

It is interesting how many different types of communication there are. Many of us use our voice as the major form of communication but also supplement that with our eyes to detect facial and other body movements. Flag semaphore, which I learned as a child, conveys information at a distance with hand-held flags, rods, disks, paddles, etc. Braille is a tactile writing system used by people who are visually impaired. Lip reading is understanding speech by visually interpreting the movements of the lips, face and tongue when normal sound is not available. American Sign Language, which I took as a continuing education course, uses the fingers and hand motions for the letters/words and movements of the signer's eyes, face, and head for the adverbs, adjectives and various other grammatical signals. Morse code is all based on sound/light and the combination of short (dot) and long (dash) sound/light.

Hello in morse code - . . . - . . - - -

(dot dot dot dot, dot, dot dash dot dot, dot dash dot dot, dash dash dash)

(1,1,1,1,0,1,0,1,2,1,1,0,1,2,1,1,0,2,2,2,0)

The length of a dot is 1 time unit. A dash is 3 time units. The space between symbols (dots and dashes) of the same letter is 1 time unit. The space between letters is 3 time units.

BREAKING NEWS

Your full attention for this important message. To celebrate our 30th month, we are opening a new division, NO PROBLEMO,

About six months ago, report #15, I talked about the local library and their media lab. I took a course on 3D printers there and that is where I would go and use their 3d printer. There always seemed to be a case of needing a part to be longer, wider or somehow different for the next project. I would design that new part and then print it.

Due to covid, the library media lab closed in March. The price of the printers are now “low” enough that we ordered one. As with other leading edge technology, the best products come from China or from Europe. This 3D printer will come from Prague, Czech Republic. *Prusa* Research was founded as a one-man startup in 2012 by Josef *Prusa*, a Czech hobbyist, maker and inventor. They now sell 6,000/month and have their own 500 printer farm to make parts for the printer. It also interfaces with my UK built Raspberry PI computer boards.

One of the things that I like about Prusa is their attitude. Our printer is the Original Prusa i3 MK3S DIY Kit. It is version 3 of that printer model. All of the printers are upgradeable at less than ½ the price of a new one. Since they use the printers in their 24/7 printer farm to make printer parts, they have experience on what wears out and how to minimize that problem. Also most of the replacement parts can be made on the printer. The slicer software (converts the design file to a print file) is free and open source so that the community can expand it. There is also an online user forum. When covid happened, Prusa met with officials from the Dept. of Health, designed PPE shields and released the plans to the world.

Now you will notice in the name, the term “DIY Kit”. The original printer came in a pizza box and this one, model 3 version 3, comes in a box the size of five XL pizza boxes and weighs 22.5kg (50lbs). It is estimated to take two full days to assemble and test. Whoever coined the phrase “Wheaties: the breakfast of champions” was not a techie. We know that the best breakfast is leftover pizza. The box does not include leftover pizza BUT does include a bag of gummy bears. The assembly manual consists of 12 chapters, with lots of pictures for those who can/will not read instructions, and each chapter ends with “you can now eat xx gummy bears”. There was little sympathy from Prusa when some users complained that they had consumed the gummy bears during their initial read of the instructions versus during construction.

BACK TO OUR REGULAR REPORT

The initial programming was to get two robots to talk to each other. One problem was how would they find each other. Unlike some people I know, when I used to go into an eatery to meet a friend, I would not talk to everyone I met until I reached the table of my friend. Each robot has a unique local Internet Protocol (IP) address but it is not know to others. This was solved by having all the robots communicate thru a central server. The server can then give the robots a list of names of who else is on the network. That also has three advantages:

- I can record what each robot is sending/receiving. Adhering to my friends warning “remember the robots are watching and just waiting for you to make a mistake”.
- The server can send commands out to one/many/all robots
- I can shut down the server and therefore cut off the communications. The names and respective IP addresses are only stored on the server.

This did mean that I had to write code for the server and also for the robots. The IP address of the server is programmed into the robot code.

The initial testing was done with the latest robot, BRIE. This is now expanded/modified to include ALLIE and POCITO. Of course, each of these robots are different in size, use different motors/servos and different combinations of processors and controllers. I had to add RGB LEDs on ALLIE so that it can use the morse code. Just like the 0-100kph acceleration time on a vespa is 12 seconds and on a ducati is under 3 seconds, the speed of each robot is different. The goal is to have a 90% common program with a look-up table for each robot type.

Here is the video of the three robots. BRIE and POCITO enter the stage together. BRIE does her thing and POCITO then copies the moves. They then invite ALLIE on stage. The three of them do a 360 and then a victory signal sequence before I shut them down from the server.

<http://systemkeepers.com/robotics/v/3-guys.mp4>

I leave you with a question. Why does a round pizza come in a square box and you cut it into triangles?