

University of Florida

Department of Electrical and Computer Engineering

EEL 5666

Intelligent Machines Design Laboratory

Special Sensor Report: “Beverly Crusher”

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The sensory system, used by Beverly to locate and distinguish cans, consists of six IR range sensors, a break sensor, and a bump switch. These will be used to detect potential targets, home in on them, and determine if the object is acceptable for crushing. The IR sensors are Sharp GP2D12 and can be purchased at www.junun.org for \$8.25 each.

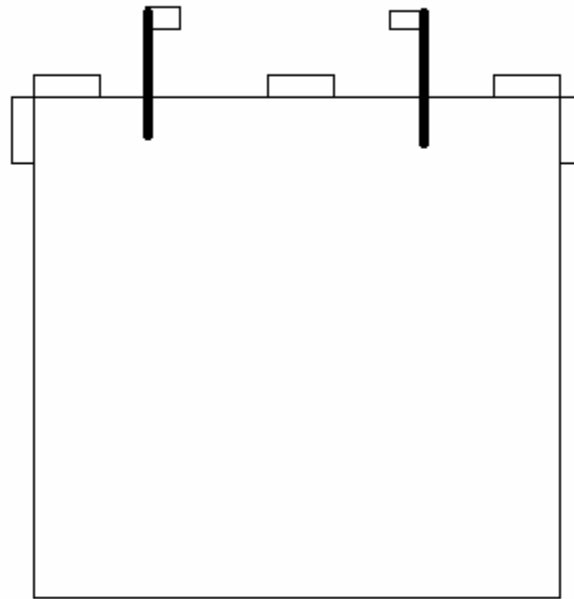


Figure S-1. Sensor layout of Beverly Crusher.

As shown in Figure S-1, the robot will utilize five IR range sensors for obstacle detection. The left and right-hand sensors will be used primarily for obstacle avoidance, such as walls and other large objects. The three, front-facing sensors are necessary for target location and obstacle avoidance. Depending on the relative readings of the sensors, Beverly will be able to distinguish between walls, concave corners, and potential cans. Table S-1 shows what different combinations of readings represent.

Relative IR Readings			Meaning
Left	Mid	Right	
M	M	M	Wall
H	M	L	Wall
L	M	H	Wall
L	L	M	Can/Table leg to the left
L	M	M	Can/Table leg to the left
M	H	H	Can/Table leg to the right
M	M	H	Can/Table leg to the right
M	H	M	Can/Table leg in front
M	L	M	Concave corner

Table S-1. Meanings of sensory reading from front IR range sensors.

If Beverly determines there might be a can to pick up, she will turn until the object is directly in front of her. She will then drive forward until one of two events occurs: the break sensor indicates that an object is in the gripper, or the front bumper indicates that Beverly has run into something. In the latter case, she will have encountered either a table leg or a wall corner, and she will proceed to back away and seek a new route. However, if the break sensor goes off, Beverly will have found a can and will proceed to pick up and crush said can. The break sensor was constructed from a CDS-cell and an LED, which were pseudo collimated using heat shrink tubing. These parts can be purchased at any electronics store.

The sixth IR sensor that is not shown in Figure S-1 is used to determine the position of the crush plate. The crush plate will always be zeroed at the same distance above the platform using the IR sensor and will be operated for an experimentally determined period of time while crushing the cans.