

# Project: Running Machine

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## Presentation

Name Project: Running Machine Arduino COVID19

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Date Project: 11/06/2020

## How works my system?

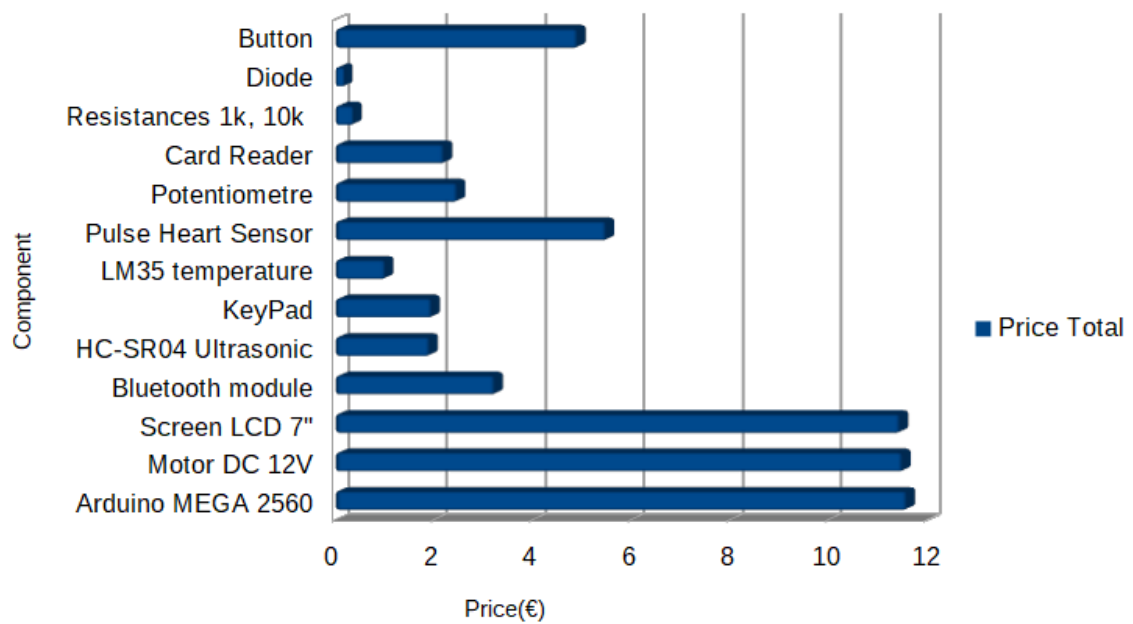
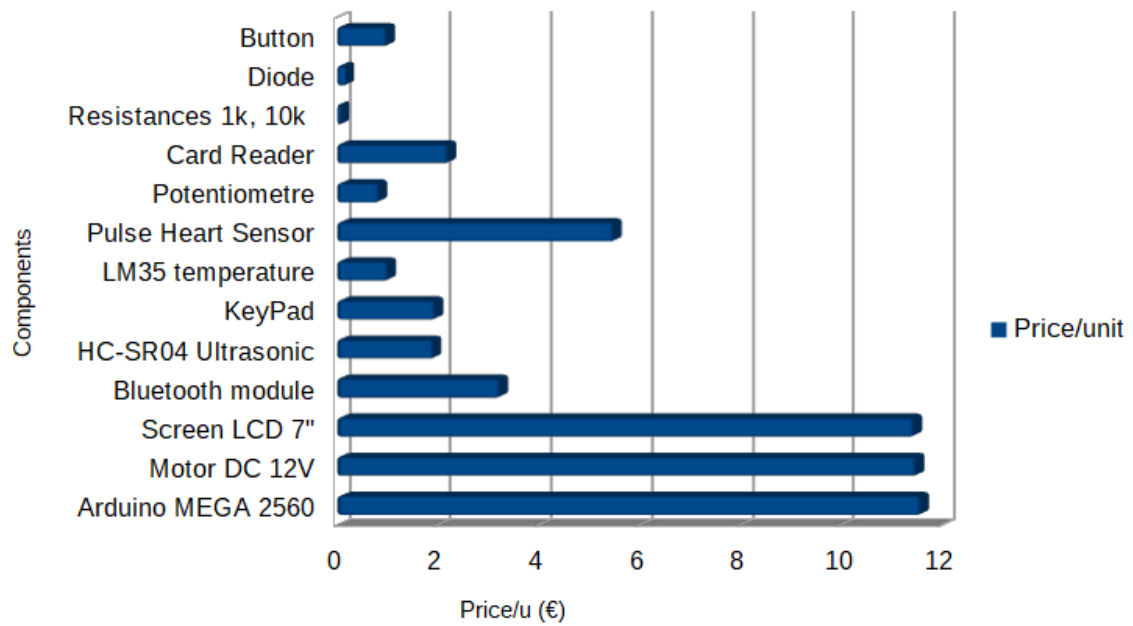
Simulate a Running Machine with many sensors and others components connecting with one motherboard Arduino MEGA (Control). The machine has some states: STANDBY, IDENTIFICATION, SELECT MODE, TRAINING SEASON, STOP and DOWNLOAD DATA.

