I have attached a picture at the end of Hobbies working at recycle. The tall white boxes go on the left and the lower juice boxes go on the right. Hobbie keeps going back to the pit until it is empty.

Here is the video of Hobbie does recycle.

https://1drv.ms/v/s!AiELAs3hBGHIjgBb0eGfUwgghCrn

At the end of my first year university, where I majored in Computing Science, I was hired to work the summer for one of my computing science professors. He wanted to write a book which would pose problems and require the readers to write computer programs to solve them. I was tasked with designing and writing the programs which would be included in an answer book.

I have started to create a series of future projects for my robot clan. Each project has the following six sections:
IDEA
PICTURE
PROCESS
TESTING
NOTES
VARIATIONS

The first project was the recycle one. The largest sections were the TESTING and NOTES ones.

The latest project is to build a much smaller robot with wheels instead of being a tracked vehicle. Of course this meant using a smaller controller/brain, though still from Italy. The remainder of the hardware is still from China. The new brain can only handle 6V and therefore I had to use different motors, Hobbie uses 9V encoder motors where you specify the RPMs. The smaller robot uses DC motors where you specify percentage power and since no two motors are 100% identical, they perform differently at the same power level. Harder to drive in a straight line if the left motor performs differently than the right motor. Different motors also requires different software commands.

So Pocito is a tri-pod vehicle with a motor driving each of the rear wheels and a free moving ball front wheel. Pocito has an ultrasonic sensor, an IR sensor, LED lights, a light sensor and a sound generator.

A tri-pod results in me learning another physics lesson, weight distribution. Pocito uses direct drive motion, the motors are directly connected to the two rear wheels. This means most of the weight is at the back end and the front center wheel floats. Easy to do wheelies but does result in limited traction. I therefore had to extend the frontend and add a second weight/bumper.

When we were having our house built, I would make a few trips out from Ottawa to "inspect" the work. I would stay at a relatives place in Penticton. One November morning I was making the trip up to the house and the road was a bit icy, no problem for a seasoned Ontario/Quebec driver. However coming towards me was a BC driver in an empty pickup truck. He hit a piece of ice and did a 360. One of his problems was that he had no weight over the rear wheels.

The design problem that I am working on involves how to get on and off a busy highway, ensuring that I am only driving on the right side of an undivided road, think counter clockwise in a circle.

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    --------O
```
--- is the road
O is the highway

Here is a line-follow test that you can try. Stand up and look down at your feet. Pretend you have blinders on (use a pair of binoculars) and your vision is restricted to the width of your feet. (Pocitos IR sensor is on the under carriage and can only see 2cm wide). You can only see forward to your toes. The road is a carpet the width of your vision (your two feet wide). Now go for a walk.

How do you traverse from the road to the highway? If the road and the highway meet at a T junction, then you walk until you reach the end of the carpet. Stop. Turn right and go on the highway. Great for country roads but not when there are a bunch of vehicles/people doing the same thing behind you.

After hearing about the tragic accident with the lady and the uber vehicle, I wanted to test reaction time to an obstacle. Therefore I tested Pocito coming out of a corner, traveling at 14 cm/second and set the ultrasonic sensor to stop when an object was within 4cm of Pocito. Pocito uses a $25 unidirectional sound sensor that can only detect objects directly in front of it.

Autonomous vehicles need three sensor capabilities, as each performs a different function. Cameras can identify the object, lidar can measure distance, and radar sensors can eventually provide a precise estimation of velocity. The 'lidar sensor,' is a omnidirectional device that detects objects in 3D with pulses of laser light. Visualize a coffee can that is rotating at 8 rotations/sec and takes 240 "pictures"/rotation. Adding a simple lidar sensor to Hobbie would cost over $600.

One future project will add a dash camera to one of the robots.

Now that you have conquered the line-follow test, try the same test but walk backwards, still looking down in front of you.   This is how Pocito has to drive backwards.

Here is the intro video for Pocito

https://1drv.ms/v/s!AiELAs3hBGHIjhBtMQYeTj0m00Yn

Mad Mikael Mecanix will be visiting the factory this month. Who knows what will be created.