

```
1 using System;
2 using System.Collections;
3 using System.Collections.Generic;
4 using Impinj.OctaneSdk;
5
6
7 namespace TG2_RFID
8 {
9     public class Project
10    {
11        public static ushort realAmbient = 0;
12
13        /// <summary>
14        /// The map of registered people in the project.
15        /// </summary>
16        protected static volatile Dictionary<string, Cardholder>
17            registeredPeople = new Dictionary<string, Cardholder>();
18
19        /// <summary>
20        /// The map of registered ambients in the project.
21        /// </summary>
22        protected static volatile Dictionary<ushort, Ambient> registerAmbient
23            = new Dictionary<ushort, Ambient>();
24
25        /// <summary>
26        /// The map of registered transitions in the project.
27        /// </summary>
28        protected static volatile Dictionary<Tuple<string, ushort>,
29            Transition> registerTransition = new Dictionary<Tuple<string,
30            ushort>, Transition>();
31
32        /// <summary>
33        /// Registers a new cardholder given an tag epc.
34        /// </summary>
35        /// <param name="valueEPC">tag EPC as an string epc.</param>
36        /// <param name="person">Person.</param>
37        public static void RegisterNewCardholder(string valueEPC, Cardholder
38            person)
39        {
40            person.SetCardholderEPC(valueEPC);
41            registeredPeople.Add(valueEPC, person);
42        }
43
44        /// <summary>
45        /// Registers a new ambient given an antenna.
46        /// </summary>
47        /// <param name="antenna">Antenna.</param>
48        /// <param name="ambient">Ambient.</param>
49        public static void RegisterNewAmbient(ushort roomNumber, Ambient
50            ambient)
51        {
52            registerAmbient.Add(roomNumber, ambient);
53        }
54
55        /// <summary>
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51     /// Registers a new ambient given an antenna.
52     /// </summary>
53     /// <param name="antenna">Antenna.</param>
54     /// <param name="transition">Ambient.</param>
55     public static void RegisterNewTransition(Tuple<String, ushort> antenna, Transition transition)
56     {
57         registerTransition.Add(antenna, transition);
58     }
59
60     public static void RegisterNewCardholder(string EPC, string name)
61     {
62         var cardholder = new Cardholder(name);
63         Project.registeredPeople.Add(EPC, cardholder);
64         foreach (var transition in Project.registerTransition.Values)
65         {
66             var ant1 = transition.GetAtributes1stAmb().Item2;
67             var ant2 = transition.GetAtributes2ndAmb().Item2;
68             if (!cardholder.curvesPowerReadingsDictionary.ContainsKey(ant1))
69             {
70                 cardholder.curvesPowerReadingsDictionary.Add(ant1, new Curve());
71             }
72             if (!cardholder.curvesPowerReadingsDictionary.ContainsKey(ant2))
73             {
74                 cardholder.curvesPowerReadingsDictionary.Add(ant2, new Curve());
75             }
76             if (!cardholder.curvesDoplerFrequencyReadingsDictionary.ContainsKey(ant1))
77             {
78                 cardholder.curvesDoplerFrequencyReadingsDictionary.Add(ant1, new Curve());
79             }
80             if (!cardholder.curvesDoplerFrequencyReadingsDictionary.ContainsKey(ant2))
81             {
82                 cardholder.curvesDoplerFrequencyReadingsDictionary.Add(ant2, new Curve());
83             }
84         }
85     }
86 }
87
88 public static void PopulateProjectCardholders()
89 {
90     Project.registeredPeople.Clear();
91     Project.RegisterNewCardholder("E200 001B 2609 0147 0780 7C25", "Maria Beatriz");
92     Project.RegisterNewCardholder("E200 001B 2609 0147 0510 78BD", "Andre");
93     Project.RegisterNewCardholder("E200 001B 2609 0147 0460 7BA5",

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        "Jese");
