A system and a method defined herein are intended to detect, to monitor and to characterise in a non-invasive way for the patient the cardiac arrhythmias that are associated with the development of atrial arrhythmia and increased risk of ischemic cerebral stroke. The system consists of a portable device with integrated sensors for biosignals; the modules integrated in the portable device for recognition of intermittent atrial arrhythmia episodes; a module for characterisation of the distribution of atrial arrhythmia episodes aiming to assess disease progression, designed for the use in the server or in the smart devise. The proposed technical solution allows to carry out a long-term monitoring of atrial fibrillation in a non-invasive way for the patient. If a non-documented atrial arrhythmia, especially an atrial fibrillation is detected by automatic means during the long-term monitoring, a physician is informed by e-mail by sending the electrocardiogram of the said arrhythmia episode. If the physician confirms diagnosis of atrial fibrillation, a recommendation to seek the advice of cardiologist is sent to patient's smart device. Monitoring can be carried out in different ways: e.g. during the treatment in out-patient setting; in the rehabilitation and nursing hospitals; in the day or long-term treatment hospital, in the private healthcare establishments, which could provide atrial arrhythmia monitoring services for their patients; also for the patients after severe illness (e.g. cerebral stroke, myocardial infarction, patients on dialysis treatment), in patients with increased risk of atrial fibrillation and stroke; for clinics responsible for personalised selection of antiarrhythmic medication doses; in clinics carrying out post-procedural prognostic indication and efficacy evaluation of therapeutic interventions (such as catheter ablation); for pharmaceutical enterprises conducting long term studies of medicinal preparations.