1. Problems Encountered

In promoting products, services or conveying messages to the public, human promoters are normally employed to walk around to distribute flyers or samples to reach out to more people. This requires additional manpower resources, which incur significant cost for small to medium companies. Besides, engaging human promoters may not effectively gain attraction from the public as they find nothing special about seeing human promoters.

2. Objective of Project

This project is aimed to develop an autonomous robot to replace human promoters with 2 main objectives:

i) To replace human promoters.
ii) To increase productivity by the saving of manpower cost to do the job.
iii) To gain more attraction from the public with the using of “non-human” promoters.

3. Proposed Solution

The proposed solution is an autonomous robot, which consists of 3 modules:

i) A navigation platform which is able to navigate autonomously around the place and able to stop or avoid obstacles along the way. It has sensors to avoid hitting objects, including the public, around.
ii) A 3D model with animation programmed to suit the promotional objective. Sound and light effects can be added as and when needed.
iii) A compartment to put promotional items or flyers

The features of the proposed solution are:

i) Modular design – The solution is designed in 3 modules which are changeable to adapt to the applications. This makes it flexible to use and fast to switch among different applications.

ii) Cost effective – The solution can be implemented and realized at low cost (< $1,000) as compared to other autonomous robots for indoor navigations, which normally costs more than $10,000. This is especially suitable for small to medium companies.

(a) Side view (b) Back view

Figure 1. The proposed solution – Applied in ITE Innovation Fiesta to Attract Public

4. Key Challenges & Learning Points

1. Fabricating 3-D model with animation. Our initial plan is to fabricate our own 3D model using 3D printing. After calculating the cost, we realized that buying the model and doing rework on the model for animation is much cheaper than the 3D printing. So we learn a lesson that not always self-design and fabrication is good. We need to widen our perspective and consider other solution to achieve the desired objective at better cost. This is important to make a product competitive in the market.

2. Types of materials used for the chassis. At first, the chassis was constructed using aluminum structure without the cover with the intention to demonstrate to the public the engineering concept behind that make the robot works since. We want to promote an engineering course. Later we received common feedback to cover up the body for nicer appearance. From here, we learn a lesson that what we think is good may not be perceived the same by others. So we need to gather other people's opinion, especially the ones from customers or stakeholders in order to be accepted in the market.

3. Controlling the navigation speed. We learnt about using a microcontroller to control the navigation, whether to go straight, reverse, turn left, turn right or stop. After doing the project, we learnt that there are many parameters to control and many factors to consider to optimize the behavior to suit the application. For example:

    a) the motor torque during the turning should be different from going straight,
    b) the navigation speed is affected by the hardness of the floor,
    c) the motor torque of the robot must be just right so that it can move at enough speed but at the same time should be within the safe speed limit so that people feel safe walking around,
    d) the turning must be adjusted to suit the layout of the navigation area to avoid being trapped.

4. Since one of the objectives is to have a low-cost solution, one of our challenges is to find materials that can be easily designed at low cost. Although we can conveniently design using 3D printing, the cost is high to print out the design at this size.

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