Target application: Strega-comanda-color (Witch Says Colors)

The players must be at least 3.

With a counting out rhyme, a "WITCH" is selected.

The Witch calls out a color; all the players must go and touch a "thing" of that color: it can be clothes, objects, or anything in the nature and environment.

The game ends when the witch touches a player before he/she can touch the wanted color.

This player will be the witch for the next round of the game.

Target application: Strega-comanda-color (Witch Says Colors)

- Kilobots have led of different colors, each kilobot sets a color
- One Kilobot is nominated the WITCH
  - Chooses a led color
- The kilobot with the nominated colored led runs away (runner)
- All the others try to catch (catchers)
- The game ends when the running Kilobot is captured
- Work in team, implement both runner and catchers software

We will need to decide on some requirements engineering questions:

- Initial positioning?
- Communication protocol?
- How to define "capture"?
- What should be communicated while moving?

Requirements definition for Witch-says-colors

Initial list of requirements

How to write good requirements - 1

Good Requirements Are SMART

- **Specific**
  - It must address only one aspect of the system design or performance
- **Measurable**
  - Performance is expressed objectively and quantitatively
- **Achievable**
  - It must be technically achievable at costs considered affordable

Please write in English…

👍 Witch says color

~~strega comanda color~~

~~bruja dice color~~

~~魔女は色を言う~~

Background material

- The AMADEOS Book, chapters 1-2-3 and glossary
- All previous teachings
- Material on kilobots

Viewpoint: Architecture

We consider SoS-level requirements

Some requirements on Environments:

[A10] The kilobots shall operate on a space of ?x? ?

[A20] The surface shall be …

Some requirements on SoS structure and rules:

[A30] The SoS shall be composed of XXX kilobots and a controller located about 50 cm above the whiteboard

[A40] The SoS target shall be ???

[A50] At SoS starts, the kilobots shall be positioned ???

[A60] Each kilobot shall be able to operate either as a runner or a witch; this is decided … ?

[A70] Each Kilobot shall operate to ???

[A80] Each Kilobot shall have hardcoded the following information: ???

[A90] The execution shall complete when ???

Include description of states of the SoS (start – operational -termination).

Viewpoint: Architecture

We consider CS-level requirements

- Here you will need to comment on:
  - the device and its physical characteristics, including speed, engine
  - its behaviour and autonomy (a kilobot can move forward, turn left, turn right, …
  - Anything specific of the behaviour of the individual device and not of the SoS

Some questions (checklist):

- SoS: Which kind of SoS (directed, acknow., …)? What is the SoS mission? Which functionalities? Allowed movements? Composition of the SoS (we specified there can be only one leader)?
- CS: What are the CSs? What is a CS able to do by itself? Autonomy? Speed? Max Duration? Starting conditions (location, positioning)? Allowed movements? Which kind of engine?

Viewpoint Communication/RUI

Communication at CS-level

- Here we need to describe the interfaces of a CS (RUPI and RUMI), for example temperature sensors, infrared sensors, exchange of cyber information, stigmergic channels.

Communication at SoS-level

[C10] When the game starts, kilobots transmit through RUMI???

[C20] When …, Kilobots shall exchange through their RUMI the following information ?

[C30] Kilobots shall estimate their respective distance by energy signals (RUPI) starting from …?

Some questions (checklist):

Differentiate between RUPI and RUMI. What is transmitted over these channels? How does a CS knows about the others? Did we define comm. technology? Did we define interactions? Which transmission range for each CS? Which max message size can a CS transmit? What about message structure?

Viewpoint Emergence, Dynamicity, Time, Evolution, Dependability, Security

- Emergence
  [E10] The interaction of multiple kilobots ???
- Dynamicity
  [D10] The kilobots ??? (how do they react to proximity?) Any requirement to have coordinated movements?
- Time
  [T10] Kilobots shall measure time according to a local clock, whose resolution is the kilotick (1/32 of second)
  Are we using timestamps?
  Are we synchronizing kilobots?
- Dependability
  [DE10] ???
- Security
  [S10]???
- Some questions (checklist):
  - Dynamicity: what is our sequence of actions for dynamic aspects?
  - Some possible thoughts: (unexpected) stops or malfunctioning?

How to progress

1. Define groups of 2-3 students
   - At most 8 groups
2. Assign groups to
   - Architecture (3 groups max)
   - Communication (3 groups max)
   - Remaining viewpoints (3 groups max)
3. Each group works individually for 25 minutes
4. Then 20 minutes discussion (global session)
5. Groups are grouped togheter
   - Architecture (1-2 groups), Communication (1-2 groups), remaining viewpoints (1 group)
6. Groups work togheter for 25 minutes
7. Then 20 minutes discussion (global session)
8. Iterate from point 2 until convergence

Let's start our work now…

Implementation

- (to be filled during lecture)