

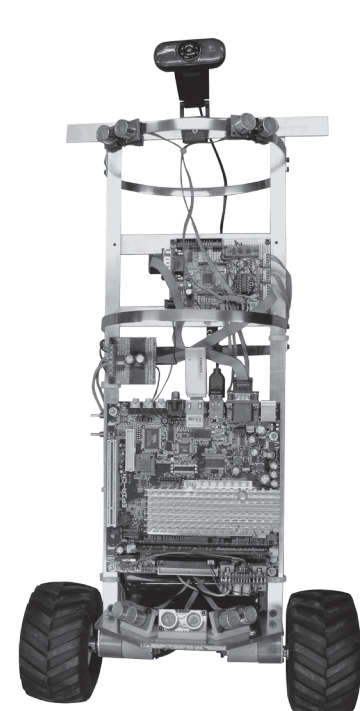
# Life saving robot for elderly people

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Elderly people often suffer from isolation and fear to have a serious problem when being alone at home. One hard fall, a hypoglycemic coma or a stroke may cause the person to die because nobody is there to help. The goal of this project is to build a prototype robot which can accompany his or her owner and detect physiological anomaly. If a problem has been detected, the robot can send an alarm to one or more trusted people to ask for help. The robot can then be remotely operated from a PC or smartphone such that the alarmed person can check what happened.

## Project Scope

The aim of the project is to build a mobile platform that can navigate autonomously through an apartment, as well as be remotely steered over the Internet with a webcam. A web server is used to display all medical information on a website and to control the robot. Wireless medical sensors are used to measure physiological data like heart rate, breathing rate, skin temperature and movements. An algorithm was implemented to detect anomalies in these signals.



Robot without dress

## Results

The developed robot can do almost everything that was planned. Its most impressive feature is that it can stand and drive on two wheels using a self-balancing control algorithm. This has been achieved by using an accelerometer and a gyroscope to know the angle, and by using an incremental sensor on the wheels to know the speed of the robot. Once the speed and angle are known, the power on the motors is calculated using a PID controller.

To know about the health of the patient, a sensor from Zephyr Technology, which is attached to a chest belt, has to be worn by the patient. This sensor sends data about heart rate, breathing rate, skin temperature and movements to the robot via Bluetooth. The robot then monitors the health of the patient and can send an email to pre-defined persons.



Physiological monitoring sensor from Zephyr Technology

On the robot's computer, a Java applet has been developed which controls everything: the remote control, the health data, the sending of emails and the communication with the sensor.

The video streaming has been done with an open-source software running on Linux called FF-server. This is the part that consumes most processor power and energy.

## Discussion and Conclusion

A very interesting additional feature would be to add artificial intelligence such that the robot can learn new skills on its own or by teaching it. The results of this work show good perspectives for a future commercialization of the robot. There is an abundance of possible clients and their number is expected to grow within the next few years. To achieve commercialization, an industrial partner should be found.



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