194     Project.RegisterNewCardholder("E200 001B 2609 0147 0450 7B99",
        "Marquemi");
195     Project.RegisterNewCardholder("E200 001B 2609 0147 0380 7B85",
        "Caixeta");
196     Project.RegisterNewCardholder("E200 001B 2609 0147 0910 7C5D",
        "Geordana");
197     Project.RegisterNewCardholder("E200 001B 2609 0147 0850 7C39",
        "Takashi");
198     Project.RegisterNewCardholder("E200 001B 2609 0147 0840 7C31",
        "Luan");
199     Project.RegisterNewCardholder("E200 001B 2609 0147 0710 7C0D",
        "Redy");
200     Project.RegisterNewCardholder("E200 001B 2609 0147 0660 7BF5",
        "Mayara");
201     Project.RegisterNewCardholder("E200 001B 2609 0147 0900 7C55",
        "Isa");
202     Project.RegisterNewCardholder("E200 001B 2609 0147 0390 7B8D",
        "Hooper");
203     Project.RegisterNewCardholder("E200 001B 2609 0147 0720 7C01",
        "Joao");
204     Project.RegisterNewCardholder("E200 001B 2609 0147 0600 7BD1",
        "Anastacia");
205     Project.RegisterNewCardholder("E200 001B 2609 0147 1100 7CA5",
        "Lucas");
206     Project.RegisterNewCardholder("E200 001B 2609 0147 0650 7BE9",
        "Renato");
207     Project.RegisterNewCardholder("E200 001B 2609 0147 0790 7C2D",
        "Aline");
208     Project.RegisterNewCardholder("E200 001B 2609 0147 0590 7BDD",
        "Artur");
209     Project.RegisterNewCardholder("E200 001B 2609 0147 1040 7C81",
        "Marina");
210     Project.RegisterNewCardholder("E200 001B 2609 0147 0520 7BB1",
        "Jose");
211     //GlobalDataReader1.Cadastro.Add("AD08 3003 4604 3152 2C00 0086",
        "Tag exemplo impinj");
212 }
213
214 /// <summary>
215 /// Checks whether the seen tag is registered.
216 /// </summary>
217 /// <returns><c>true</c>, if tag registered was ised, <c>>false</c>
        otherwise.</returns>
218 /// <param name="tag">Tag.</param>
219 public static bool IsTagRegistered(Tag tag)
220 {
221     return registeredPeople.ContainsKey(tag.Epc.ToString()); ;
222 }
223
224 /// <summary>
225 /// Gets cardholder from tag
226 /// </summary>
227 public static void ReadingCardholderTag(Tag tag, String senderName)
228 {
229     registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder

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cardholder);
130
131     cardholder.ReadingCardholderTag(tag, senderName);
132 }
133
134 public static void ProcessDataGiveTransition(Transition transition,
135     Tuple<string, ushort> antennaPersonAt, Cardholder person, Tag tag,
136     string senderName)
137 {
138     var otherAntenna = transition.GetOtherAntenna(antennaPersonAt);
139     var powerCurveLastAntenna = person.GetPowerCurve(antennaPersonAt);
140     var powerCurveOtherAntenna = person.GetPowerCurve(otherAntenna);
141     var dopplerCurveLastAntenna = person.GetDopplerEffectCurve
142         (antennaPersonAt);
143     var dopplerCurveOtherAntenna = person.GetDopplerEffectCurve
144         (otherAntenna);
145
146     /*
147     * Compare Peaks Time
148     */
149
150     /*
151     * Compare Peaks Time and value
152     */
153
154     /*
155     * Compare last value RSSI
156     */
157
158     /*
159     * Compare mean / median
160     */
161
162     /*
163     * Compare Doppler transition point
164     */
165
166     // Compare powerCurve peaks
167     var peakListLast = powerCurveLastAntenna.CalculatePeaks();
168     var peakListOther = powerCurveOtherAntenna.CalculatePeaks();
169     var maxLastAntenna = powerCurveLastAntenna.GetCurveMaxPoint();
170     var maxOtherAntenna = powerCurveOtherAntenna.GetCurveMaxPoint();
171
172     /*
173     * Compare RSSI Peaks Time
174     */
175     if (powerCurveLastAntenna.CompareCurveLastPeak
176         (powerCurveOtherAntenna))
177     {
178         // sets ambient to cardholder
179         registeredPeople.TryGetValue(tag.Epc.ToString(), out
180             Cardholder cardholder);
181         cardholder.SetAmbient(transition.GetAmb4GivenAntenna
182             (antennaPersonAt), 0);
