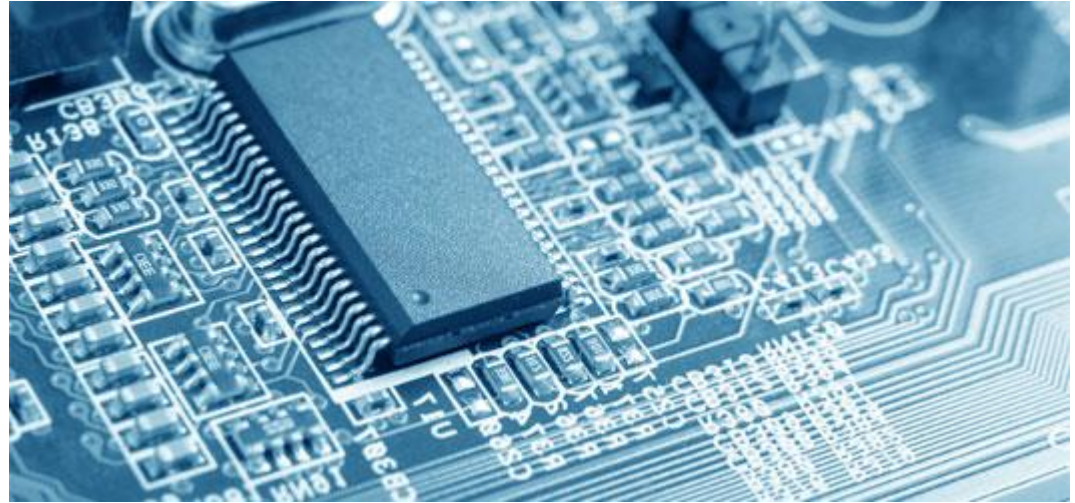




NAZARBAYEV  
UNIVERSITY

SCHOOL OF SCIENCE AND TECHNOLOGY



# **ROBT305 - Embedded Systems**

**Alternative Course Project Topics**

**6 November, 2015**

# Course projects

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## ▶ Aims:

- ▶ Acquire practical skills of designing soft and hard embedded systems for robotic applications
- ▶ Utilize education and research facilities of the department for student projects
- ▶ Create a basis for student graduate projects

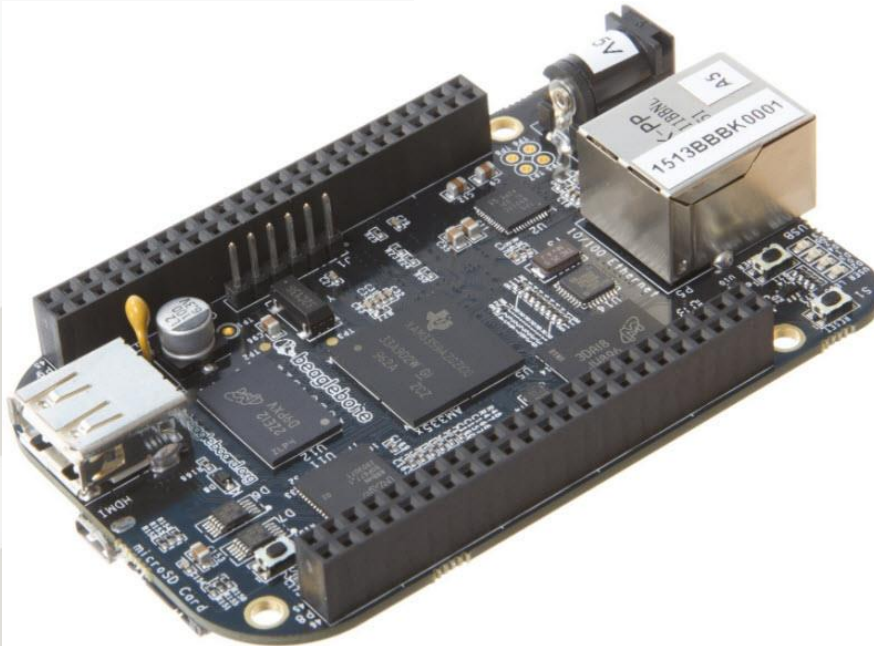
**Deadline – 3 December – project presentations**

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# Project #1 BBB based orientation sensor

