CPEN 391 Module 2 Design Change Document

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* Components not mentioned below remain unchanged from original design.

Hardware Architecture Design Change

1. **DE1-SoC Computer System with ARM processor**
   Act as a remote server that receives image data at a constant interval via Bluetooth and performs hardware-accelerated deep neural network (DNN) prediction, given the pre-trained model parameters, to predict the presence of potential poachers.

2. **Terasic RFS Daughter Board**
   - Bluetooth chip
     Establish connection with the RaspberryPi to receive image data (capture by camera module) and pass the data into De1-Soc for processing.
   - WiFi chip
     Connect and send processed image data/results to a cloud-based database for long-term storage.

3. **RaspberryPi Computer**
   - 3-axis accelerometer
     Predict animal activities such as resting, walking, running etc. based on collected sensor data.
   - Temperature sensor
     Detect wildfire based on collected temperature data.
   - Bluetooth
     Establish connection between RaspberryPi and De1-SoC to send image data for processing.
   - WiFi
     Establish connection between RaspberryPi and the cloud-based database to send sensors data and store them in the database.
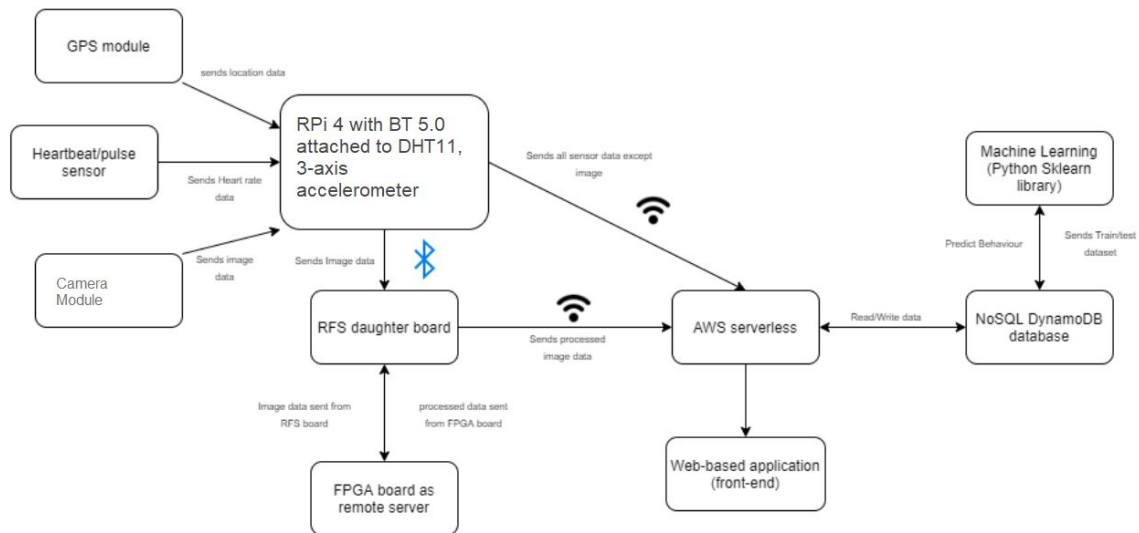
4. **Camera Module**
   Detect human presence and identify unauthorised personnel based on the images captured.

Software Architecture Design Change

1. **Machine Learning Library**
   Python Library used for predicting animal behaviour is changed from the Chainer library to the Sklearn library.

Algorithmic Processing Change

Reasons for Design Change

1. Falling behind of original schedule due to lack of resources to interface sensors on RFS board with De1-SoC board.
2. New hardware components (GPS module, camera module, heartbeat sensor, etc.) are easier to set up on a RaspberryPi than De1-SoC board, hence requires less setup time than interfacing the sensors with De1-SoC.
3. Team members are more proficient in interfacing hardware components with a RaspberryPi and there are more open resources online.
4. Test and validation process is faster and easier when working with RaspberryPi, since the Python script is easier to work with as opposed to the C program and Verilog testbench.
5. Due to time constraint, the above changes are required to produce an MVP before the end of the term.

Impact of Changes to Target Market

A RaspberryPi computer and a camera module are required for the new design and hence increases the cost of the product.