## Components

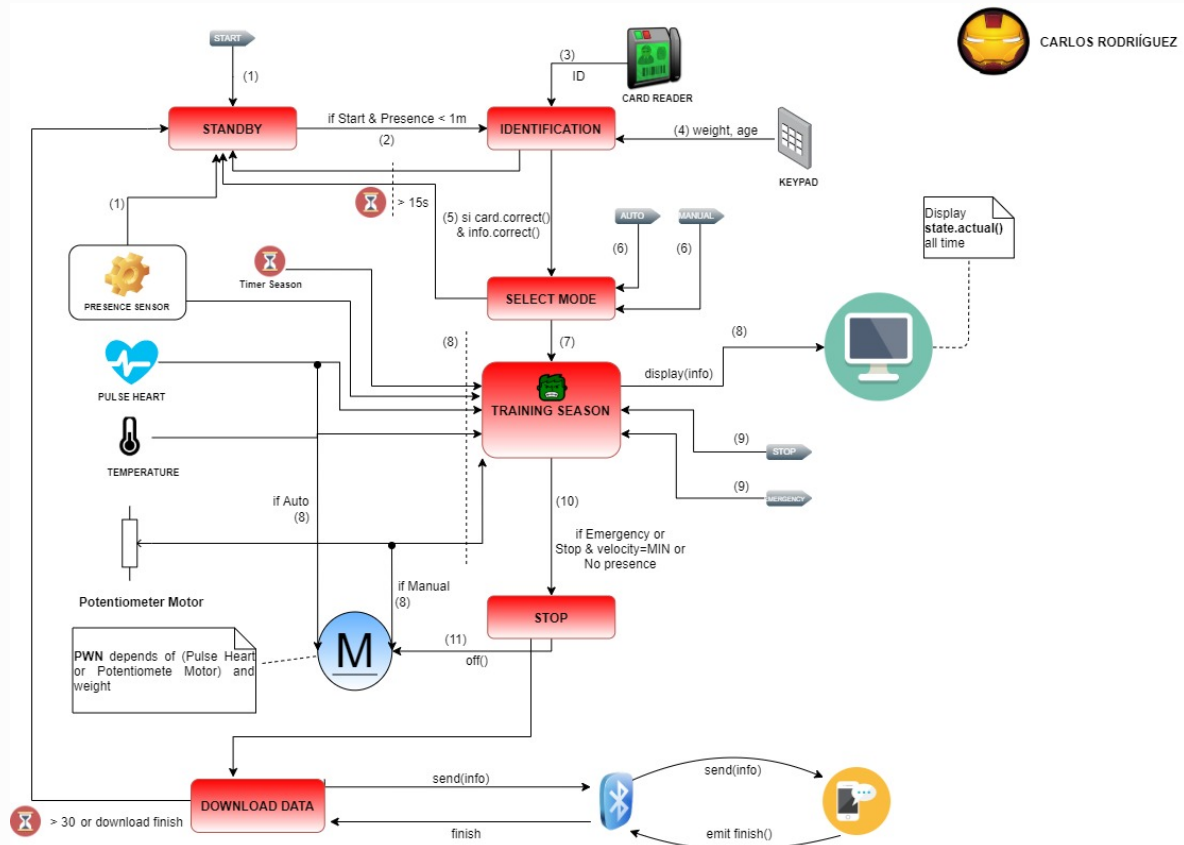
Component	Quantity	States
Arduino MEGA	1	ALL
Motor DC	1	STANDBY, TRAINING SEASON
Screen LCD	1	ALL
Bluetooth module	1	DOWNLOAD DATA
HC-SR04 Ultrasonic	1	STANDBY, TRAINING SEASON
KeyPad	1	IDENTIFICATION
LM35 temperature	1	TRAINING SEASON
Pulse Heart Sensor	1	TRAINING SEASON
Potentiometer	3	TRAINING SEASON
Card Reader	1	IDENTIFICATION
Resistances	6	"
Diode	1	"
Button	5	"

