ANNALS of the ORADEA UNIVERSITY.

Fascicle of Management and Technological Engineering, Volume VI (XVI), 2007

SENSORIAL SORTING SYSTEM FOR DIFFERENT SHAPES AND DIMENSIONS

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Abstract: The paper has as object, the exposing of a sensorial system for the fit-out of a robotized sorting system; the robotized system is used for sorting the objects form a belt carrier. The sorting will be made depending on the object's length and depending on object's shape. For the objects length determination it will be presented a detection-at-passing system (barrage type). The detection system ensures the object's (of a certain length) evidencing by a breaking out or an intensity variation of incident light beam on an optic line. For the objects shape determination it will be proposed a relief sensor witch has at his basis a tactile sensorial system with. Also the logical diagram of a state-automaton will be presented.

Key words: cells robotics, sensors, relief, optic, detection.

1. INTRODUCTION

The developing of the industrial processes imposes their automation concerning the manufacturing of different products. This developing had led to the appearance of some automated belts fitted with sorting installations.

The complex industrial processes impose the implementation of the manufacturing flexible cells. Inside these manufacturing cells a very important part are the robots – as complex mechatronics systems.

The efficiency of the robotized cells is so much better as the robots have the possibility to interact with the environment in which they are placed.

The performances of a robotized system are limited by the sensor's capacity to collect information and by the sensor's ability to transmit information to the system in which he belongs.

The single elements which give information concerning the investigation process, with a view to processing and elaboration of the commands by the command and control systems, are the sensors.

Inside a manufacturing cell an important part is to sort the different pieces from the belt carrier - which is a part of this cell. A fundamental method is the object's sorting depending on their shape and dimensions.

2. THE DETERMINATION OF THE OBJECT SHAPE

For the shape determination of the different objects for sorting and manipulation it is proposed a relief sensor which has at his base tensometrical detection. The method has at his base the measuring of the displacement variation of a palpate prod from a sensorial tactile cells array, on the tensometrical detection principle. The displacement of the prods is controlled through a successive sampling; the relief sensor is moving on the object that follows to be gripped.

The relief determination is made sequentially by the superposition of the sampling plans. In the first phase, the prods that come in contact with the object are producing the elastic lamella deformation, respective the measuring bridge disequilibrium in the joints of the elements array. The relief sensor is fixed on the robot's griper, fig.1. The robot, by pressing, will determine the object's shape; after this the griper will rotate itself with 180°, it will have to grippe the object and then the object will be placed in the corresponding container, fig.2.

