the ability to work in a group with students from various technical backgrounds

### WHY RUN AN INTERNAL COMPETITION?

Since there is a limit of 1x team per university, you can involve more students to learn more about robotics by running an internal competition in your own university.

#### *Benefits include:*

- More students can be involved in learning about robotics in an already established format
- Foster innovation and creativity in robotics
- Opportunity to be NI Certified for free. Students are given the opportunity to take the Certified LabVIEW Developer Exam (CLAD) for free and join thousands of engineers globally to hold this certification.
- Each team gets access to online training performed online by NI engineers specialising in robotics
- Get to put forth the winner of this international competition to go to Sydney, Australia to attend the live final to represent your university in this high level international robotics competition.

## WHAT NI WILL PROVIDE:

- Initial platform training by NI Engineers who specialise in robotics applications.
- 1x free robotics development kit containing software and hardware components including the **NI myRIO; board level reconfigurable control system, and the LabVIEW Robotics Software Module**. Additional discounted robotics development kit for additional teams will have to be purchased.
- Ongoing access to online training for LabVIEW and NI myRIO.
- Guidance on building the actual competition track.



## WHAT YOU'LL NEED:

### Manpower

- As many interested teams comprising of 4-6 team members each.
- An assigned academic supervisor/university staff to look after the team and manage their robot development schedule. It is encouraged to have a university staff to 'manage' the participating teams and ensure that the team sticks within the allotted timeline. NI will be getting in touch with the assigned supervisor to guide him or her at different stages of the competition.

### Equipment

- Robotics Development Kits (NI myRIO and LabVIEW Robotics Module) for all teams involved. Ask an NI representative regarding the cost for the number of kits you'll need. Ideally, one kit for a team of 4-6 students.
- Track Materials for running the qualifying event to determine the team that goes to the 2018 NI ARC Live Final. It does not have to be the same materials as the actual track but should be enough to see how the robot fares in a very similar track. This could include, competition mat, boundaries, ramps etc.

## THINGS TO ACCOUNT FOR:

- Cost for additional equipment for each team's robot may include the following:

Items	Estimated Cost (AUD)
Motors for Driving	\$50-100
Servo for Steering	\$50-100
IR Sensors	\$10-20 each
Sonar Sensors	\$10-20 each
Wheels	\$50-100
Chassis	\$50-100
Circuitry	\$30
Flights/Accommodation for at least 1-2 team members to fly to Sydney, Australia (if not based in Sydney) <i>*can be sponsored by the university</i>	Depends on origin.

*This is just a rough estimate. Dependent on how complex the robot design is, there are various different ways in which the teams can choose what items to include in their design. (eg, Lidar sensor can be used instead IR sensor which is more expensive but has more capabilities)*

- Cost for duplicating the actual live competition track for your university's own internal competition. Note that it doesn't have to use the exact same materials but just enough to simulate the elements that the robot will navigate within. Your university can then put forth the winner to compete in the live final in Sydney on September 2018.