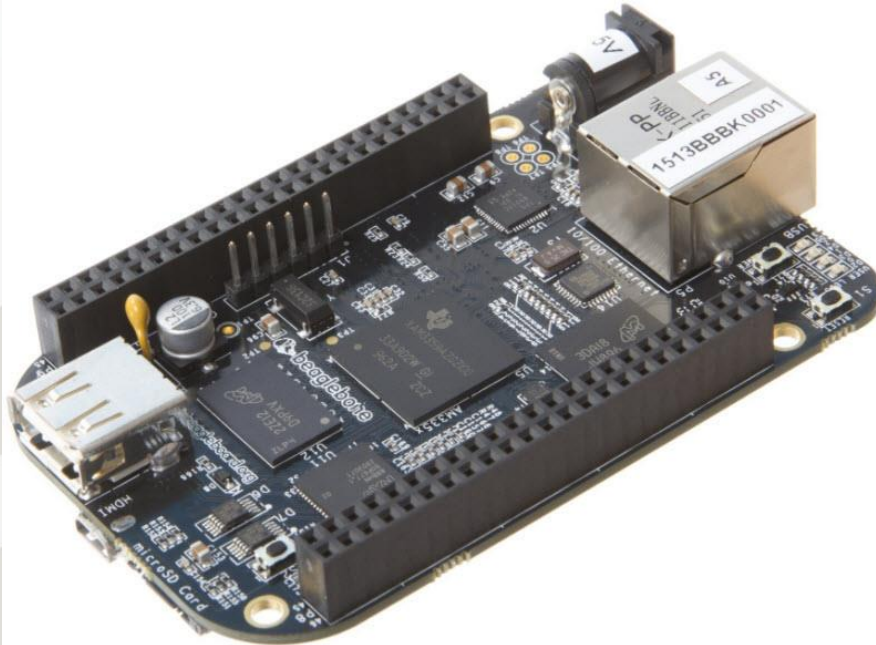
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1. Connecting Pololu Minimu-9 v3 sensor to BBB board (project assignment#1)
2. Implementing open-source sensor measurement fusion algorithm from <http://www.x-io.co.uk/open-source-imu-and-ahrs-algorithms/>
1. PThreaded implementation:
  - thread #1 – sensor data acquisition
  - thread #2– data fusion algorithms implementation
  - thread #3 – graphical interface or streaming video via Ethernet or WiFi to a PC (bonus points)



# Project #2 BBB based orientation sensor 2

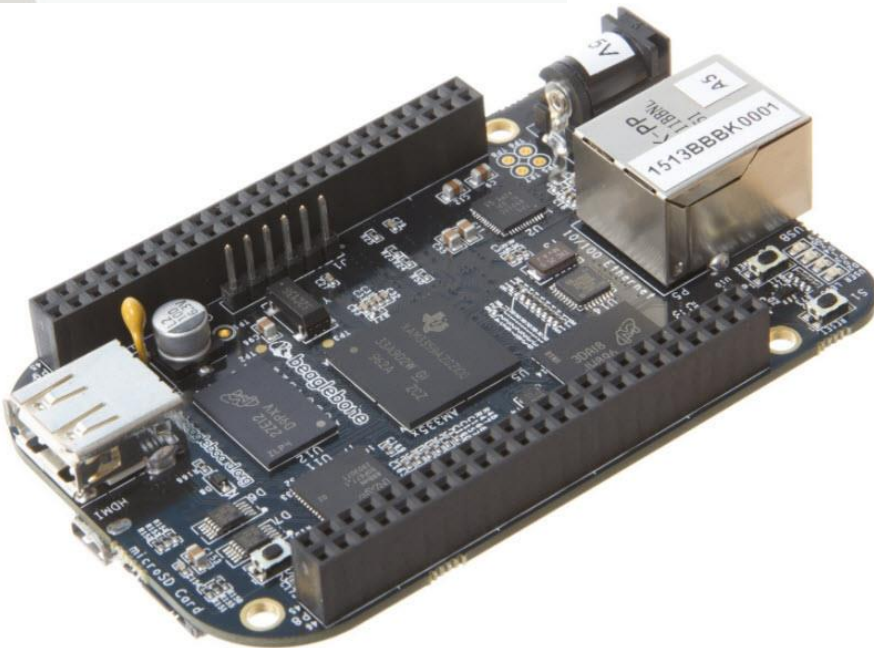
- ▶ Connecting CHR-UM7-LT Orientation Sensor to BBB board via UART or SPI interface  
<https://www.chrobotics.com/shop/um7-lt-orientation-sensor>
- ▶ Implementing open-source sensor measurement fusion algorithm from  
<http://www.x-io.co.uk/open-source-imu-and-ahrs-algorithms/>
- ▶ PThreaded implementation:
  - thread #1 – sensor data acquisition
  - thread #2– data fusion algorithms implementation
  - thread #3 – graphical interface or streaming video via Ethernet or WiFi to a PC (bonus points)



