คณะวิศวกรรมศาสตร์

มหาวิทยาลัยสงขลานครินทร์

สอบกลางภาค ประจำภาคการศึกษาที่ 2   ประจำปีการศึกษา 2552

วันที่ 23 ธันวาคม 2551   เวลา 9:00 – 11:00 น.

วิชา 217 - 481 Artificial Intelligence and Robotics   ห้อง R200

คำสั่ง

1. ข้อสอบมีทั้งหมด 5 ข้อ ให้ทำทุกข้อ

2. ไม่อนุญาตให้นำ โน้ต ตำรา หรือเอกสารใดๆ เข้าห้องสอบ

3. อนุญาตให้นำพจนานุกรมคำศัพท์ภาษาอังกฤษเข้าห้องสอบได้

ชื่อ................................นามสกุล................................ รหัส........................

ข้อ	คะแนนเต็ม	คะแนนที่ได้
1	5	
2	5	
3	5	
4	5	
5	5	
รวม	25	

อ. ชลิตา หิรัญสุข

ผู้ออกข้อสอบ

217 - 481: Artificial Intelligence and Robotics

Tutor: *Chalita Hiransoog*

Note: Only dictionaries (both paper copies and electronic dictionaries) are allowed into this examination. Answers are expected in English and show all working when possible.

Question 1: General Knowledge for Artificial Intelligence

Compare the differences between 'strong AI' and 'weak AI'. (5 marks)

Question 2: Artificial Intelligence in Robotics Design

Discuss the benefits of introducing AI into robotics design. (5 marks)

Question 3: Artificial Intelligence in Robotics Design

Discuss the possible drawbacks of introducing AI into robotics design. (5 marks)

Question 4: Robotics and Senses

Robotic Perception, On Purpose

European researchers developed technology that enables a robot to combine data from both sound and vision to create combined, purposeful perception. In the process, they have taken the field to a new level.

Currently, computer vision is good at recognising objects in images and videos and has been successfully employed in several specialised industrial applications, such as quality control during microchip fabrication.

But robotic perception is much weaker in less defined situations, like understanding and responding to human behaviour and even conversations. Yet, it is precisely this sort of interaction which promises the most compelling applications for future humanoid technology, where people-like robots can act as guides, or mix with people, or use perception to infer appropriate actions.

A truly perceptive robot, capable of acting independently and appropriately in complex situations remains a distant goal, but European researchers brought it much closer with their Perception-on-Purpose (POP) project.

Original, by design

"The originality of our project was our attempt to integrate two different sensory modalities, namely sound and vision," explains Radu Horaud, POP's coordinator.

"This was very difficult to do, because you are integrating two completely different physical phenomena," he adds.

Vision works from the reflection of light waves from an object, and it allows the observer to infer certain properties, like size, shape, density and texture. But with sound you are interested in locating the direction of the source, and trying to identify the type of sound it is.

Tricky issue

On its own, sound is difficult to pinpoint, because it needs to be located in a 3D space. Then there is the problem of background noise, such as an open window letting in sounds from next door.

But it turned out that integrating two different senses helped the researchers in their bid to locate and tune into relevant sounds.

"It is not that easy to decide what is foreground and what is background using sound alone, but by combining the two modalities -- sound and vision -- it becomes much easier," reveals Horaud.

"If you are able to locate ten sound sources in ten different directions, but if in one of these directions you see a face, then you can much more easily concentrate on that sound and throw out the other ones."

4.1 Two different sensory modalities, Vision and Sound, how are they different? (2 marks)

4.2 What will be the benefit of integrating vision and sound senses into robotics design? (3 marks)

Question 5: Design Project

According to your system design project in class, outline the capability of your chosen system (i.e. Rehabitation Assistant System or Gardening System or Waste Collection System). (5 marks)