## Budget

Component	Price/component	Total	Provider
Arduino MEGA 2560	11.58	11.58	banggood
Motor DC 12V	11.49	11.49	banggood
Screen LCD 7"	11.44	11.44	aliexpress
Bluetooth module	3.22	3.22	aliexpress
HC-SR04 Ultrasonic	1.9	1.9	aliexpress
KeyPad	1.94	1.94	aliexpress
LM35 temperature	1.00	1.00	aliexpress
Pulse Heart Sensor	5.48	5.48	banggood
Potentiometre	0.82	2.46	digikey
Card Reader	2.19	2.19	aliexpress
Resistances 1k, 10k	0.071	0.355	farnell
Diode	0.17	0.17	digikey
Button	0.98	4.9	aliexpress



# System Flow Diagram



## Description

For each state, we display it

We Start in STANDBY

### STANDBY:

- Motor DC is off

In the case, if we push the button START and we are less than 1 meter, we'll pass to IDENTIFICATION

### IDENTIFICATION:

- We check the ID with our card
- Write our weight and age
- The Control checks the input data

If the input data is correct we go to the next state, SELECT MODE

### Exception

- We have expired the time (15s) to identify
- The input data is invalid

If any exception occurs, we come back to the state STANDBY

### SELECT MODE:

- We choose the control auto or control manual with the corresponding buttons

When we choose it, we pass to TRAINING SEASON

#### Exception

- We have expired the time (15s) to select mode

If the exception occurs, we come back to the state STANDBY

### **TRAINING SEASON**

We constantly read the data from the sensors: temperature, pulse heart, time, presence sensor and speed. The last value depends on our weight and our previous choice, pulse heart it was Auto or potentiometre motor it was Manual. We display this information in LCD.

#### Exception

- We press the button Emergency or Stop and the speed is the minimum
- The presence sensor does not detect a presence within 1 meter

If any exception occurs, we pass to the state STOP

### **STOP:**

In this state we'll stop the motor DC if occurs the exception\_button() or we'll reduce the motor speed gradually if occurs the exception\_no\_presence()

