"Twin"

An AI-based Companion Robot

Twin

The Companion Robot

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Objectives

- To make a robot that will try to ensure a sound mental health of the isolated people like covid patients and people who feel lonely or has mental health issues.
- To give this people some company by detecting their mood.

Outcome

- It will accompany lonely people.
- It will help them to relieve stress, depression and anxiety.
- It will improve mental health of disturbed and frustrated people.
- To sum up,it will act like a friend made of hardware.

State of the art

- Paro is a companion robot which is mainly for autistic teenager and disabled child which has a soft toy like structure.It mainly-
  - Mimicries the reaction of the patient
  - stimulates interaction between patients and caregivers
  - has been found to reduce patient stress

- Oracle is a friend robot that can detect the anxiety level with approximately 88% success.
  - capable of changing its behavior based on the user
  - Use pre-recorded speech while the human uses a keyboard to communicate with each other.

- In the early phase of the COVID-19 pandemic, interactions with a companion robot offered opportunities for people to deal with the challenges of social distancing.Companion robot Vector played three socially supportive relationship roles in mitigating loneliness of people-
  - Personal assistant
  - Relational peer
  - Intimate buddy
- Olly
  - proactively start conversation according to use mode
  - Give suggestions to do something

- NAO is able to deal with challenging facial emotion recognition tasks with various pose variations.
  - used a POSIT(Pose from Orthography and Scaling with ITerations) algorithm to identify head rotations and to improve the Active Appearance Model(AAM) fitting accuracy.
  - detect 18 facial actions and seven basic emotions.
  - 85.73% accuracy for AU recognition and 88.83% for emotion detection with the consideration of both shape and texture features.
- Pepper
  - Detect sadness or happiness of the user
  - Facial expression while talking with the user

Limitation of current system

- There is no such existing robot which can operate in Bangla.
- Most of these are too heavy for carrying around.
- There is no such existing system that combines mood detection as well as security system and also works as personal assistant.
- It is difficult for robot to respond to diversified human emotions.
- Sounds emitted are not diversified according to emotions.
- Different human reacts to same emotions differently,so robot can’t always solve this issue.
- Doesn’t stop the interactivity temporarily when the user is very aggressive with the robot.