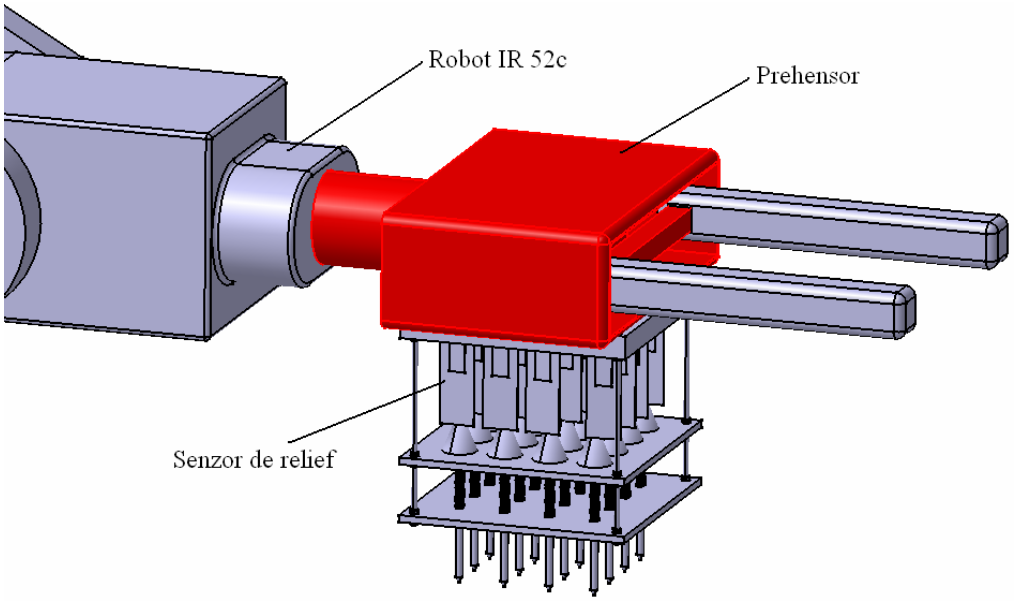

Fig. 1 Fixing the sensors of relief on the gripping

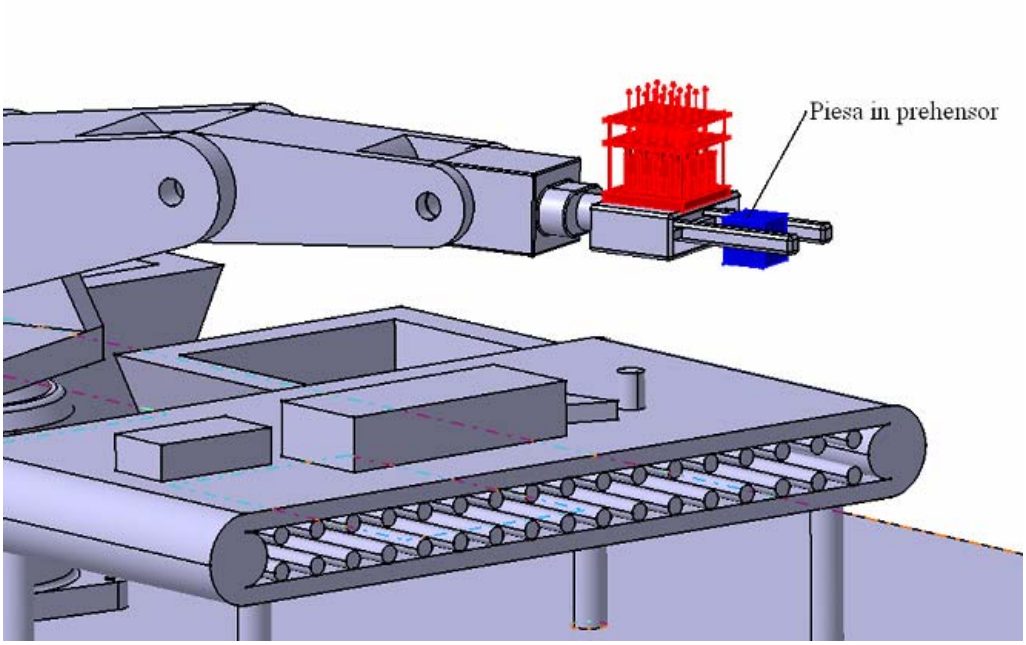

Fig. 2. The piece gripping

3. THE DETERMINATION OF THE OBJECT'S DIMENSIONS

For the determination of the object's dimensions an optical detection system (barrage type) is used. The optical sensorial system ensures the object's (of a certain length) evidencing by a breaking out or an intensity variation of incident light beam on an optic line. The emitters and the receivers are placed aside and the other of the belt carrier. The emitters set-up and the receivers set-up for the assemblage is in function of the objects (witch will be detected) length, figure 3 and figure 4.

In figure 3 is presented the connections electric scheme. The optical sensorial system placed on the belt carrier permits the sorting of the objects which have lengths of 150 mm and 300 mm. For the determination of the objects length it is presented in figure.4 and in table 1 the stages that are covered for the determination of the pieces dimensions.