183     }
184 }
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178         else
179         {
180             // sets ambient to cardholder
181             registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder cardholder);
182             cardholder.SetAmbient(transition.GetAmb4GivenAntenna(otherAntenna), 0);
183         }
184
185         /*
186         * Compare Peaks Time and value
187         */
188         //if ((peakListLast.Count > 0 && peakListOther.Count > 0 &&
189             (peakListLast[peakListLast.Count - 1].Item2 > peakListOther
190             [peakListOther.Count - 1].Item2))
191         // || (peakListLast.Count == 0 || peakListOther.Count == 0 &&
192             maxLastAntenna.Item1 > maxOtherAntenna.Item1 &&
193             maxLastAntenna.Item2 > maxOtherAntenna.Item2))
194         //{
195             // sets ambient to cardholder
196             registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder cardholder);
197             cardholder.SetAmbient(transition.GetAmb4GivenAntenna(antennaPersonAt), 1);
198         //}
199         //else
200         //{
201             // sets ambient to cardholder
202             registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder cardholder);
203             cardholder.SetAmbient(transition.GetAmb4GivenAntenna(otherAntenna), 1);
204         //}
205
206         /*
207         * Compare last value RSSI
208         */
209         if (powerCurveLastAntenna.CompareCurveLastPeak(powerCurveOtherAntenna))
210         {
211             //sets ambient to cardholder
212             registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder cardholder);
213             cardholder.SetAmbient(transition.GetAmb4GivenAntenna(antennaPersonAt), 2);
214         }
215         else
216         {
217             //sets ambient to cardholder
218             registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder cardholder);
219             cardholder.SetAmbient(transition.GetAmb4GivenAntenna(otherAntenna), 2);
220         }
221
222         /*

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219      * Compare mean
220      */
221      if (powerCurveLastAntenna.CompareCurveMeans
222          (powerCurveOtherAntenna))
223      {
224          //sets ambient to cardholder
225          registeredPeople.TryGetValue(tag.Epc.ToString(), out
226              Cardholder cardholder);
227          cardholder.SetAmbient(transition.GetAmb4GivenAntenna
228              (antennaPersonAt), 3);
229      }
230      else
231      {
232          //sets ambient to cardholder
233          registeredPeople.TryGetValue(tag.Epc.ToString(), out
234              Cardholder cardholder);
235          cardholder.SetAmbient(transition.GetAmb4GivenAntenna
236              (otherAntenna), 3);
237      }
238      /*
239      * Compare meadian
240      */
241      if (powerCurveLastAntenna.CompareCurveMedians
242          (powerCurveOtherAntenna))
243      {
244          //sets ambient to cardholder
245          registeredPeople.TryGetValue(tag.Epc.ToString(), out
246              Cardholder cardholder);
247          cardholder.SetAmbient(transition.GetAmb4GivenAntenna
248              (antennaPersonAt), 4);
249      }
250      else
251      {
252          //sets ambient to cardholder
253          registeredPeople.TryGetValue(tag.Epc.ToString(), out
254              Cardholder cardholder);
255          cardholder.SetAmbient(transition.GetAmb4GivenAntenna
256              (otherAntenna), 4);
257      }
258      /*
259      * Compare Doppler transition point
260      */
261      if (!Double.IsNaN(dopplerCurveLastAntenna.CalculateCrossingPoint
262          ().Item1) &&
263          !Double.IsNaN(dopplerCurveOtherAntenna.CalculateCrossingPoint
264          ().Item1) &&
265          dopplerCurveLastAntenna.CalculateCrossingPoint().Item1 >
266          dopplerCurveOtherAntenna.CalculateCrossingPoint().Item1)
267      {
268          //sets ambient to cardholder
