**1 Context Model**

Weather service

Fire Department

Robot

Campus

Public safety

Campus management

Police Department

**2 Binary signaling protocol**

|  |  |  |
| --- | --- | --- |
| **Code** | **Issue** | **Department** |
| **0000** | **No issue** | **-** |
| **0001** | **Fire** | **Fire Department, Campus management** |
| **0010** | **Student help during night** | **Public safety, Campus management** |
| **0011** | **Violence or fight** | **Police, campus management** |
| **0100** | **Weather report from weather service** | **Campus management. Weather service** |

**0000 – No issue**

Campus management

Campus building

0000

0000

0000

Any system

robot

**0001 – Fire accident**

When the robot finds there is a Fire accident it is triggered with the code 0001. This code then indicates that it has come across a fire incident and it has to call the fire department service. It alerts the management and the fire department with the same code and hence it will be easy to identify.

0001 0001

robot

Fire Dept

Campus building

0001

Campus management

**0010 – Public safety**

When the robot finds there is an incident of violence it is triggered with the code 0010. This code then indicates that it has come across a robbery or any serious crime incidents and it has to call the Public safety department service. It alerts the management and the Public safety with the same code and hence it will be easy to identify.

**0010** **0010**

robot

Public safety

Campus building

**0010**

Campus management

**0011 – Police dept**

When the robot finds there is an incident of violence it is triggered with the code 0011. This code then indicates that it has come across a robbery or any serious crime incidents and it has to call the police department service. It alerts the management and the police with the same code and hence it will be easy to identify

**0011** **0011**

robot

Police dept

Campus building

**0011**

Campus management

**0100 –weather service**

**Robot obtains the data from the weather service and then inform the campus management which in turn inform the students regarding the weather and ask them to stay safe when it is not normal**

**0100**

robot

weather service

**0100**

Campus management

**3. Pseudo code for interacting with elements**

**c. Checking building status and normal maintenance:**

* **check\_Status(building\_number)**

{

Check(building\_number)

If (issue\_present)

{

Return 1;

}

Else {

Return 0;

}

}

* **Maintain( building\_number)**

{

Check\_Status(building\_number);

If(check\_Status(building\_number)==1)

{

Try {

Solve\_issue(building\_number)

}

Catch(error)

{

Send\_Request(department, building\_number)

Campus\_management(building\_number)

}

}

**b. Binding to department service providers to request information**

* **Send\_Request(department, building\_number)**

{

Issue=1;

If(department==’Fire’)

{

campusManagement(issue,building\_number)

Return fireDept(issue,building\_number)

}

Else if(department==’public safety’)

{

campusManagement(issue,building\_number)

Return publicSafety(issue,building\_number)

}

Else if(department==’police’)

{

campusManagement(issue,building\_number)

Return policeDept(issue,building\_number)

}

Else if(department==’weather’)

{

Return weatherService() // This gives info of upcoming weather to campus managemnt

}

}

1. **Receiving and responding to requests:**

* **Obtain\_response(department)**

{

dep = department

If(dep==’fire’ || dep==’public safety’ || dep ==’police’)

{

Send\_campusManagement( ETA, stepsToBeTaken);

}

Else if(dep==’weather’)

{

Report = getWeatherReport(date, time, range)

Send\_ReportTocampus(Report)

}

}

**Discussion**

**Service level agreement for testing performance of the robot**

SLA (Service Level Agreement) was introduced when the IT outsourcers came with a fact, they can run a system better than the in-house staff. So, to ensure that these promises are kept unbroken they implemented these agreements. The company that provides the service will promise with features that are enticing such as ‘24 hours’ available resources which includes customer services or internet or support maintenance and few others.

For a Robot, to assess its performance you need few features such as

* Maximum duration:
  + The maximum duration here represents the maximum number of hours the robot can take for monitoring a job. It shouldn’t delve into a job such as maintenance for longer time which leads it to skipping checking status of the buildings.
* Minimum duration
  + Minimum duration is same as the above term. The robot should be assigned a minimum duration it should work on a job to increase the efficiency. As an example, the robot should take at least 10 minutes to inspect a building which ensures that it didn’t skip any area it is not supposed to.
* Must complete by
  + This is a constraint that makes sure that the robot completes the given task on time. If the above minimum duration and the maximum duration is followed, then it’s easy to complete the task on time.
* Actions
  + Actions are generally the steps taken by a system due to a cause. They generally have priority. A single incident can cause the system to take multiple actions but, these actions do have priority while executions

There are other metrics also that comes into play for SLA like minimum late start, maximum early finish for the jobs. These provide constraints for what’s the minimum amount of time the robot can start late for a job and the latter one defines how early can a job be done once it is started. Also, these SLAs are for a robot with these functionalities and they tend to differ for different jobs and based on locations.

**Priority defined for the robot:**

For the robot that does the ground checking for the campus buildings, the term “priorities” in its decision making defines its order of steps taken during an incident. These actions or steps are based on what type of incident that it comes across with. When a robot faces a simple issue such as water leaking it priority must be informing the campus management to fix the leakage. Whereas when incidents such as fire accidents happens it must contact the fire department first then it must inform the campus management so they can provide some measures to keep people safe.

The delay in requesting for help or priority change might sometime cause huge disaster. These priorities can even be life changing. In case of armed robbery or intentional injurious incidents the robot should contact the ambulance and then the police department. Few seconds can be a life saving moment for those who are severely injured. The victims might be relieved to see an ambulance rather than seeing a police vehicle at first. So, in case of multiple actions the priority method should be implemented to help with the robot’s decision-making capabilities.