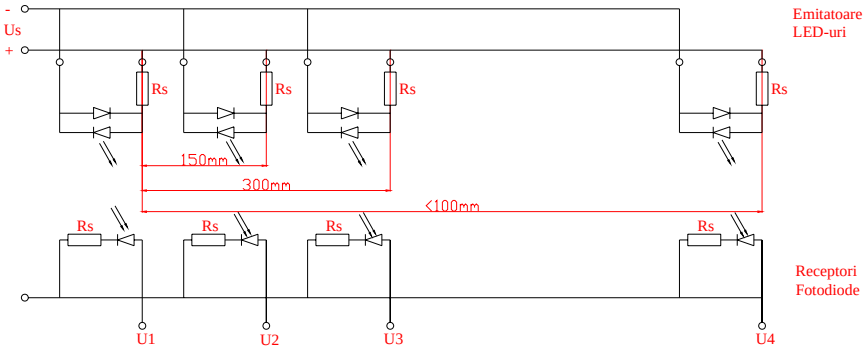

Fig. 3. The schema of command

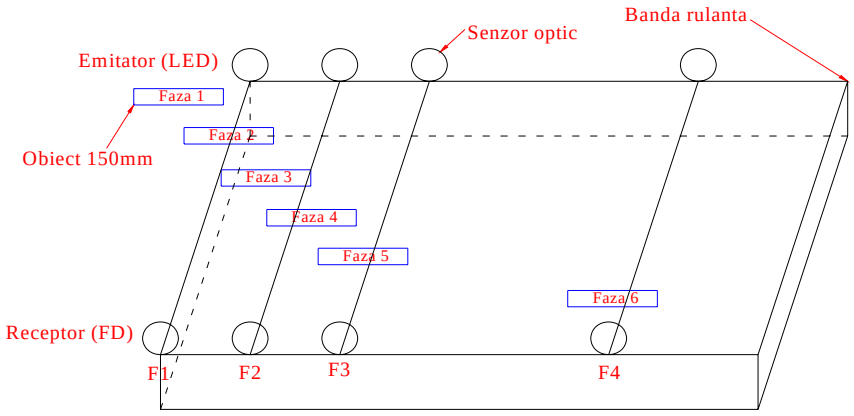

Fig. 4. Change object of band

Representation stages Table 1

Stages	F1	F2	F3	F4	Object
1	0	0	0	0	Absence object
2	1	0	0	0	Presence object
3	1	1	0	0	Object =150mm
4	1	1	1	0	Object =300mm
5	0	1	1	0	Object <300mm
6	0	0	1	0	Object <150mm
7	0	0	0	1	Notification relief

The first stage – the initial phase in which the object (piece) isn't on the belt and the output signals of the receivers are "0" (object absence).Function of the binary values from table 1, the robot sorts the objects that have lengths of 150 mm and 300 mm. For dimensions smaller than 150 mm, the robot will test the shape of the object; this testing is done with the tactile relief sensor.

4. The logical diagram work out

The logical diagram permits the direct, fast and intuitive transcription of the operating conditions that have to be accomplished by the sequential automaton as a logical program with inputs, states, decisions and outputs. The transposing of the technological conditions,

which appears in the problem, isn't dependent as informational flux's organization mode, and is dependent only by the type of the electrical and electronic devices.

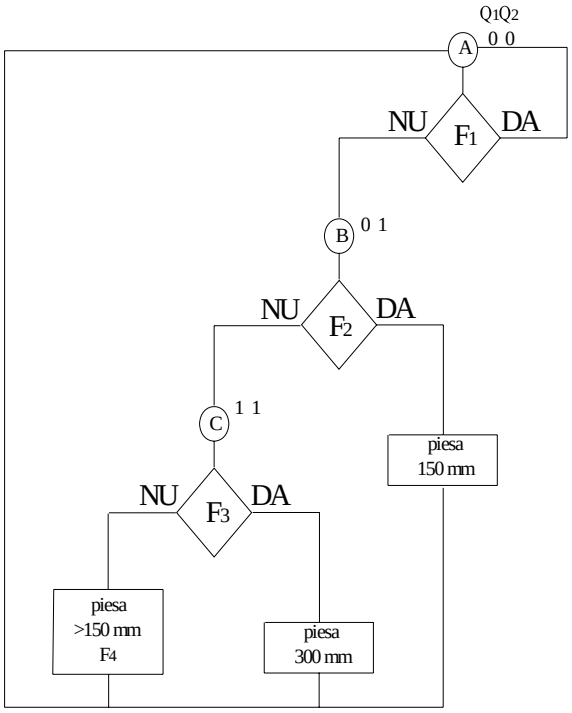

Fig. 5 The logical diagram

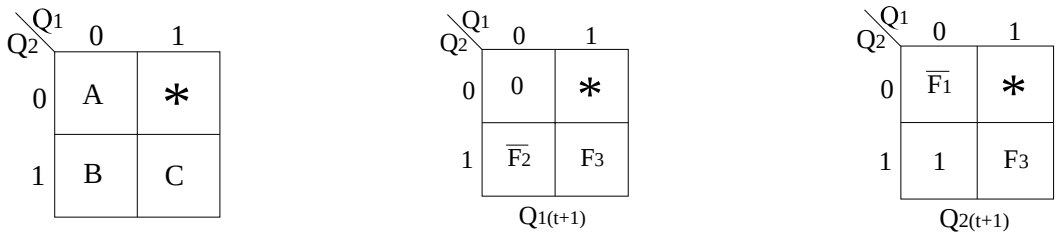

Fig. 6 The diagram of the states at "t" time moment and the next-states diagrams

The logical diagram is worked out starting from the transitions table (Table 1). In the next stage, the encoding of states resulted after the logical diagram work out (fig.5), it will be choose the type of the elementary automaton that will join the structure of the memory block. The encoding of the states resulted from the logical diagram ensures the properly working condition of the circuit and determines the complexity of the final state.

5. REFERENCES

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