

Declaration of authorship

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I declare that this piece of work which is the basis for recognition of achieving learning outcomes in the (Microprocessor Systems) EMISY course was completed on my own

EMISY Project 21 Portable Compass

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1 Analysis of the project

1.1 Discussion of project requirements

We need to create a simple portable compass circuit
It should:

- Use energy-saving power modes of microcontroller
- Be battery powered
- Be portable (cellphone/wrist watch)
- Communicate using graphical OLED display and two buttons keyboard

1.2 Discussion of solution

2 Detailed circuit diagram

3 Diagram

3.1 Diagram itself

3.2 Diagram description

3.2.1 How to make the project

3.2.2 Microcontroller

I decided to use ATmega328P, 8-bit avr microcontroller.

Relatively small Up to $9.25 \text{ mm} \times 9.25 \text{ mm}$ dimensions, compared to apple watch display of 34 mm by 40 mm for smaller version. [1] 286th page

Square It is shaped in a square which also simplifies portability [1] 286th page

Popular A lot of documentation, usecases, guides

5 software selectable power saving modes Our device should use energy-saving power modes and 5 is a plentiful choice [1] 7th page
Quick research suggests that this microcontroller can use as low as 0.36 mA [2]

Ease of use In-system programming feature [1] (1 page) and programming environments which allow for easy development of code. [3]

3.2.3 All other components

4 Draft of the microcontroller firmware

4.1 Block diagram

4.2 Description of the algorithm

References

[1] ATmega 328P datasheet

[2] Electrical Engineering exchange, atmega328 one year on batteries

[3] avr gcc