Once the engine is turned off, we go to the next state DOWNLOAD STATE

### **DOWNLOAD STATE**

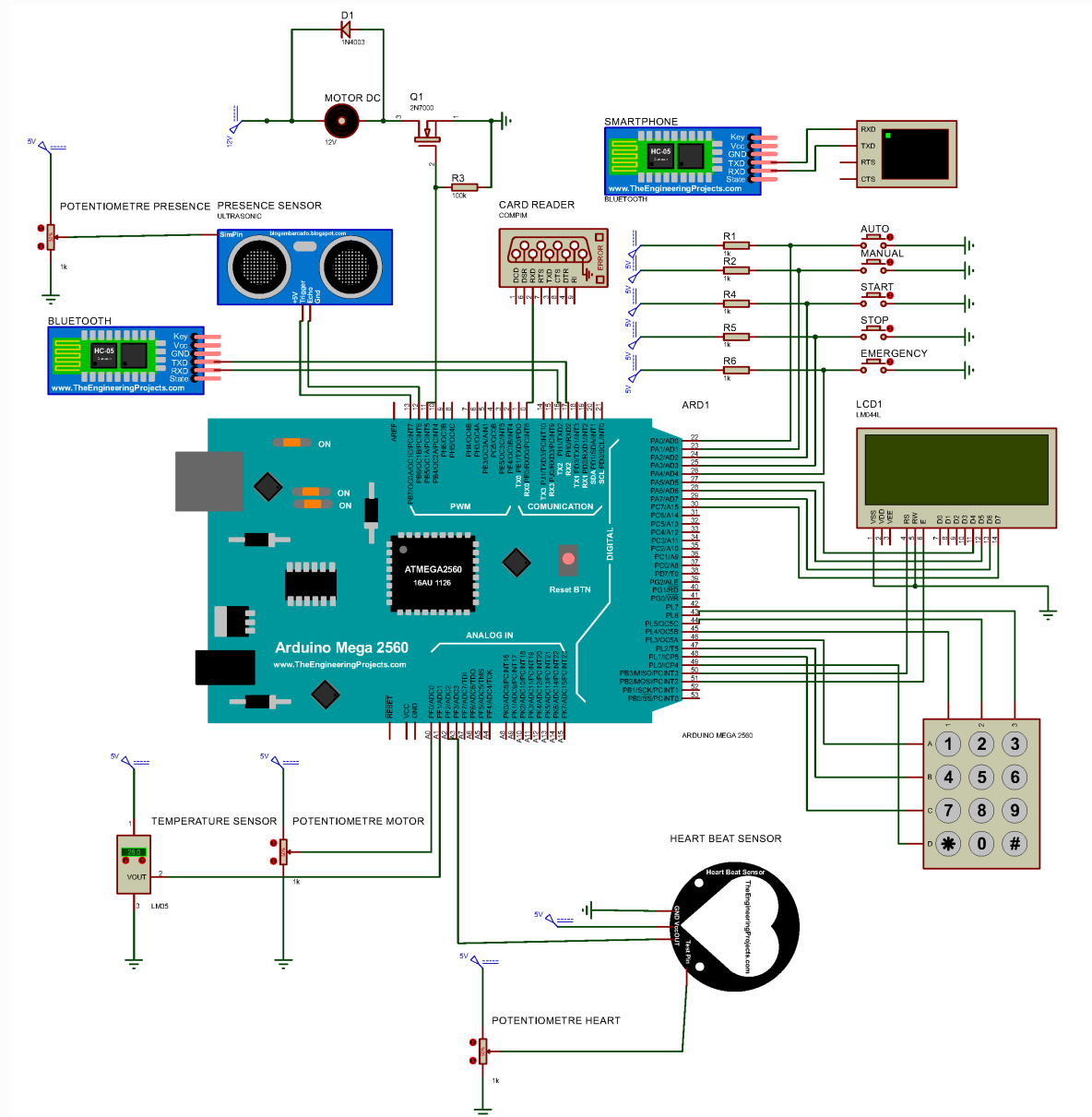
Finally, we send the training data to the mobile via bluetooth

#### Exception

- We have expired the time (15s) to download the data
- We finish sending the data

If any exception occurs, we pass to the state STANDBY

# Circuit



## Links

Arduino MEGA 2560

[https://www.banggood.com/es/Mega-2560-R3-ATmega2560-16AU-Control-Module-Without-USB-Cable-p-1044805.html?gpla=1&gmcCountry=ES&cy=EUR&createTmp=1&utm\\_source=googleshopping&utm\\_medium=cpc\\_bgs&utm\\_content=lijing&utm\\_campaign=ssc-es-all-0716&ad\\_id=367216407014&gclid=Cj0KCQjwuJz3BRDTARIsAMg-HxXIqSkkl31iUt6eH0bvevhCP76OrZLB1Am\\_YxdV1i5c9P6EThojH40aAv9ZEALw\\_wcB&cur\\_warehouse=CN](https://www.banggood.com/es/Mega-2560-R3-ATmega2560-16AU-Control-Module-Without-USB-Cable-p-1044805.html?gpla=1&gmcCountry=ES&cy=EUR&createTmp=1&utm_source=googleshopping&utm_medium=cpc_bgs&utm_content=lijing&utm_campaign=ssc-es-all-0716&ad_id=367216407014&gclid=Cj0KCQjwuJz3BRDTARIsAMg-HxXIqSkkl31iUt6eH0bvevhCP76OrZLB1Am_YxdV1i5c9P6EThojH40aAv9ZEALw_wcB&cur_warehouse=CN)

