

Project title: Baymax Duo

Team #2

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Project Goal and Objectives:

Motivation:

In modern society, it becomes more and more favorable to equip people with wearable devices in order to measure different kinds of data and provide possible assistants based on previous data recorded from these wearable devices. Meanwhile, a robot with multi-functions can assist people widely even in daily life. Here, we think about a duo device that combines the wearable device (smart watch) with a robot to realize amazing functionality. Therefore, we'd like to propose such a duo device, which we call "Baymax Duo" (Inspired from the famous animation "Big Hero 6") with functions that could company people in 24/7 basis and provide assistance in health, living environment safety, and other concerns.

Significance/Uniqueness:

With the development of modern civilization, people concern health, safety, and convenience much more than before. How to enjoy a life with high quality becomes a valuable question considered by commercial market. We have three concerns according to the motivation. First, due to unawareness, some people suffer severely from sudden heart attack, which may even threaten the lives. In this case, Baymax Duo we propose could provide necessary assistance, such as bring medicine to these people and send text message to relevant people or hospital to save the lives. Second, criminal recognition is of great significance to protect home safety. Baymax Duo provides such function to identify criminals and friends to reinforce home safety. In that way, potential threaten to home could be eliminated as much as possible. Third, with the help of Baymax Duo, some easy work, such as getting something could be done by just making arm gestures. This will not only realize a more comfortable life, but also help improve the life quality of elderly people or disabled people. For example, if an old man wants to drink some water, he doesn't need to go to the kitchen to get it, the only think he needs is to make the arm gestures with the smart watch. The robot on the other side will pick up the water for him. Based on the three major functions, our Baymax Duo has the practical value and has the market potential for sure.

Objectives:

This project aims to develop Bayman Duo that contains a smart watch and a robot, which can communicate with each other and operate as required. The smartwatch wearer can make direction to the robot using three ways: arm gesture, voice control, and screen touch. Meanwhile, the robot can send required information to the smartwatch and wait for next direction. Automatic emergency assistance will also be made necessarily according to sensor data sent by the smart watch. These characteristics make the Bayman Duo especially useful to facilitate people for ordinary housework and most important, save peoples lives by providing immediate assistance when accidents happen. Specific objectives are listed as follows:

- Develop the app for the smart watch using Android Studio;
- Mutual communication between smart watch and robot. E.g., the robot can take photo of a person and send it to the smart watch. The wearer of the smart watch then can make direction to the smart watch to let the robot to do further actions;
- Get gesture training data to make to movement of robot;
- Automatically get data from the sensor of the smart watch. When anomaly is detected, the robot will respond accordingly.

System Features:Input allowed by smart watch:

- Voice;
- Gesture;
- Automatic sensor data;
- Screen touch/button.

Output of the smart watch:

- Text;
- Vibration;
- Send message/make automatic call.

Input of the robot:

- Image.

Output of the robot:

- Necessary movement.

Three scenarios (use case):

- By sending image that captured by the robot to the smart watch, the wearer could identify a specific person (and only limited to person and no other objects involved at this stage). If the person is identified as a criminal or friend, optional messages such as call police directly, open the door, send current emergency coordinates to police station etc. will be given to the smart watch wearer to let him/her to make the decision.
- By using sensor that embedded in the smart watch to monitor user's periodical pulse and relative coordinates to provide emergency assistance to unpredictable events such as stroke, heart attack, tumbles, and send message to hospital, relatives or other locations.
- By sending command (through screen touch of the smart watch or making arm gestures) on user's side to control robot's behavior to reach/achieve certain objects in a certain range.

Related work

Rainer Lutze and Klemens Waldhör. "A Smartwatch Software Architecture for Health Hazard Handling for Elderly People" presented at International Conference on Healthcare Informatics, P356-361, 2015.

Backup project:

The backup project will involve in remote tracking functions between the smart watch wearer and the robot. In this scenario, we are assuming that the person with the smart watch is the one that needs distant assistance from the robot. On the robot's side, it will first use the active tracking system to record user's routine coordinates. After that, it will analyze the user's location and the current of itself to calculate the shortest pass and go to the wearer's side. When the robot finally arrives at the location where wearer sends out the emergency signals, it will perform the help functions immediately. Potentially, the wearer can see the live image of the current location of the robot. By sending specific commands such as "back", "forward", "left", "right", the wearer can customize the robot's behaviors whenever it is necessary. From the wearer's end, the smart watch can show the time that is still needed (or time left) for robot to come to user as well as the current status (battery conditions, specific component's health/usage status etc.) of the robot.

Bibliography

url: <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7349711>