Main Features

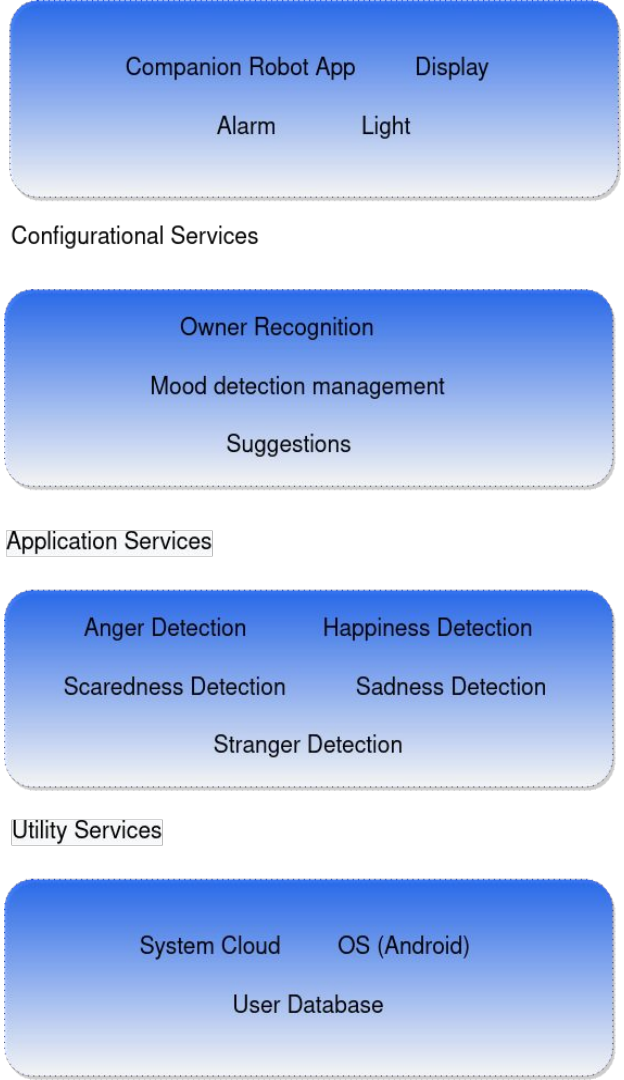
1

1. At first robot will detect its owner.
2. Detect sadness or happiness and anxiety level of the user.[Pepper]
3. Proactively start conversation according to user mode in Bangla language. [Olly]
4. Give suggestions to do something according to mood. [Olly]
5. Set reminder. [Alexa]
6. Could work as radio.
7. Facial expression while talking with the user.
8. Could read the user a book.
9. Could control AC,turn on/off light,TV.
10. Easy to carry around as small in size.

End Users

- People who thinks they need some company
- Isolated people
- People dealing with mental health issues