Motor DC 12V

[https://es.banggood.com/HANPOSE-775-Motor-DC-12V-24V-80W-150W-288W-DC-Motor-Large-Torque-High-Power-DC-Motor-Double-Ball-Bearing-Spindle-Motor-p-1441968.html?gpla=1&gmcCountry=ES&cy=EUR&createTmp=1&utm\\_source=googleshopping&utm\\_medium=cpc\\_bgcs&utm\\_content=lijing&utm\\_campaign=ssc-es-all-newcustom-0822-re0318&gclid=Cj0KCQjwz4z3BRCgARIsAES\\_OVcGH6qfLeMciUqjevWzwGAMDbkpdLzJva1Df-J-3h\\_GX3HI6mxNrZgaAhxKEALw\\_wcB&ID=585306&cur\\_warehouse=CN](https://es.banggood.com/HANPOSE-775-Motor-DC-12V-24V-80W-150W-288W-DC-Motor-Large-Torque-High-Power-DC-Motor-Double-Ball-Bearing-Spindle-Motor-p-1441968.html?gpla=1&gmcCountry=ES&cy=EUR&createTmp=1&utm_source=googleshopping&utm_medium=cpc_bgcs&utm_content=lijing&utm_campaign=ssc-es-all-newcustom-0822-re0318&gclid=Cj0KCQjwz4z3BRCgARIsAES_OVcGH6qfLeMciUqjevWzwGAMDbkpdLzJva1Df-J-3h_GX3HI6mxNrZgaAhxKEALw_wcB&ID=585306&cur_warehouse=CN)

## LCD

[https://es.aliexpress.com/item/32841538696.html?src=google&src=google&albch=shopping&acnt=631-313-3945&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle\\_7\\_shopping&aff\\_atform=google&aff\\_short\\_key=UneMJZVf&&albagn=888888&albcpl=9866812732&albag=99951347003&trgt=1089857825512&crea=es32841538696&netw=u&device=c&albp=1089857825512&albp=es32841538696&gclid=Cj0KCQjwz4z3BRcGARIsAES\\_OVeGRLlj2ssVijvMs03PBVdVIqv6AFgZ7E6Z1X2eeX6Qa8lDVo\\_rZcQaAqsHEALw\\_wcB&gclsrc=aw.ds](https://es.aliexpress.com/item/32841538696.html?src=google&src=google&albch=shopping&acnt=631-313-3945&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle_7_shopping&aff_atform=google&aff_short_key=UneMJZVf&&albagn=888888&albcpl=9866812732&albag=99951347003&trgt=1089857825512&crea=es32841538696&netw=u&device=c&albp=1089857825512&albp=es32841538696&gclid=Cj0KCQjwz4z3BRcGARIsAES_OVeGRLlj2ssVijvMs03PBVdVIqv6AFgZ7E6Z1X2eeX6Qa8lDVo_rZcQaAqsHEALw_wcB&gclsrc=aw.ds)

## Bluetooth module

[https://es.aliexpress.com/item/32659958252.html?src=google&src=google&albch=shopping&acnt=494-037-6276&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle\\_7\\_shopping&aff\\_atform=google&aff\\_short\\_key=UneMJZVf&&albagn=888888&albcpl=2047572441&albag=80829465588&trgt=743612850714&crea=es32659958252&netw=u&device=c&albp=743612850714&albp=es32659958252&gclid=Cj0KCQjwJz3BRDTARIsAMg-HxVEVtaMYmtvEQZEmKKiOFql043DLjmoz2JVrXNcMCdrDITynBaLFDUaAg7fEALw\\_wcB&gclsrc=aw.ds](https://es.aliexpress.com/item/32659958252.html?src=google&src=google&albch=shopping&acnt=494-037-6276&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle_7_shopping&aff_atform=google&aff_short_key=UneMJZVf&&albagn=888888&albcpl=2047572441&albag=80829465588&trgt=743612850714&crea=es32659958252&netw=u&device=c&albp=743612850714&albp=es32659958252&gclid=Cj0KCQjwJz3BRDTARIsAMg-HxVEVtaMYmtvEQZEmKKiOFql043DLjmoz2JVrXNcMCdrDITynBaLFDUaAg7fEALw_wcB&gclsrc=aw.ds)