# Project #3 BBB based IP camera

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1. Connecting Logitech webcam to BBB board
2. Streaming video via Ethernet or WiFi to a PC
3. Motion detector (open-source library)
4. PThreaded implementation – bonus points

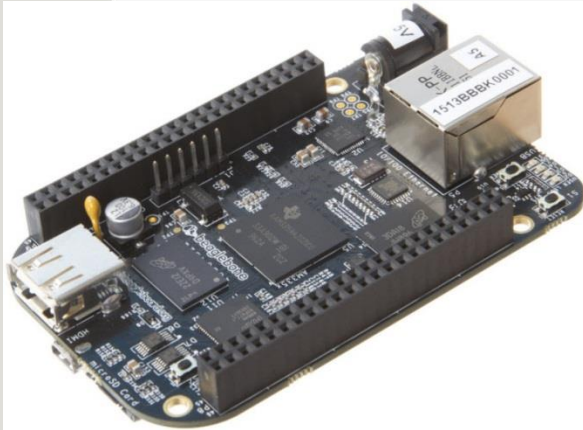




# Project #4 2D Scanner for a Dr. Jaguar mobile robot

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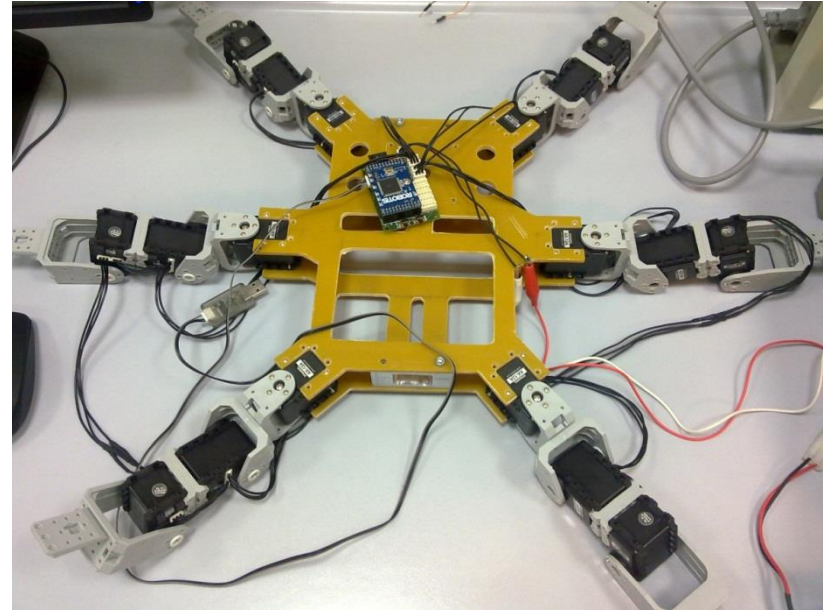
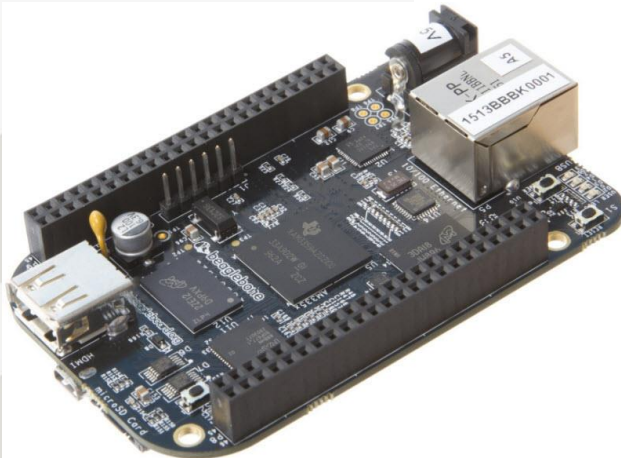
1. Connecting BBB to Dr. Jaguar mobile robot
2. Connecting Hokuyo UTM-30LX laser range finder (LIDAR) sensor to BBB
3. Transmitting LIDAR data to control PC via Wi-Fi



# Project #5 Hexapod Robot

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1. BBB based embedded systems (master):
2. Servomotors control using CM-700 controller (slave)
3. Different gait patterns for various terrains



# Alternative Projects

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1. Use of BBB board interfaced with at least 1-2 external hardware is required
2. PThreaded implementation – bonus
3. Agree with course instructor