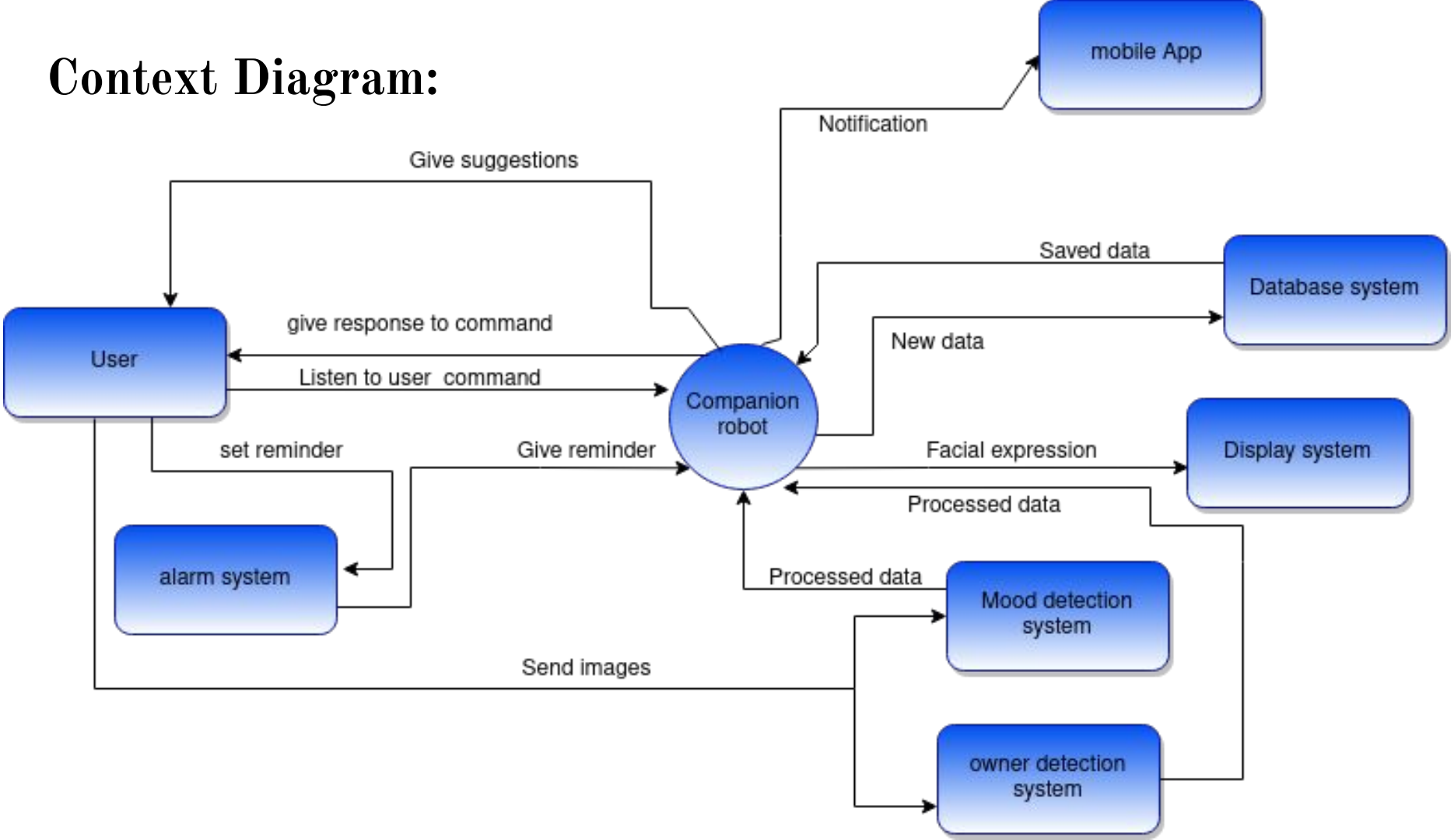
System Architecture



Functional and Non-functional requirement

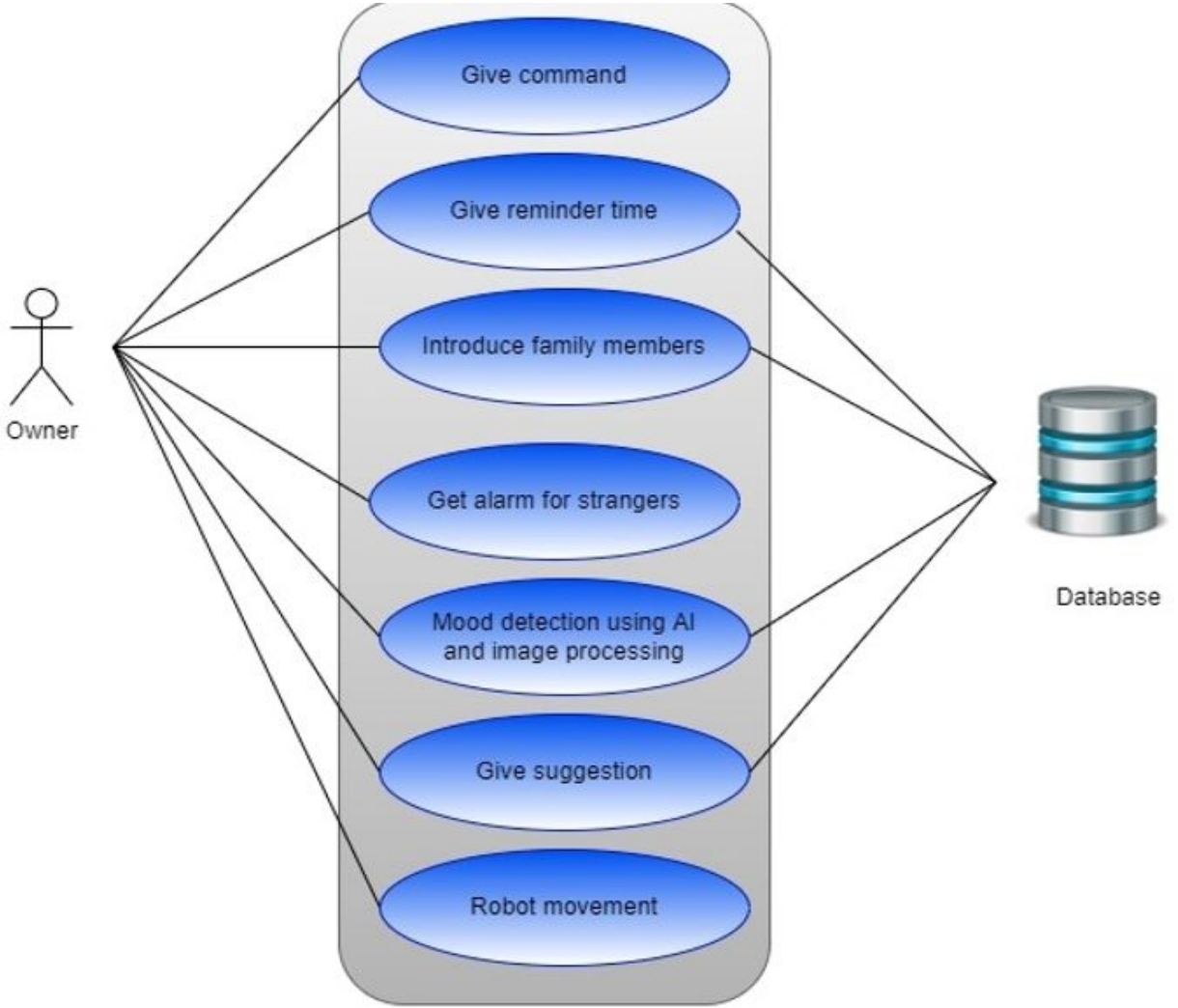
Serial No	System Requirement	Functional	Non-Functional
1	User-friendly interface	✖	✔
2	Mood Detection	✔	✖
3	Stranger Detection	✔	✖
4	Owner Recognition	✔	✖
5	A user-friendly display	✔	✖
6	Voice Command Response	✖	✔
7	Face like Display	✖	✔
8	Give reminder	✔	✖
9	Android App	✔	✖
10	Neck movement	✖	✔
11	Secured app alert	✖	✔