## HC SR04

[https://es.aliexpress.com/item/32981718332.html?src=google&src=google&albch=shopping&acnt=439-079-4345&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle\\_7\\_shopping&aff\\_atform=google&aff\\_short\\_key=UneMJZVf&gclsrc=aw.ds&&albagn=888888&&ds\\_e\\_adid=438858099991&ds\\_e\\_matchtype=&ds\\_e\\_device=c&ds\\_e\\_network=u&ds\\_e\\_product\\_group\\_id=539263010115&ds\\_e\\_product\\_id=es32981718332&ds\\_e\\_product\\_merchant\\_id=107895144&ds\\_e\\_product\\_country=ES&ds\\_e\\_product\\_language=es&ds\\_e\\_product\\_channel=online&ds\\_e\\_product\\_store\\_id=&ds\\_url\\_v=2&ds\\_dest\\_url=https://es.aliexpress.com/item/Ultrasonic-sensor-HC-SR04-HCSR04-to-world-Ultrasonic-Wave-Detector-Ranging-Module-HC-SR04-HCSR04-Distance/32981718332.html?src=google&albcpl=10191226970&albag=102259630256&gclid=Cj0KCQjwz4z3BRcGARIsAES\\_OVcQbNI1wEcFINyvlFmt9LdKJkh3XfYkL68bcZEURMvnm-WEja49EJMaAviAEALw\\_wcB](https://es.aliexpress.com/item/32981718332.html?src=google&src=google&albch=shopping&acnt=439-079-4345&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle_7_shopping&aff_atform=google&aff_short_key=UneMJZVf&gclsrc=aw.ds&&albagn=888888&&ds_e_adid=438858099991&ds_e_matchtype=&ds_e_device=c&ds_e_network=u&ds_e_product_group_id=539263010115&ds_e_product_id=es32981718332&ds_e_product_merchant_id=107895144&ds_e_product_country=ES&ds_e_product_language=es&ds_e_product_channel=online&ds_e_product_store_id=&ds_url_v=2&ds_dest_url=https://es.aliexpress.com/item/Ultrasonic-sensor-HC-SR04-HCSR04-to-world-Ultrasonic-Wave-Detector-Ranging-Module-HC-SR04-HCSR04-Distance/32981718332.html?src=google&albcpl=10191226970&albag=102259630256&gclid=Cj0KCQjwz4z3BRcGARIsAES_OVcQbNI1wEcFINyvlFmt9LdKJkh3XfYkL68bcZEURMvnm-WEja49EJMaAviAEALw_wcB)

## Keypad

[https://es.aliexpress.com/item/33015683220.html?src=google&src=google&albch=shopping&acnt=631-313-3945&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle\\_7\\_shopping&aff\\_atform=google&aff\\_short\\_key=UneMJZVf&&albagn=888888&albcpl=9866812513&albag=101880764522&trgt=896505316494&crea=es33015683220&netw=u&device=c&albp=896505316494&albp=es33015683220&gclid=Cj0KCQjwz4z3BRcGARIsAES\\_OVfG3I90OjUesgvs7k1U27f76CIBRmagEpgs03n0vI4ZZUd8cswFxcIaAkFKEALw\\_wcB&gclsrc=aw.ds](https://es.aliexpress.com/item/33015683220.html?src=google&src=google&albch=shopping&acnt=631-313-3945&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle_7_shopping&aff_atform=google&aff_short_key=UneMJZVf&&albagn=888888&albcpl=9866812513&albag=101880764522&trgt=896505316494&crea=es33015683220&netw=u&device=c&albp=896505316494&albp=es33015683220&gclid=Cj0KCQjwz4z3BRcGARIsAES_OVfG3I90OjUesgvs7k1U27f76CIBRmagEpgs03n0vI4ZZUd8cswFxcIaAkFKEALw_wcB&gclsrc=aw.ds)

