SMART BRACELETS PROJECT

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REPORT

Following the project rules, the first phase to implement is the “Pairing Phase”: at the beginning of the simulation, the first step is to send broadcast messages so that every single mote finds which other mote has its own same key (the random key is composed of 20 digits.); the “sendBroadcastMessage()” function serves this purpose. When each mote has found the other one with the same key, a special message is transmitted (in unicast) to the source device, so the variable special_code is set to 1. This task is done with the “sendSpecialMessage()” function.

In our simulation, the couples, defined by the TOS_NODE_ID, are (1,2) and (3,4), with the odd numbers representing the Parents, while the even ones representing the Children.

We divide the pairing phase in three subphases. The first one is the broadcast phase, identified by the variable “paired” equal to 0. Here we send packet containing the preloaded key to any other motes in the network. When a mote receives a packet containing its own key, it is ready for the next subphase: the special message phase, identified by “paired” equal to 1. At this time of execution, we need to send a special message that is simply a 1 of the variable “special code”. After a mote has both sent and received the special code, it is ready to set its own variable “paired” to 2 and to begin the ”Operation mode” .

Operation mode INFO messages contain the positions of the child and the kinematic status. The statuses are mapped as follows: 0-STANDING 1-WALKING 2-RUNNING 3-FALLING. To respect the rules about the probability distribution we use Random.rand16() and then use module-10 to obtain 10 number, each one with a probability of about 0.1, finally we gather in group of 3 some numbers to give statuses STANDING, WALKING and RUNNING a probability of 0.3 and only one number is assigned to FALLING, which only has a probability of 0.1. Coordinates x and y are obtained with the Random-rand16() divided by 10 to get smaller number to represent our random number, since rand16() gives numbers between 0 and 65000 about.

Upon the reception of a message containing the FALLING status the program begins the “Alert Mode”: in this mode the Parent sends a FALLING ALARM. Moreover, in case of Parent’s bracelet does not receive any message from the Child, after one minute from the last received message, a MISSING alarm is sent reporting the last

position received. This specific aspect is implemented when ParentMilliTimer is fired.

***Note**: Due to the congestion on the channel caused by the great number of broadcast messages, it may happen that the running simulation on COOJA results in an infinite loop of an erroneous communication between two motes during the “Pairing Phase”. It’s very rare, but in case it happens, please select the option “reload with new random seed” on COOJA and restart the simulation.

****Used IOT-Tools**: TINYOS/COOJA/NODE-RED