Context Diagram:



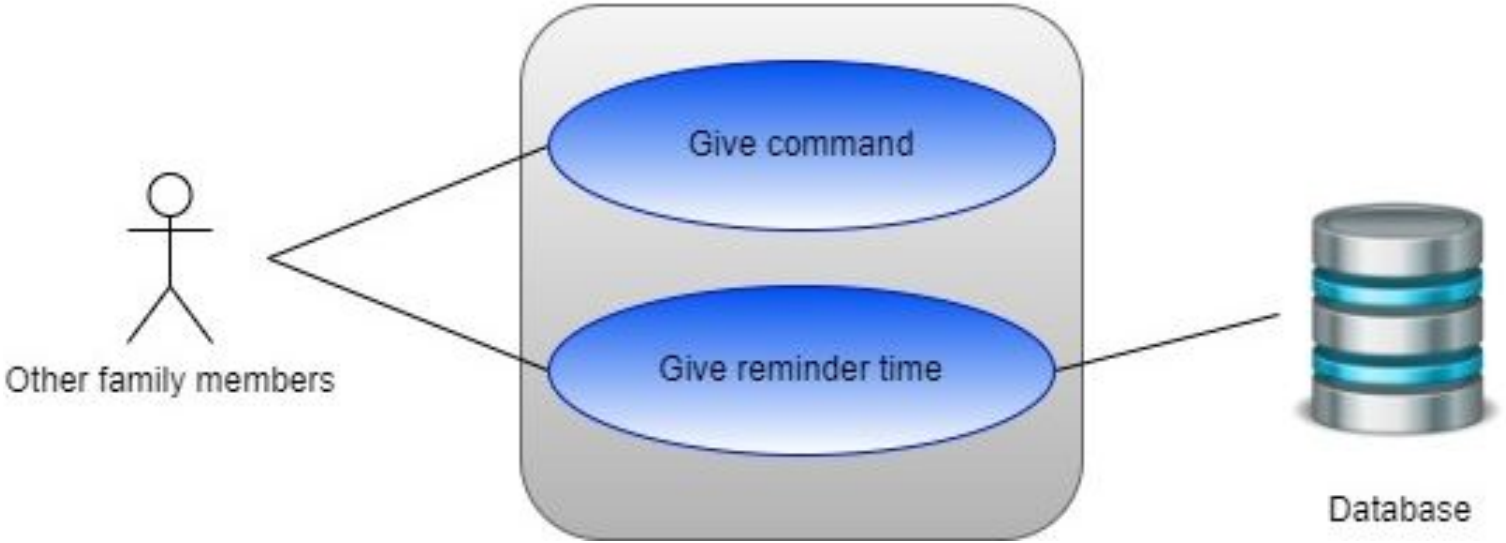
Use Case Diagram

For owner



Use Case Diagram

For other detected users

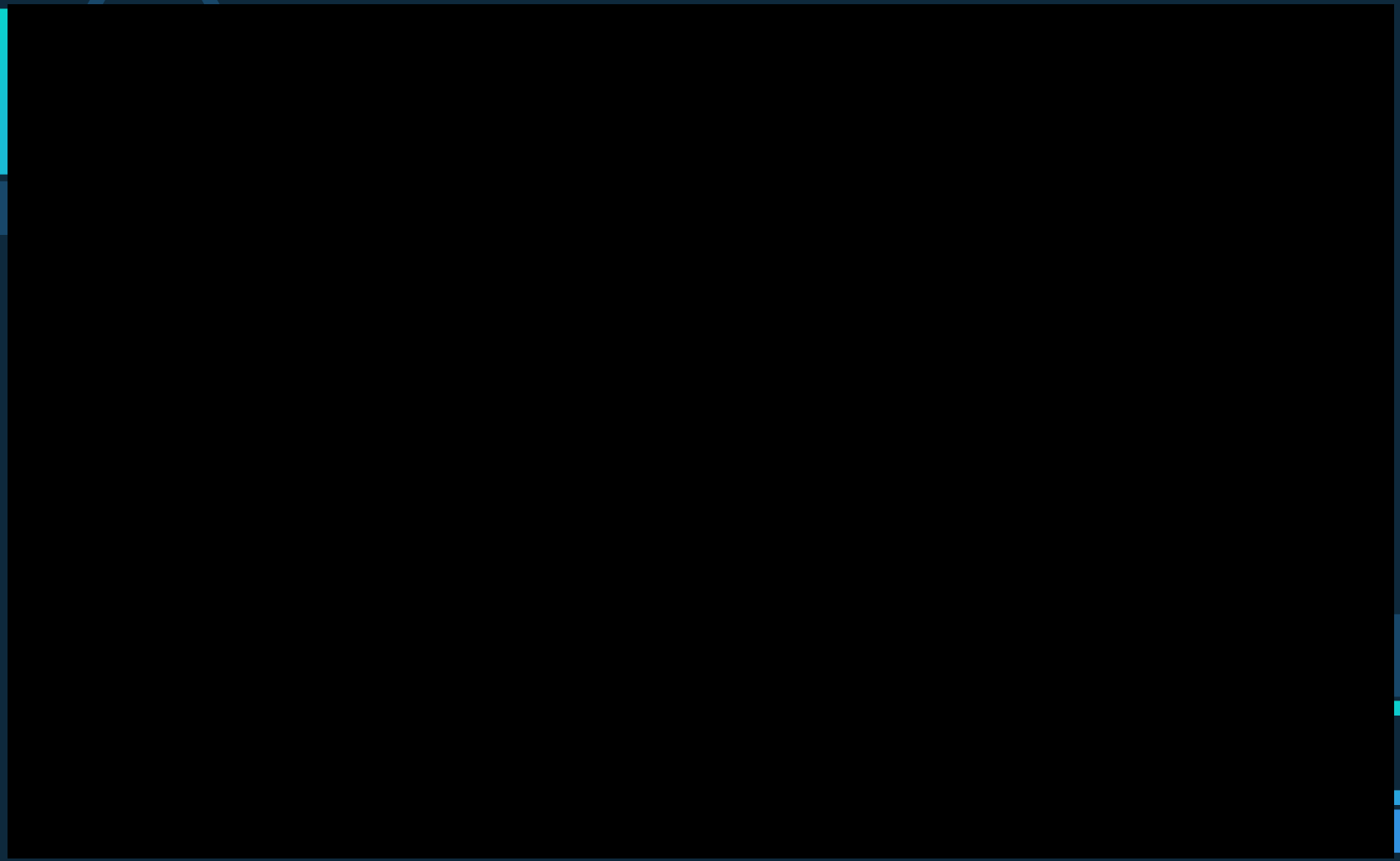


Limitations of our system

- The robot can’t move by itself.
- It can’t detect the emotion of more than one user at a single time.
- It will respond using only predefined set of instructions.
- It won’t be able to conduct high level interactive conversations.
- The result of mood detection won’t be 100% accurate.

Future work

- If the database is further enriched, the accuracy level will be improved.
- It will be capable of movement and follow its owner.
- It will replace therapists in the future in addressing different mental issues.
- If further improved, it can engage the owner in an interactive conversation.



Thank you

Any questions?