## LM35

[https://es.aliexpress.com/item/32809025911.html?src=google&src=google&albch=shopping&acnt=439-079-4345&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle\\_7\\_shopping&aff\\_atform=google&aff\\_short\\_key=UneMJZVf&gclsrc=aw.ds&&albagn=888888&&ds\\_e\\_adid=438858099988&ds\\_e\\_matchtype=&ds\\_e\\_device=c&ds\\_e\\_network=u&ds\\_e\\_product\\_group\\_id=854439011708&ds\\_e\\_product\\_id=es32809025911&ds\\_e\\_product\\_merchant\\_id=107807731&ds\\_e\\_product\\_country=ES&ds\\_e\\_product\\_language=es&ds\\_e\\_product\\_channel=online&ds\\_e\\_product\\_store\\_id=&ds\\_url\\_v=2&ds\\_dest\\_url=https://es.aliexpress.com/item/DC-4V-30V-LM35D-LM35DZ-Digital-Temperature-Sensor-Linear-Module-LM35-For-Arduino-Smart-car/32809025911.html?src=google&albcpl=10191226967&albag=102259630216&gclid=Cj0KCQjwz4z3BRcGARIsAES\\_OVdsYqwDZeh7zggkMq5fzz3KyRIAwboKHfBPkgFpBh0FOynPumSNFAcaAvjTEALw\\_wcB](https://es.aliexpress.com/item/32809025911.html?src=google&src=google&albch=shopping&acnt=439-079-4345&isdl=y&slnk=&plac=&mtctp=&albbt=Gploogle_7_shopping&aff_atform=google&aff_short_key=UneMJZVf&gclsrc=aw.ds&&albagn=888888&&ds_e_adid=438858099988&ds_e_matchtype=&ds_e_device=c&ds_e_network=u&ds_e_product_group_id=854439011708&ds_e_product_id=es32809025911&ds_e_product_merchant_id=107807731&ds_e_product_country=ES&ds_e_product_language=es&ds_e_product_channel=online&ds_e_product_store_id=&ds_url_v=2&ds_dest_url=https://es.aliexpress.com/item/DC-4V-30V-LM35D-LM35DZ-Digital-Temperature-Sensor-Linear-Module-LM35-For-Arduino-Smart-car/32809025911.html?src=google&albcpl=10191226967&albag=102259630216&gclid=Cj0KCQjwz4z3BRcGARIsAES_OVdsYqwDZeh7zggkMq5fzz3KyRIAwboKHfBPkgFpBh0FOynPumSNFAcaAvjTEALw_wcB)

## Pulse Heart sensor

[https://es.banggood.com/Pulse-Heart-Rate-Sensor-Module-Compatible-STM32-Heartbeat-Sensor-p-1410915.html?gpla=1&gmcCountry=ES&cy=EUR&createTmp=1&utm\\_source=googleshopping&utm\\_medium=cpc\\_bgcs&utm\\_content=lijing&utm\\_campaign=ssc-es-all-newcustom-0822-re0318&gclid=Cj0KCQJwuJz3BRDTARIsAMg-HxXuBAV2nSEBwqZA9C7cQtsj7u9CJpBHGxv8OIgWoaKQ4jrdyk6UwaAjG4EALw\\_wcB&cur\\_warehouse=CN](https://es.banggood.com/Pulse-Heart-Rate-Sensor-Module-Compatible-STM32-Heartbeat-Sensor-p-1410915.html?gpla=1&gmcCountry=ES&cy=EUR&createTmp=1&utm_source=googleshopping&utm_medium=cpc_bgcs&utm_content=lijing&utm_campaign=ssc-es-all-newcustom-0822-re0318&gclid=Cj0KCQJwuJz3BRDTARIsAMg-HxXuBAV2nSEBwqZA9C7cQtsj7u9CJpBHGxv8OIgWoaKQ4jrdyk6UwaAjG4EALw_wcB&cur_warehouse=CN)

## Potentiometre

[https://www.digikey.es/product-detail/es/microchip-technology/MCP4151-103E%2FP/MCP4151-103E%2FP-ND/1874217?utm\\_adgroup=Data%20Acquisition&utm\\_source=google&utm\\_medium=cpc&utm\\_campaign=Shopping\\_Product\\_Integrated%20Circuits%20%28ICs%29&utm\\_term=&productid=1874217&gclid=Cj0KCQJwz4z3BRCgARIsAES\\_OVccL-YdZX8ukAABri4JkYZqbyZIxEV3I7O6CpdvKsmkoeu6Id4swlsaAjbGEALw\\_wcB](https://www.digikey.es/product-detail/es/microchip-technology/MCP4151-103E%2FP/MCP4151-103E%2FP-ND/1874217?utm_adgroup=Data%20Acquisition&utm_source=google&utm_medium=cpc&utm_campaign=Shopping_Product_Integrated%20Circuits%20%28ICs%29&utm_term=&productid=1874217&gclid=Cj0KCQJwz4z3BRCgARIsAES_OVccL-YdZX8ukAABri4JkYZqbyZIxEV3I7O6CpdvKsmkoeu6Id4swlsaAjbGEALw_wcB)

