

New Safety Measures with a Real-Time Location System

Saskatchewan Polytechnic (SaskPoly) conducted applied research to develop The Real-Time Location System that was a prototype system comprised of commercial of the shelf (COTS) hardware, open-source software packages, software and firmware customized for system configuration and operation, and SaskPoly designed mounting brackets. The complete prototype system has 2 subsystems: nodes and a hub.


The nodes are implemented using DecaWave DWM1001 Development kits. There are five nodes, 4 of which are used as stationary anchor nodes and 1 of which is used as a target node. Custom firmware runs on the nodes to implement:

- a ranging method to measure distance between 2 nodes using a Two-Way Time of Flight methodology,
- a messaging layer to control communications between nodes to allow for node discovery; ranging measurements; and diagnostic collection, and
- an API to interface with the hub to provide information from nodes.

The hub is implemented using several open-source software tools running on a Raspberry Pi platform. In the prototype system, the hub is connected to the target node. The hub is responsible to:

- interface with the target node to collect the distance measurements between the target and all other nodes in the network of nodes,
- compute the 3D position of the target node based using the distance to the nodes designated as anchors and positioning algorithm running on the hub,
- providing the 3D position and measured distances to the API that can interface with a display system, and
- present the collected information on a Grafana dashboard.

The project delivered 2 prototype systems in July 2021, consisting of hub, nodes, software and firmware loaded, cables, rechargeable batteries.



Proponent:	Saskatchewan Polytechnic
Project Duration:	July 2019 to June 2021
Project Cost	\$614,000
IMII & Industry:	\$314,000
NSERC:	\$300,000