269          registeredPeople.TryGetValue(tag.Epc.ToString(), out
270              Cardholder cardholder);
271          cardholder.SetAmbient(transition.GetAmb4GivenAntenna
272              (antennaPersonAt), 5);
```

```

260     }
261     else if (!Double.IsNaN
262             (dopplerCurveLastAntenna.CalculateCrossingPoint().Item1) &&
263             !Double.IsNaN(dopplerCurveOtherAntenna.CalculateCrossingPoint
264             ().Item1) &&
265             dopplerCurveLastAntenna.CalculateCrossingPoint().Item1 <
266             dopplerCurveOtherAntenna.CalculateCrossingPoint().Item1)
267     {
268         //sets ambient to cardholder
269         registeredPeople.TryGetValue(tag.Epc.ToString(), out
270         Cardholder cardholder);
271         cardholder.SetAmbient(transition.GetAmb4GivenAntenna
272         (otherAntenna), 5);
273     }
274     else
275     {
276         //if ((peakListLast.Count > 0 && peakListOther.Count > 0 &&
277         (peakListLast[peakListLast.Count - 1].Item1 > peakListOther
278         [peakListOther.Count - 1].Item1))
279         //|| (peakListLast.Count == 0 || peakListOther.Count == 0 &&
280         maxLastAntenna.Item1 > maxOtherAntenna.Item1 &&
281         maxLastAntenna.Item2 > maxOtherAntenna.Item2))
282         //{
283             // sets ambient to cardholder
284             registeredPeople.TryGetValue(tag.Epc.ToString(), out
285             Cardholder cardholder);
286             cardholder.SetAmbient(transition.GetAmb4GivenAntenna
287             (antennaPersonAt), 5);
288         //}
289         //else
290         //{
291             // sets ambient to cardholder
292             registeredPeople.TryGetValue(tag.Epc.ToString(), out
293             Cardholder cardholder);
294             cardholder.SetAmbient(transition.GetAmb4GivenAntenna
295             (otherAntenna), 5);
296         //}
297     }
298 }
299
300 /*
301  * Compare Doppler transition point and RSSI peaks
302  */
303
304 if ((peakListLast.Count > 0 && peakListOther.Count > 0 &&
305     (peakListLast[peakListLast.Count - 1].Item1 > peakListOther
306     [peakListOther.Count - 1].Item1) &&
307     (!Double.IsNaN(dopplerCurveLastAntenna.CalculateCrossingPoint
308     ().Item1) &&
309     !Double.IsNaN(dopplerCurveOtherAntenna.CalculateCrossingPoint
310     ().Item1) &&
311     dopplerCurveLastAntenna.CalculateCrossingPoint().Item1 >
312     dopplerCurveOtherAntenna.CalculateCrossingPoint().Item1)))
313     //|| (peakListLast.Count == 0 || peakListOther.Count == 0 &&
314     maxLastAntenna.Item1 > maxOtherAntenna.Item1 &&
315     maxLastAntenna.Item2 > maxOtherAntenna.Item2))

```

```

296         {
297             // sets ambient to cardholder
298             registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder cardholder);
299             cardholder.SetAmbient(transition.GetAmb4GivenAntenna(antennaPersonAt), 6);
300         }
301         else if ((peakListLast.Count > 0 && peakListOther.Count > 0 &&
302             (peakListLast[peakListLast.Count - 1].Item1 <= peakListOther
303             [peakListOther.Count - 1].Item1) &&
304             (!Double.IsNaN(dopplerCurveLastAntenna.CalculateCrossingPoint
305             ().Item1) &&
306             !Double.IsNaN(dopplerCurveOtherAntenna.CalculateCrossingPoint
307             ().Item1) &&
308             dopplerCurveLastAntenna.CalculateCrossingPoint().Item1 <=
309             dopplerCurveOtherAntenna.CalculateCrossingPoint().Item1)))
310         {
311             // sets ambient to cardholder
312             registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder cardholder);
313             cardholder.SetAmbient(transition.GetAmb4GivenAntenna(otherAntenna), 6);
314         }
315
316
317         //if (powerCurveLastAntenna.GetSize() > 4 ||
318         //    powerCurveLastAntenna.GetSize() > 4)
319         //{
320             int TESTANDO = 0;
321         //}
322
323         //if ((peakListLast.Count > 0 && peakListOther.Count > 0 &&