## Card Reader

[https://es.aliexpress.com/item/32803014822.html?src=google&src=google&albch=shopping&acnt=494-037-6276&isdl=y&slnk=&plac=&mtctp=&albbt=Gpoogle\\_7\\_shopping&aff\\_atform=google&aff\\_short\\_key=UneMJZVf&&albagn=888888&albcpr=2047572441&albag=80829465588&trgt=743612850714&crea=es32803014822&netw=u&device=c&albpgr=743612850714&albpdr=es32803014822&gclid=Cj0KCQJwuJz3BRDTARIsAMg-HxUDPnZmjiQghES8HKAVhkbV98pX\\_xwqXf7rvhx3l2RIU01XoFA9F0AaAn0FEALw\\_wcB&gclsrc=aw.ds](https://es.aliexpress.com/item/32803014822.html?src=google&src=google&albch=shopping&acnt=494-037-6276&isdl=y&slnk=&plac=&mtctp=&albbt=Gpoogle_7_shopping&aff_atform=google&aff_short_key=UneMJZVf&&albagn=888888&albcpr=2047572441&albag=80829465588&trgt=743612850714&crea=es32803014822&netw=u&device=c&albpgr=743612850714&albpdr=es32803014822&gclid=Cj0KCQJwuJz3BRDTARIsAMg-HxUDPnZmjiQghES8HKAVhkbV98pX_xwqXf7rvhx3l2RIU01XoFA9F0AaAn0FEALw_wcB&gclsrc=aw.ds)

## Resistances 1k

[https://es.farnell.com/multicomp/mf50-1k/res-1k-1-500mw-axial-pel-c-metal/dp/9339779?gclid=Cj0KCQJwuJz3BRDTARIsAMg-HxWCy-IzahDXuolNTs0YP\\_NkWUMNOtusnUa8siz1Ej7-ij0TGj0nk8saAvxIEALw\\_wcB&gross\\_price=true&mckv=s\\_dc|pcrid|432228698802|plid||keyword||match||slid||product|9339779|pgrid|103373310867|ptaid|pla-900487480502|&CMP=KNC-GES-SHOPPING\\_Passives\\_Passive-Components\\_NEW-STRUCTURE-27-APR-2020](https://es.farnell.com/multicomp/mf50-1k/res-1k-1-500mw-axial-pel-c-metal/dp/9339779?gclid=Cj0KCQJwuJz3BRDTARIsAMg-HxWCy-IzahDXuolNTs0YP_NkWUMNOtusnUa8siz1Ej7-ij0TGj0nk8saAvxIEALw_wcB&gross_price=true&mckv=s_dc|pcrid|432228698802|plid||keyword||match||slid||product|9339779|pgrid|103373310867|ptaid|pla-900487480502|&CMP=KNC-GES-SHOPPING_Passives_Passive-Components_NEW-STRUCTURE-27-APR-2020)

## Diode

[https://www.digikey.es/product-detail/es/diodes-incorporated/1N4007-T/1N4007DICT-ND/76454?utm\\_adgroup=Diodes%20-%20Rectifiers%20-%20Single&utm\\_source=google&utm\\_medium=cpc&utm\\_campaign=Shopping\\_Product\\_Discrete%20Semiconductor%20Products&utm\\_term=&productid=76454&gclid=Cj0KCQJwuJz3BRDTARIsAMg-HxXyyy7RXdAb-MNCbyinTDLOKHlx3tguXNcP4Sc2KOj9sD1rhTAFfHwaAi7IEALw\\_wcB](https://www.digikey.es/product-detail/es/diodes-incorporated/1N4007-T/1N4007DICT-ND/76454?utm_adgroup=Diodes%20-%20Rectifiers%20-%20Single&utm_source=google&utm_medium=cpc&utm_campaign=Shopping_Product_Discrete%20Semiconductor%20Products&utm_term=&productid=76454&gclid=Cj0KCQJwuJz3BRDTARIsAMg-HxXyyy7RXdAb-MNCbyinTDLOKHlx3tguXNcP4Sc2KOj9sD1rhTAFfHwaAi7IEALw_wcB)

## Button

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