ANALOG TO DIGITAL CONVERTOR ADC

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ADC

- An ADC converts an input voltage into a number and has a resolution.
- A 10 Bit ADC has a range of 0-1023. (2^10=1024)
- The ADC also has a Reference voltage(ARef).
- When input voltage is GND the output is 0
- When input voltage is equal to ARef the output is 1023
- So the input range is 0-ARef and digital output is 0-1023.

ADC REGISTERS

To configure the working of the ADC we have different registers:

- ADC Multiplexer Selection Register ADMUX: For selecting the reference voltage and the input channel.
- ADC Control and Status Register A ADCSRA: As the name says it has the status
 of ADC and is also use for controlling it.
- The ADC Data Register ADCL and ADCH: The final result of conversion is here.

ADMUX

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|-------|-------|-------|-------|-------|-------|-------|-------|
| REFS1 | REFS0 | ADLAR | MUX4 | MUX3 | MUX2 | MUX1 | MUX |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Refrence Sel. Bits

00 -> AREF, Internal VREF OFF

01 -> V_{REF} is equal to V_{AVCC}

10 -> Reserved

11 -> V_{REF} = 2.56V (Internal Ref V)

ADC Channel Sel. Bits

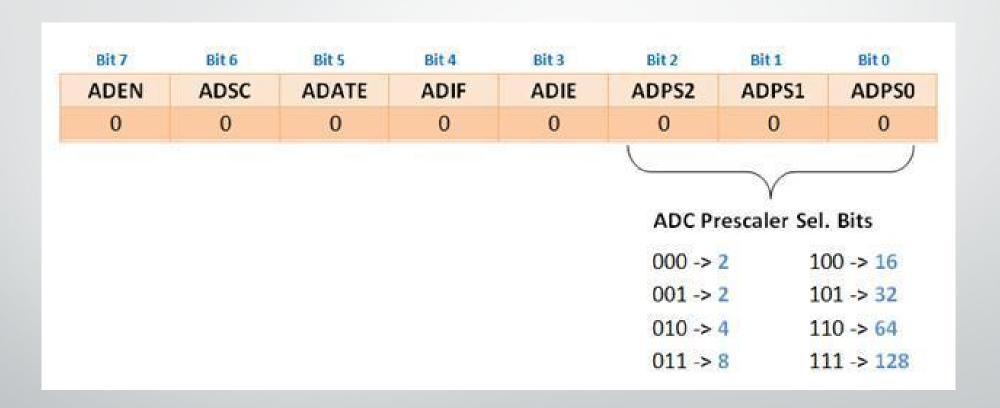
0000 -> ADC0 0100 -> ADC4

0001 -> ADC1 0101 -> ADC5

0010 -> ADC2 0110 -> ADC6

0011 -> ADC3 0111 -> ADC7

ADSCRA



ADCL and **ADCH**

| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | V.E |
|--------------|------|--------------|------|------|------|------|------|------|
| <u>&</u> | 200 | <u>7≅</u> V. | - | 72 | 2 | ADC9 | ADC8 | ADCH |
| ADC7 | ADC6 | ADC5 | ADC4 | ADC3 | ADC2 | ADC1 | ADC0 | ADCL |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | LTI |

• uint16_t ReadADC(uint8_t ch) { PEADING ADC INPUT

- //Select ADC Channel ch must be 0-7
- ch=ch&0b00000111;
- ADMUX|=ch;
- //Start Single conversion
- ADCSRA|=(1<<ADSC);
- //Wait for conversion to complete
- while(!(ADCSRA & (1<<ADIF))); //Clear ADIF by writing one to it</p>
- ADCSRA|=(1<<ADIF);</pre>

return(ADC); }

*THANK YOU