324             (peakListLast[peakListLast.Count - 1].Item1 > peakListOther
325             [peakListOther.Count - 1].Item1))
326         //    || (peakListLast.Count == 0 || peakListOther.Count == 0 &&
327             maxLastAntenna.Item1 > maxOtherAntenna.Item1))
328         //if (maxLastAntenna.Item1 > maxOtherAntenna.Item1)
329         //if (powerCurveLastAntenna.CalculateMeanY() >
330             powerCurveOtherAntenna.CalculateMeanY())
331         //if (powerCurveLastAntenna.GetCurveLastValue() >
332             powerCurveOtherAntenna.GetCurveLastValue())
333         //{
334             // sets ambient to cardholder
335             registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder cardholder);
336             cardholder.SetCurrAmbient(transition.GetAmb4GivenAntenna(antennaPersonAt));
337         //}
338         //else
339         //{
340             // sets ambient to cardholder

```



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336 // registeredPeople.TryGetValue(tag.Epc.ToString(), out 7
    Cardholder cardholder);
337 // cardholder.SetCurrAmbient(transition.GetAmb4GivenAntenna 7
    (otherAntenna));
338 //}
339
340 person.SetCurrAmbient(Project.GetAmbientInstance 7
    (Project.realAmbient));
341 }
342
343 // TODO
344 // Aqui vamos processar a curva já populada!
345 // Processa o cardholder data
346 public static void ProcessCardholderData(Tag tag, string senderName)
347 {
348     //get curves
349     registeredPeople.TryGetValue(tag.Epc.ToString(), out Cardholder 7
        person);
350     var antennaPersonAt = Tuple.Create<string, ushort>(senderName, 7
        tag.AntennaPortNumber);
351     var transition = Project.GetTransitionInstance(antennaPersonAt);
352
353     var ambient = transition.GetAmb4GivenAntenna(antennaPersonAt);
354
355     Tuple.Create<string, ushort>("Reader #1", 2);
356     Tuple.Create<string, ushort>("Reader #2", 1);
357     Tuple.Create<string, ushort>("Reader #2", 2);
358     Tuple.Create<string, ushort>("Reader #3", 1);
359     Tuple.Create<string, ushort>("Reader #3", 2);
360
361     if (ambient.GetName() == ("Area_Externa(0)") &&
362         transition != Project.GetTransitionInstance 7
            (Tuple.Create<string, ushort>("Reader #1", 1)))
363     {
364         return;
365     }
366     else if (ambient.GetName() == ("Sala_Reuniao(2)") &&
367         transition != Project.GetTransitionInstance 7
            (Tuple.Create<string, ushort>("Reader #2", 1)))
368     {
369         return;
370     }
371     else if (ambient.GetName() == ("Corredor_Baias(3)") &&
372         transition != Project.GetTransitionInstance 7
            (Tuple.Create<string, ushort>("Reader #3", 2)))
373     {
374         return;
375     }
376     //else if (ambient.GetName() == ("Sala_Principal(1)")
377
378
379
380     ProcessDataGiveTransition(transition, antennaPersonAt, person, 7
        tag, senderName);
381 }
382

```

```
383     /// <summary>
384     /// Returns Ambient type instance from dictionary according to key
385     given
386     /// </summary>
387     public static Ambient GetAmbientInstance (ushort ambientKey)
388     {
389         registerAmbient.TryGetValue(ambientKey, out Ambient
390         ambientInstance);
391         return ambientInstance;
392     }
393     /// <summary>
394     /// Returns Transition type instance from dictionary according to key
395     given
396     /// </summary>
397     public static Transition GetTransitionInstance(Tuple<string, ushort>
398     antennaID)
399     {
400         registerTransition.TryGetValue(antennaID, out Transition
401         transitionInstance);
402         return transitionInstance;
403     }
404     /// <summary>
405     /// Getter people
406     /// </summary>
407     ///
408     public static Cardholder GetCardholder(string tag)
409     {
410         registeredPeople.TryGetValue(tag, out Cardholder cardholderObj);
411         return cardholderObj;
412     }
413 }
414 }
415 }
416 }
417 }
418 }
```