

# Automatic Face Tracking System using Quadrotors for Estimation of Elderly People's Emotion

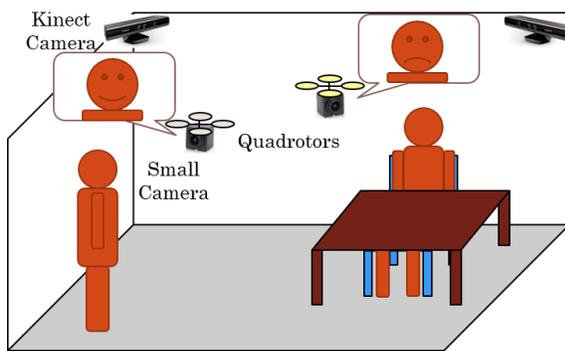
For health care provided to elderly people or people with some mental disorders, patients' emotion needs to be observed regularly. The current practice uses a number of staff to observe their faces and use smile as the indicator. However, the ratio of staff to patients is not enough and the task require regular observation, resulting in inefficiency, ineffectiveness, and fatigue of the caregivers. Therefore, a system for tracking people's face and processing for their emotion is necessary for this task. This research proposes the use of environmental cameras together with mobile cameras to track people's face to obtain their facial images.

In the proposed method, quadrotors equipped with small video cameras are used to follow and track people's face (Fig. 1), where the facial images can be sent back and the emotion estimation can be performed. Xbox 360's Kinect cameras are installed in the environment to cover the area and detect the positions and orientation of each person in the space. The position and direction of the head is then used to set up the goal position for the quadrotor such that it is at a distance in front of the person and pointing the camera towards the face. The quadrotor's position is also detected from the depth image provided by the Kinect sensors, while its orientation is obtained from the onboard inertial measurement unit (IMU). Finally, the quadrotor is navigated to the goal position, where the camera can capture the person's facial images. Fig. 2 displays the tracking process in action for tracking of one person using 5 Kinects and one quadrotor, covering a 3-by-3.5 sq. m. area.

**Keywords:** quadrotor, Kinect, human tracking, face tracking

## Reference

- [1] Srisamosorn, V., Kuwahara, N., Yamashita, A., Ogata, T., and Ota, J. "Automatic Face Tracking System using Quadrotors: Control by Goal Position Thresholding". *Proceedings of the IEEE International Conference on Robotics and Biomimetics (ROBIO 2014)*, pp. 1314-1319, Dec 2014.



**Fig. 1** System of quadrotors in elderly nursing home



**Fig. 2** Quadrotor tracking the person's face