Good day every one, I'm Herman van Dyk and this is my conceptual design Presentation. My project is a medical wristband that can measure and display one's body temperature. The current time of day will also be displayed, similar to that of a normal watch.

Click

So, This presentation will cover the following aspects:
The design concept.
A functional analysis of the system.
An architectural synthesis of the system
The scope of the design.
Resources needed to realise the design
And also some possible stumbling blocks which might become a problem during the design.

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Functional analysis is a tool to describe the behaviour of the system on a lower level of detail, and the purpose of functional analysis is to identify and clearly state how the system is to work when fully completed. The functional analysis is started of by a system life cycle view. Firstly the system will be developed, and after this the system will enter the loop. The system will then be in this loop most of the time and it is in this loop where the system is either operated or maintained. Once a failure occur in the operate system function, the transition will be made to the maintain system function, and if an unrepairable error has occurred, the system will exit the loop and be disposed.

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To get a better understanding how the system is to function, the system life cycle that was just discussed on the previous slide is viewed at a deeper level, that has more detail. Firstly, to operate the system it must be taken out of storage, placed on the wrist of a user and be turned on. The system will then transition into the loop, and will then execute the measuring and processing function. This is the function the system will perform most of the time, and the system will only exit the measuring and processing function when prompted by the user by some sort of input or HMI. Once the system has exited the measuring and processing function, the system will either display certain information to the user, be configured or turned off.

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The measuring and processing function where the system will operate in most of the time, is now expanded even more, to reveal more detail. This function is where the current body temperature of the user will be measured and general timekeeping will be performed. The user's input will also be monitored constantly, so that the system can transition to the next function, as mentioned in the previous slide.

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The display output function (back click, back click) shown here, is now expanded. (Click, click) This is where the system will determine the output type that must be displayed, which is either the current time or current body temperature. The output type is determined from what the user has requested through the available HMI devices. The system will then display the requested information.

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Next the configure device function from earlier is expanded, where the current time can be set. The current saved hour reading will be displayed to the user, and will be incremented by the user input until the user finds it suitable. Therefore, the current saved time is displayed by the device, and the device will determine if the user is satisfied by the current hour reading or setting by monitoring the

input HMI of the device. Once the user finds the reading suitable, the system will exit the loop and this hour reading will then be saved. Otherwise, the reading will be incremented and the process will be repeated. The same process holds for setting the minute reading.

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Now the maintain system function from the system life cycle is expanded. To maintain the system, the error must be identified, and corrected. The error is identified as either the device does not turn on, no HMI is available (such as the display, or button) or no temperature reading is given. To rectify the error, the component related to the error must be repaired, recharged or replaced. When an unrepairable error occur, the device will move to the dispose function, as mentioned earlier.

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Next is the Architectural Synthesis. This is also known as Physical Design and is the process by which the design, that has been captured up to this point in the Functional Analysis, is transformed into something that can actually be constructed on a concept level. Architectural Synthesis is used to determine what functional elements, or resources, are needed by the system to be able to accomplish the functions mentioned earlier. The system architecture is shown, where the system boundary can be seen as well as how the system interfaces with the user and the outside world.

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The physical architecture of the system is now shown. The various components needed to physically construct the system, and how they interface with each other can be seen. Note that this is only on a high level, as the specific component will be selected during the detailed design.

Click

Therefore, from the physical design diagram the resources needed are
a micro-controller, such as an 8 or 16 bit
Some form of display to the user, such as a 7 segment or an LCD
User input, such as a button
A power supply, either a rechargeable, or non-rechargeable.
And a temperature probe, such as a thermistor, RTD or an infrared sensor.

Once again, the specific technology and component will be determined during the detailed design, with trade-off studies.

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So the scope of the design is summarized in the figure, and is divided into a hardware and software part. The hardware's phases of design are shown on this slide. The hardware design scope is divided into sub-categories, shown by the blue blocks, followed by sub-tasks under each category. The general design procedure that will be followed during the detailed design is revealed. The software will be embedded on the micro-controller to implement the device functionality.

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As a conclusion, some possible stumbling blocks which may be encountered during the design include the following:
So, the measuring of body temperature from the skin's temperature. This will be a stumbling block as environment and surrounding temperatures will influence the temperature reading of the skin, which might not reflect true body temperature.
The size of the final product must be kept small, you can just think of a watch a person must wear. This will be a challenge, considering all the resources that are needed to build the device, such as the microcontroller, display and so forth.

And lastly, to keep energy usage low, since the device will be battery powered.